Covid-19 patients can spread virus by breathing: Study

Viral particles also exhaled while talking and singing, not just while coughing: NUS team

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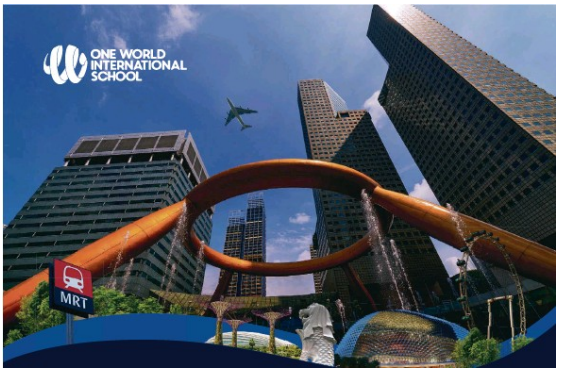
A new study by a National University of Singapore (NUS) team has found that an infected person can spread Covid-19 by exhaling fine aerosol particles when breathing, talking and singing, not just through droplets when coughing or sneezing.



The authors of the study said yesterday that the research findings reinforce the need for infection control measures – such as social distancing, mask wearing and increased room ventilation – especially in an indoor environment where airborne transmission of the virus is most likely to occur.

The study, led by researchers from NUS and conducted at the National Centre for Infectious Diseases (NCID), showed that talking and singing can produce two types of viral particles – fine aerosols (less than 5 micrometres in size), and coarse aerosols (larger than 5 micrometres).

The fine aerosols generated from both types of activities contained more viral particles than coarse aerosols, said Professor Paul Tambyah from the NUS Yong Loo Lin School of Medicine.

Prof Tambyah, a co-author of the paper, said that while there was no linear relationship between the size of an aerosol particle and the amount of virus it carries, the size can give researchers a clue as to how much virus or parts of a virus are present in an aerosol particle.

Associate Professor Tham Kwok Wai, from the Department of the Built Environment at the NUS School of Design and Environment, said that while previous studies had established the relative amount of aerosols produced through breathing, talking and singing, none of them measured the amount of virus particles each activity is able to generate.

"Therefore, our team's work provides a foundation for estimating the risk of transmission of infection (for each activity)," said Prof Tham, who led the study.

The paper was first published online in the journal Clinical Infectious Diseases last Friday.

The team had studied 22 Covid-19 patients who were admitted to the NCID from February to April. Each of them was asked to perform, on the same day, three separate activities that involved exhaling air, which produced respiratory particles.

The activities were 30 minutes of breathing, 15 minutes of talking in the form of reading aloud passages from a children's book, and 15 minutes of singing different songs. They rested between the activities.

While the participants were carrying out the activities, a specially designed piece of equipment known as the Gesundheit-II was used to collect the respiratory particles that were generated.

Each participant was required to place his head at the cone-shaped inlet of the equipment. The cone served as a ventilation hood where air was continuously drawn from around the participant's head, allowing the collection of particles exhaled into the connecting sampler.

Aerosols were collected in two sizes – coarse and fine. The sample viral load was then quantified using a method called reverse transcription-quantitative polymerase chain reaction (RT-PCR).

Project co-leader Kristen Coleman from Duke-NUS Medical School, referring to the virus that causes Covid-19, said: "We observed that Covid-19 patients who are early in the course of illness are likely to shed detectable levels of Sars-CoV-2 RNA in respiratory aerosols."

However, the amount of virus expelled from talking and singing varied between patients, she noted. "Some released more virus from talking, as they may have spoken loudly during the experiments, though the underlying reason for why their viral loads were higher, compared with singing, still remains unclear."

To reduce one's exposure to fine-particle aerosols in indoor environments, the existing safe management measures are important, along with increased room ventilation and more efficient air-cleaning technologies.

Prof Tham said: "In situations involving singing, safe distancing among singers, as well as the averting and filtering of airflow from choir to audience, such as by deploying air curtains, are important considerations.

"For situations involving talking, determining airflow patterns and minimising exposure through seating and furniture configurations, distancing, and air movement alteration, such as (by using) fans, including desk fans, are practical options that can be taken to lower the risk of Sars-CoV-2 transmission."

The researchers are now looking to establish the infectiousness of airborne aerosols, or live virus, that infected people emit by talking.

They are also planning to use the same methods to determine if the aerosol viral load associated with the new variants – especially the Delta variant – is higher than in previous strains.