

Considerations for aerosol transmission

Typical transmission routes

Droplet transmission consists of exposure to larger droplets, smaller droplets, and particles that are generally too large to be suspended in the air for long periods of time. Aerosol transmission consists of exposure to smaller droplets and particles that remain in the air for longer times and can travel greater distances.

COVID-19 is transmitted primarily person-to-person via large respiratory droplets (i.e. inhaling droplets, coughing and or sneezing), when contaminated objects contact mucous membranes, or when touching one's own mouth, nose, or possibly eyes after contacting contaminated objects or surfaces. There is evidence of transmission occurring up to 48 hours before symptoms begin (presymptomatic), or even from individuals who are asymptomatic (who never develop symptoms) or whose symptoms went unnoticed. The highest risk of virus spread is from a person who has symptoms like fever or cough.

Human coronaviruses have been detected in stool and blood, however the roles of fecal-oral and blood-borne transmission remain uncertain.

Aerosol transmission

The predominant mode of transmission of COVID-19 is via large respiratory droplets during close unprotected contact. Although aerosols are produced during activities such as speaking, breathing and coughing, it is not clear what role in transmission these have for distances greater than 2 metres. The role of these aerosols has been suggested (by one modelling study) to contribute to transmission in close proximity (within 2m). 'Aerosol spread' (spread via aerosols that remain aloft and can travel over longer distances and over longer times) has not been shown to be a dominant mode of transmission for COVID-19. However, aerosols are known to contribute to COVID-19 transmission in two circumstances: in health care settings when performing aerosol generating medical procedures (AGMPs); and more recently identified, during specific circumstances in community settings.

Since the beginning of the COVID-19 pandemic, it has been known that aerosol-generating medical procedures (AGMP) have the potential to cause transmission of the virus through the air at longer distances. These procedures occur almost exclusively in medical settings and are managed through additional infection prevention and control measures when these procedures are being done.

Alberta Health has also been monitoring evidence and outbreaks since the onset of the COVID-19 pandemic, and evidence supports that in specific circumstances the risk of transmission via aerosol particles across greater distances can also occur resulting in context-specific aerosol transmission.

Specific circumstances

The specific circumstances that appear to heighten the risk of this transmission are:

1. Crowded gatherings that occur in an enclosed indoor location;
2. Individuals gathered indoors together for prolonged periods of time;
3. The indoor space has limited to no ventilation;
4. During the gathering, specific activities happen that can result in forceful droplet expulsion or generate an increased amount of smaller respiratory droplet sizes. For example, heavy exertion or increased breathing rates occurring from singing, shouting or intense exercise that can increase the quantity of smaller respiratory particles.

How does this impact Alberta's response?

Aerosol transmission from activities other than AGMP seems to happen with the combination of circumstances listed above. Evidence suggests it does not occur over very long distances (e.g. ventilation ducts) or very long periods of time (e.g. hours after someone has left a room). For illnesses like measles where this does happen, it is referred to as airborne transmission. Although COVID-19 does not appear to transmit like measles through airborne transmission, individuals and businesses should assess for the circumstances that raise the risk of aerosol transmission, and where these circumstances exist, apply mitigation strategies.

Protecting Albertans

Alberta's approach to mitigating risks of COVID-19 transmission includes, but is not limited to, requirements for physical distancing; masking and use of Personal Protective Equipment (PPE); hand hygiene, health screening of individuals who attend businesses and events; isolation and quarantine requirements; accessible testing to support early detection; contact tracing to limit spread of infection and enhanced environmental cleaning and disinfection.

Considerations for aerosol transmission

Alberta is committed to continual review of its COVID-19 requirements and public health measures and has been responsive to learnings from outbreaks where these specific circumstances are likely to be present. Existing protective requirements that address circumstances where aerosol-like transmission could occur include:

- Businesses and entities are required to ensure that ventilation systems are operational and functioning as intended.
- High-intensity fitness classes are required to separate participants at a distance of 3 metres or greater.
- Settings where shouting, alcohol consumption and close contact simultaneously occur (such as nightclubs) have remained closed during relaunch.
- Limits have been established on the number of people who can gather for private social gatherings.

What businesses and the public need to know

To limit the risk of this context-specific aerosol transmission, enclosed and/or poorly ventilated spaces in indoor settings should be identified and the following mitigation steps should be considered:

- Move the activity outdoors, if possible.
- Ensure ventilation systems serving these spaces function optimally and are suitable for the intended use of the space.
- Wherever possible, introduce more outside fresh air into the enclosed space (e.g. open a window or door).
- Have all attendees wear, at a minimum, a non-medical mask, if appropriate for the activity. (Note: that at this time masks are not recommended for intense exercise but could be used for moderate exercise)
- Enhance physical distancing to be greater than 2 metres between individuals who share the space if vigorous activity is happening (e.g., use the guideline for 3m distancing for high intensity fitness classes in indoor spaces).
- Reduce the number of individuals sharing the space.
- Lower the intensity and frequency of shouting, singing or exercise.
- Introduce frequent pauses of activities that occur in these spaces for the purposes of letting the air clear (i.e. Choir singing is required to pause for 10 minutes after 30 minutes of singing).
- Strengthen protocols for screening of attendees and workers to ensure no one symptomatic or with known recent COVID-19 exposure attends.

Considerations for health care workers and health care settings

This new understanding of aerosol transmission in specific contexts and circumstances does not change current infection prevention and control (IPC) recommendations for health care workers. As always, a point of care risk assessment should be done, and measures appropriate to the context should be used.

Alberta-specific evidence related to occupationally acquired COVID-19 infection shows that the risk of infection in health care settings is very low if current IPC and PPE requirements are strictly followed. Further, this evidence does not indicate spread in hospitals and health care settings takes place when current IPC guidance is followed. Current PPE recommendations continue to provide the necessary level of protection and the IPC recommendations for healthcare settings remain unchanged at this time.

¹ S. Tsekrekos (personal communication, Nov 08, 2020; attached as 'AHS Occupational COVID Case Summary – Data Notes 8_Nov_2020.docx')