Review of “It is time to address airborne transmission of COVID-19”


One-Minute Summary

- The authors appeal to relevant national and international organizations and the medical community to recognize the risk of airborne transmission of Coronavirus Disease 2019 (COVID-19).
- Evidence cited to support the potential for airborne spread of COVID-19 include the following:
  - Viruses are released in microdroplets during breathing, talking and coughing; the small size of these microdroplets allow them to be suspended in air and are inhalable at distances beyond 2 metres from their source (Morawska et al., Yan et al., Xie et al., Lindsley et al.).
  - A retrospective study (Yu et al.) analyzed the spatial patterns of a community outbreak of SARS-CoV-1 in Hong Kong and the authors concluded that airborne transmission may explain the pattern of cases.
  - The authors cite an outbreak investigation from a poorly ventilated restaurant as supporting evidence for aerosol transmission (Li et al.).
  - The authors cite experimental data that viable “airborne virus can be exhaled” from respiratory syncytial virus, Middle East Respiratory Syndrome coronavirus, and influenza. The commentary states that “there is every reason to believe SARS-CoV-2 behaves similarly” to these viruses (van Doremalen et al., Liu et al.).
  - The authors are advocating for recognition by the World Health Organization (WHO) and other organizations to acknowledge the potential for airborne transmission which they believe will encourage public health interventions that include: (1) providing sufficient and effective ventilation; (2) supplement general ventilation with local exhaust, high efficiency air filtration, and germicidal ultraviolet lights; and (3) avoid overcrowding.

Additional Information

- None
PHO Reviewer's Comments

- The authors use the terms “aerosol transmission” and “airborne transmission” interchangeably although the focus of the evidence cited and supplementary measures would more accurately be defined as aerosol transmission.

- Respiratory virus transmission, including COVID-19, occurs on a spectrum from large droplets in close contact to smaller droplets (or aerosols) that have the potential to transmit across further distances. Referring to a pathogen as “airborne”, in a hospital setting, refers to the predominant mode of transmission and the infection control measures necessary to protect patients and healthcare workers from exposure. Airborne transmission occurs when airborne particles remain suspended in the air, allowing them to travel on air currents and then inhaled by others in the vicinity or at further distances away from the source. By this definition, COVID-19 is not an airborne infection (such as measles or tuberculosis). In media interviews the authors of this commentary agreed that hospital policies, which include droplet/contact precautions for routine care, have been appropriate. There is broad agreement among the scientific community that the predominant mode of COVID-19 transmission is by the droplet route within close contact. The debate brought forward by this commentary is in regards to the extent that small aerosols can be infectious.

- There is a great deal of epidemiological evidence supporting droplet transmission, which this commentary did not reference. This evidence is summarized in more detail here and here.

- Some notable issues with the authors’ citations include:
  - In the shopping mall outbreak investigation, Cai et al. suggest aerosolization of COVID-19 as a possibility but air sampling was not conducted. In addition, the authors acknowledge that fomite transmission may have occurred.
  - In the aerodynamic analysis at two hospitals, Liu et al. did not look for viable COVID-19. In addition, the risk of infection transmission is uncertain as the quantity of viral genetic material recovered was low and the length of time the aerosols remained afloat in the air was not explored (see synopsis of the Liu et al article).
  - While the experiment by van Doremalen et al. indicates that aerosol transmission of COVID-19 is plausible, it does not demonstrate or measure the risk of aerosol transmission, which is dependent on an interplay of multiple factors such as droplet size, viability, COVID-19 virulence and degree of viral shedding (see synopsis of the van Doremalen et al article).
  - In a preprint case study, Miller et al. proposed that aerosol transmission was most likely the dominant route of transmission in a superspreading event in a choir. While supporting the idea that singing itself might have a role in aerosol transmission, Hamner et al. pointed out in a peer-reviewed report of the same outbreak that there were multiple opportunities for droplet and fomite transmission as choir members shared snacks and were in close proximity for an extended period of time.

- This commentary has generated public discussion and controversy. However, much of the controversy can be attributed to different use of terminology and how these terms impact hospital infection control practice and public health policy. The premise for this commentary’s assertion of “airborne” transmission is theoretical evidence of transmission and superspreading events possibly related to small aerosol generation, which are more likely the exception, rather than the norm. The recent viewpoint by Klompas et al. in JAMA (July 13, 2020) states that long-range aerosol-based transmission is not the dominant mode of SARS-CoV-2 transmission.
• This commentary does not advocate for N95 respirator use for routine care of COVID-19 patients. It does advocate for improved ventilation and avoidance of overcrowding. These recommendations are not particularly controversial as evidence suggests an increased risk of infection in crowded, poorly ventilated spaces. The extent that inhalation of small aerosols can cause clinical infection is an area of active investigation.
• The WHO, Public Health Agency of Canada, and Public Health Ontario continue to recommend droplet/contact infection control precautions in healthcare settings and the use of N95 respirators for aerosol-generating medical procedures.

References


19. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Technical brief: IPAC recommendations for use of personal protective equipment for care of individuals with suspect or confirmed COVID-19 [Internet]. Toronto, ON: Queen's Printer for Ontario; 2020 [cited