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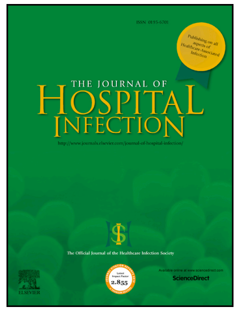

# Putting a balance on the aerosolization debate around SARS-CoV-2

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# Putting a balance on the aerosolization debate around SARS-CoV-2

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Dear Sir,

We were moved to respond to the recent letter on the nature of airborne spread of SARS-CoV-2.[1] There is currently intense debate over how much transmission occurs through the production of aerosols <5 µm, which have the capacity to remain airborne for hours and are thus at the mercy of prevailing draughts or ventilation currents.[2] If SARS-CoV-2 is emitted in aerosol in this manner, then susceptible persons may inhale the virus outside the statutory 1-2 metre distance imposed by infection prevention bodies and the World Health Organisation (WHO) (https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200326-sitrep-66-covid-19.pdf?sfvrsn=81b94e61_2). It is important to better ascertain the risk of aerosol spread before ruling it out completely. Should the main mode of transmission be due to droplets (>5 µm) and direct contact, as currently advocated, then advice on preventive measures would be adequate. But evidence is beginning to accumulate that implies a more important role for aerosol spread and this demands an urgent reassessment of respiratory precautions.[2]

While air sampling confirms presence of SARS-CoV-2 in hospitals, it has not always found airborne (or viable) virus, although surfaces and air vents provide reservoirs.[3] It is likely that mechanical ventilation systems in healthcare environments offer reasonable protection towards airborne virus. However, community homes, restaurants and public transport do not usually have sophisticated ventilation systems, meaning that people could be exposed to SARS-CoV-2 from aerosols in indoor environments. Whether these airborne viruses comprise a sufficiently infective dose or not, has not yet been determined, although a pre-print paper suggests that they do (https://www.medrxiv.org/content/10.1101/2020.04.12.20062828v1). Researchers used a model to estimate that a person standing and speaking in a room could release up to 114 infectious doses per hour. These aerosolized respiratory droplets would easily infect other people if this happened in public places like a bank, restaurant or pharmacy.

Have there been any incidents in the community that support aerosolised spread of SARS-CoV-2? Yes, with two in particular that merit attention. On March 10th, members of the Skagit Valley Chorale, Washington, USA, met for a weekly rehearsal (https://www.latimes.com/world-nation/story/2020-03-29/coronavirus-choir-outbreak). They knew about the pandemic but decided that the rehearsal should proceed, with hand hygiene opportunities and social distancing. Of 60 members who attended, 45 became ill, three were hospitalised, and two died. The rehearsal took place in a reasonably sized church hall, with a heating system and some makeup air from outside.

Formal investigations continue but it is unlikely that all 45 infected persons clustered around the index case or touched the same contaminated surfaces.

Another outbreak supporting airborne transmission occurred in a restaurant in Guangzhou, China, whereby at least ten diners contracted SARS-CoV-2 (https://www.medrxiv.org/content/10.1101/2020.04.16.20067728v1). Researchers believe that there was just one infectious but asymptomatic person within family A, at a table positioned between two other tables more than 2 metres away hosting two different family groups (B & C). Due to currents generated by air conditioning, individuals from B & C families became infected, almost certainly from inhalation of aerosols. None of the families had met previously and none had close contact during the lunch, other than sitting at the same end of the restaurant.

These incidents and the work by van Doremalen et al. suggest that airborne transmission cannot be ruled out as a significant pathway for SARS-CoV-2 transmission in the community.[4] Respiratory viruses may be simultaneously transmitted by three routes: contact; droplet; and aerosol.[5] Whichever route predominates will depend on specific circumstances, such as the choir rehearsal; or the overcrowded, poorly ventilated restaurant, as described above. For droplets versus aerosol, the distinction is easily blurred. The traditionally accepted size parameters (<5 µm for aerosol; >5 µm for droplets) are not consistent with a modern understanding of aerosols. Droplets in a cough or sneeze can travel much farther than 2 m [6,7] and even without the momentum of a respiratory jet carrying them, droplets as large as 30 µm travel at least 2 m in indoor air currents, before falling to the ground. By what mechanism would intact virions encased in a 5 µm particle be deemed non-infectious when current guidance assumes that those in larger droplets, say, 30 µm, are infectious? Viruses have been shown to survive equally well, if not better, in suspended aerosols compared with large stationary droplets.[8] And how do asymptomatic SARS-CoV-2 patients transmit the virus so efficiently if they do not cough or sneeze? More evidence will be forthcoming, as indeed it should, since the role of airborne transmission in infection has all too sadly been neglected over the years.[5] Once antimicrobial chemotherapy and vaccines arrived last century, both transmission studies and preventive measures fell by the wayside.

The current COVID-19 pandemic is an opportunity to reconsider aerosol transmission and review relevant studies emerging from the scientific community. Rigid adherence to traditional beliefs and dismissal of aerosols, without sufficient evidence of their absence, is outdated, unscientific and at worst, potentially dangerous.

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None to report

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