

People eating at Bedok Interchange Hawker Centre. The Covid-19 virus is airborne: It is exhaled, floats around and can fill a room. As a planned study suggests, a simple, effective approach to deal with airborne transmission will be to open buildings to allow more outdoor air. Innovating modern versions of traditional fan-based cooling will make indoor spaces comfortable, while facilitating the elimination of contaminated air. ST PHOTO: KEVIN LIM



BCA, has been advising ways to improve ventilation to fight Sars-CoV-2 (as the Covid-19 virus is known). And last year, the agencies advised that virus “can also be spread through virus aerosols in the air under certain settings, such as enclosed environments which are poorly ventilated”, along with updated advice to building owners and facility managers on how to improve indoor air quality. Indeed, the adoption of some of these airborne-oriented measures might have already helped to reduce transmission.

WHAT CAN AND NEEDS TO BE DONE

And a week ago came the BCA’s announcement looking into natural ventilation.

Natural ventilation is an excellent solution for many settings, however not all indoor spaces can be opened up in this way, and air conditioning will continue to play a role. So we also need to invest in better air monitoring, filtration, and purification to keep our indoor air clean.

Carbon dioxide monitors can measure how much air in a space has already been breathed. Particulate monitors can measure the extent of particle and aerosol contamination.

Air purifiers with Hepa-type (High Efficiency Particulate Air) filters clear aerosols effectively. As an interim solution, affordable do-it-yourself purifiers can be constructed and installed within a day, before buildings’ air-handling systems are upgraded. If Hepa-type filters had been used in the Guangdong restaurant’s air conditioner, that outbreak might have been prevented.

Ultimately, we need new building codes and designs that will make indoor air as safe and healthy as outside air.

Professor of epidemiology David Fisman at the University of Toronto and co-author of the Greenhalgh letter jokes: “Air – it’s the new poop.”

People in wealthy countries don’t tolerate faeces in their water supply because it causes potentially fatal diseases. So why should they tolerate workplaces, schools, or restaurants with potentially deadly exhaled air?

Or an even closer analogy: I’m old enough to remember when indoor smoking was allowed, and a bar could contain so much exhaled smoke it would be hard to see across the room. Now it seems absurd that we would allow public spaces with high levels of visible carcinogenic aerosols.

One day, we will think the same way about invisible virus aerosols. To control the coming waves of Covid-19 variants – and the next pandemic – let’s hope that day comes soon.

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Clearing the air on Covid-19 transmission

Tiny particles, not droplets, hold the key. The building authority’s ventilation study is a welcome move.

Adam Claridge-Chang

For *The Straits Times*

On my way to work, I often walk past a smoking area. While second-hand smoke can harm passers-by, cigarette smoke can at least be seen and smelled so the risk to others is apparent. Like tobacco smoke, the Covid-19 virus is also airborne: it is exhaled, floats around and can fill a room. But

unlike smoke, its airborne particles are odourless and invisible.

The transmission mode of Covid-19 has been controversial. Some people still believe that the main routes of transmission are through touching contaminated objects that can carry infection such as doorknobs, or through coming into contact with mouth droplets.

However, a large number of studies have now demonstrated that the major route of

transmission is via tiny airborne particles called aerosols.

So the recent announcement by Singapore’s Building and Construction Authority (BCA) that it is launching a major study into the use of natural ventilation to reduce transmission inside buildings is welcome and timely (*The Straits Times*, Jan 30, ‘Study to look at reducing disease spread in Singapore buildings’).

As the planned study suggests, a simple, effective approach to deal with airborne transmission will be to open buildings to allow more outdoor air.

Innovating modern versions of traditional fan-based cooling will make indoor spaces comfortable, while facilitating the elimination of contaminated air. In the short term, ventilation can be improved by opening windows, and holding gatherings outdoors whenever possible.

However, not every indoor space can be opened up, and air conditioning will remain a reality.

How can that issue be addressed?

And how did it take so long to move away from the focus on droplets, and recognise Covid-19’s airborne transmission?

DROPLETS V AEROSOLS

The critical difference between droplets and aerosols is that droplets are so large that they fall to the ground within a few metres in seconds, while aerosol particles are small enough to float in the air for minutes or even hours.

In March last year, a group of scientists led by Professor Trisha Greenhalgh of Primary Care Health Sciences at Oxford

University published a short letter listing 10 points of evidence supporting the Covid-19 virus’ airborne transmission. One devastating observation was the frequency of long-range infections.

One such outbreak occurred in a restaurant in Guangdong, China. At three adjacent tables, nine people were infected by the index patient. Security video confirmed that the index patient never had close contact with the other tables – so droplet transmission was ruled out. All three tables were cooled by the same air conditioner. Some of the infected people were right next to the air conditioner’s blower, and so were seemingly “upwind” of the index patient.

A team of scientists headed by Min Kang at the Guangdong Provincial Centre for Disease Control and Prevention used smoke to track airflow. They discovered that the air was recirculating, and that the “upwind” infected people were effectively 10 metres downwind of the index patient.

Long-distance outbreaks are common – hence the word “super-spreader”.

Early in the pandemic, on Feb 11 2020, the World Health Organisation’s director-general Tedros Ghebreyesus got it right: He announced the virus’ airborne transmission.

He said: “This is airborne. Corona is airborne.”

But in the following month, WHO officials backtracked. Dr Tedros himself wrote “... actually it’s not airborne”.

But throughout the first year of the pandemic, evidence for airborne transmission

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accumulated and scientists increased the pressure, culminating in Professor Greenhalgh’s letter. On April 30 last year, rather quietly, WHO updated its website to acknowledge that aerosol transmission plays a role. Even today, WHO appears to minimise airborne transmission.

WHO’s stance can influence national policies. Currently, the Singapore Ministry of Health’s (MOH) main website, under the heading “How does Covid-19 spread?” starts off by echoing WHO’s old droplet claims.

It adds later on: “While there have been limited reports of airborne transmission outside of health care settings internationally, its role and extent are under further study. MOH will continue to monitor the evidence as it emerges.”

Nevertheless, since 2020, MOH, together with the National Environmental Agency, and the