

RESPONSE TO SCIENTIFIC/TECHNICAL REQUEST

Ministry of the Attorney General Guidebook Queries

Requestor: Ministry of the Attorney General

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(1) What are the modalities through which the COVID-19 virus propagates (e.g. droplets, airborne dissemination) and in what proportion?

Answer:

- COVID-19 is transmitted primarily through respiratory droplets during close, unprotected contact. COVID-19 does not propagate through airborne dissemination in the community. Fomites, or indirect transmission, likely contributes to transmission, particular in crowded institutional settings with higher viral burden.

Explanation:

- COVID-19 is transmitted primarily via respiratory droplets during close, unprotected contact. The evidence on COVID-19 routes of transmission is summarized in PHO's [What We Know So Far document](#), which is being updated periodically. Other organizations have reached the same conclusion based on current available evidence including the Centers for Disease Control and Prevention in the United States ([CDC](#)), European Centre for Disease Control ([ECDC](#)), and World Health Organization ([WHO](#)).
- Briefly, epidemiological and experimental evidence both support larger respiratory droplets as the predominant mode of transmission. The [WHO summarized 75,465 cases](#) in China and identified that the majority of COVID-19 transmission occurs within families without significance clusters in other settings. The conclusion from this report was that the mode of COVID-19 transmission was *not airborne*.
- Household secondary attack rates have ranged between 5-23%, with <1% attack rates in non-household close contacts. This is far below what would be observed from an airborne virus.

- Most respiratory droplets from COVID-19 patients will fall within 2 metres. SARS-CoV-2 has been inconsistently identified from air samples in hospitals with no study detecting viable virus from air samples.
- [SARS-CoV-2 can survive on a variety of surfaces](#) for up to several days if there is a large enough quantity of virus present. The transmission of COVID-19 from person-to-environment and environment-to-person (termed *indirect* transmission) likely does occur. The proportion of transmissions that are *direct* (i.e. droplet) versus *indirect* (i.e. fomites) depends on the setting and is difficult to quantify. For instance, in a hospital or institutional setting with relatively large burden of virus in a confined space, fomites likely contribute a substantial portion of transmissions as discussed in this [detailed hospital outbreak investigation from South Africa](#). In these settings, hand hygiene and environmental cleaning are important measures to limit transmission. In a workplace setting, direct droplet transmission will be relatively more important and measures such as physical distancing and mask wearing are likely to have a larger impact on limiting transmission.

(2) If airborne transmission is possible, what is the magnitude of this associated risk in the workplace?

Answer:

- The contribution of airborne transmission within the workplace is negligible.

Explanation:

- As discussed above airborne transmission is likely not responsible for the spread of COVID-19 in the community or workplace. Viruses travel on droplet particles which will range in size. Larger droplets fall quickly to the ground, whereas smaller droplets may remain suspended in air and travel further distances. The definition of *airborne* transmission is if a pathogen predominantly spreads over longer distances and time. Evidence summarized above and [here](#) support that SARS-CoV-2 consists predominantly of large droplets and is not *airborne*.
- Droplet size, and therefore transmission, exists on a spectrum. Experimental studies have shown that SARS-CoV-2 can survive as a small droplet for extended periods of time if these small virus containing droplets are created. This can be done [experimentally](#). In real world settings this is unlikely to be occurring. Routine speech and coughing are unlikely to generate sufficient numbers of small droplets to result in *airborne* transmission of COVID-19. In a workplace setting the contribution of small particles, and therefore *airborne* transmission, is believed to be inconsequential.

(3) To what extent does the effectiveness of the ventilation system help to mitigate such a risk?

Answer:

- As discussed, the primary mode of transmission of COVID-19 is through close unprotected contact. To date, there is no direct evidence that ventilation systems can either transmit or mitigate the risk of transmission. However, air currents generated by an air conditioner may have contributed to dispersal of infectious particles in a [Chinese restaurant](#). The restaurant was densely occupied and extent of outdoor air ventilation and in this case is not clear.
- In general, ventilating indoor environments with fresh air, whether by increasing the outdoor air ratio of the air handling system settings as much as possible or by opening windows, and avoiding or reducing recirculation, will dilute exhaled air from the occupants including any infectious particles. Even if this is not feasible for the whole facility, it may be possible for higher risk areas e.g., where crowding may be an issue. Disabling recirculation can be achieved by closing the recirculation dampers and opening outdoor air dampers. Some HVAC systems may not allow changes to outdoor air fractions, and those that do may require adjustments to filter maintenance protocols. ([Institut national de sante publique \(INSPQ\), 2020](#); [Dietz et al, 2020](#); [Federation of European Heating, Ventilation and Air Conditioning Associations \(REHVA\), 2020](#); [Morawska and Cao, 2020](#)) In these situations, outdoor air level can be enhanced by opening windows and ensuring adequate or upgrading filtering. (INSPQ, 2020; Dietz et al, 2020; REHVA, 2020; ASHRAE, 2020)
- Most guidance advises avoiding recirculation of air as far as practically possible, ensuring clean filters, and disabling demand-control ventilation settings that reduce air supply based on occupancy and/or temperature. ([INSPQ, 2020](#); [Dietz et al, 2020](#); [REHVA, 2020](#); [American Society of Heating, Refrigerating and Air-Conditioning Engineers \(ASHRAE\), 2020](#); [CDC, 2020](#)).
 - It is generally good practice to start the HVAC system at least 2 hours before the building is occupied and continuing to run it at least 2 hours after the building has been vacated ([REHVA, 2020](#); [ASHRAE, 2020](#)).

(4) How do we measure the level of effectiveness of a ventilation system?

Answer:

- As stated above, in the context of the pandemic, ensuring proper air handling system operation, avoiding recirculation, increasing percentage of outdoor air ventilation, and physical distancing measures to reduce crowding (especially in areas where ventilation may not be adequate) should limit the potential for concentration of infectious particles in air. Indoor air quality standards are provided by ASHRAE ([ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality](#)) which is referenced in the [Ontario Building Code](#), specifying the minimum level of outdoor air supply entering a building. [ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy](#) provides guidance on thermal comfort parameters.
- Note, ventilation systems require maintenance which may depend on the settings at which air handling systems are run, e.g., frequency of filter changes, maintenance checks.

(5) What proxy measures of effectiveness do experts believe are necessary to mitigate the risk of COVID-19 transmission in a workplace?

Answer:

- The hierarchy of controls for exposures to occupational hazards can be used as a systematic approach to reducing worker exposure risk. Multiple types of controls (engineering, administrative, personal hygiene and lastly personal protective equipment) can and should be utilized to remove the hazard (COVID-19) from the work place before it can reach the worker; optimize movement of workers to minimize potential contact of workers with the hazard; and modify worker actions or behaviours to reduce the exposure to the hazard
- Examples of measures to reduce exposure to COVID-19 in the workplace include:

Hierarchy of controls for worker exposure to COVID-19

Type of control	Description	Examples
Engineering	Remove/block the hazard at the source before it can reach the worker	Physical distancing, physical barriers (e.g., Plexiglass booths),

		environmental cleaning/disinfection
Administrative	Optimizing the movement of workers to minimize potential contact with the hazard	Scheduling (e.g., staggered shifts, breaks, and meals), work from home policies, limited hours, staff reduction, virtual meetings, paid sick leave, temperature screening, symptom screening/reporting
Personal Hygiene	Worker actions or behaviors that may potentially reduce hazard exposure	Hand hygiene, respiratory etiquette, masking for source control
Personal Protective Equipment	The “last line of defense” when other controls are infeasible, inadequate or exhausted.	Selection based on exposure risk. These may include masks, gloves, eye protection, gowns or coveralls.

Source: [Masking for Source Control of COVID-19: Considerations for Workers in Non-Healthcare Settings](#) (Table 2: Hierarchy of controls for worker exposure to COVID-19)

- Guidance on measures to minimize the risk of transmission in the non-healthcare workplaces can be found in the Ministry of Health’s [COVID-19 Guidance: Essential Workplaces and in sector-specific guidance](#) available from the Ministry of Labour, Training and Skills Development
- Additional considerations for measures in the workplace, including masking for source control are discussed in Public Health Ontario’s document [Masking for Source Control of COVID-19: Considerations for Workers in Non-Healthcare Settings](#)

(6) If these measures are not achieved, what would be the medical supported course of action (e.g. issue PPE to courthouse occupants or close down the workplace)?

Answer:

- As per the hierarchy of controls Personal Protective Equipment (PPE) can be considered when other controls are not feasible, inadequate or exhausted.
- Of note, the use of non-medical masks for source control is not considered PPE. As previously communicated, the scientific and technical advice has from PHO been in support of public mask wearing in the courts, and considerations for implementation if done as a recommendation vs mandatory manner. However, whether to make it mandatory vs recommended would be a policy decision for MAG.
- Cases of COVID-19 and their contacts are routinely followed up by local public health units, including assessment of the risk level of any potential workplace exposures, as outlined in the [Ministry of Health's](#) guidance on Public Health Management of Cases and Contacts of COVID-19 in Ontario.
- Guidance for identifying and managing outbreaks in workplaces, including possible outbreak control measures, is available in the Ministry of Health's [Workplace Outbreak Guidance](#).

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