

SYNOPSIS

09/02/2020

Review of “Probable evidence of fecal aerosol transmission of SARS-CoV-2 in a high-rise building”

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One-Minute Summary

- This study investigated an **outbreak of nine COVID-19 cases in a high-rise apartment building in Guangzhou, China (January 26 to February 13, 2020), where the potential mode of transmission was through fecal aerosols.**
- Patients from three different, vertically-aligned apartments were infected:
 - **Apartment 1502 (Family A, n=5):** two older adults experienced COVID-19 symptoms on Jan 26 (index patients), while three younger family members showed symptoms on Jan 29/30. Four (out of 27) environmental samples positive for COVID-19 were collected on Feb 12 from the master bedroom (n=1) and master bathroom (n=3). A single sample collected from the washbasin U-trap on Feb 19 was positive.
 - **Apartment 2502 (Family B, n=2):** middle-aged couple with symptom onset of Feb 1. No environmental samples were positive (0/2).
 - **Apartment 2702 (Family C, n=2):** a couple with onset dates of Feb 6 and Feb 13. No environmental samples were positive (0/9).
- Throat swabs from 217 other residents and staff in the building were all negative (swabs collected from Feb 9 to 11) for COVID-19 by RT-PCR. Only one of 134 environmental samples from outside the three apartments was positive for COVID-19 (i.e., sample from the master bathroom in apartment 1602 [unoccupied]); testing included vertically-aligned “02” apartments.
- **The authors contend that drainage pipes were likely conduits for fecal aerosol transmission of COVID-19 in this high-rise building.** The authors released tracer gas into the toilet of the master bathroom of apartment 1502. The tracer gas was detected at relatively high concentrations in several apartments; including the floor drains and bathtub drains of apartments 2502 and 2702. The residents of apartments 2502 and 2702 were the only ones surveyed that do not open their master bathroom windows and prefer to use their exhaust fans; therefore, these bathrooms had a relatively higher negative pressure that potentially increased the suction of fecal aerosols into these bathrooms from apartment 1502.
- **The authors propose that the primary location for exposure to COVID-19 in patients was the master bathrooms.** In apartments 2502 and 2702, the owners stated they did not use their master bathroom tubs regularly, meaning the U-traps were likely dry and conducive to airflow; however, this was not possible to confirm.

Additional Information

- The apartment building has 29 floors, of which there are three apartments on each floor, except for floor 1 (none) and floor 29 (two). Floors 2 to 28 have the same floor plan, with floor plans 01, 02 and 03 in same orientation on each floor. There are 83 apartments in total; however, during the study 26 were unoccupied. During the proposed infectious period (Jan 24 to Feb 6), there were 202 residents from 57 families living in the building.
- Further details on families and apartments:
 - **Apartment 1502 (index Family A, n=5):** four of these family members traveled to Wuhan 14 days prior to first onset of symptoms (ca. Jan 12); the other family member traveled to Jiangxi (unknown travel date). All family members returned to Guangzhou on Jan 24. Family members wore face masks when in common areas of the building.
 - **Apartment 2502 (Family B, n=2):** middle-aged couple with symptom onset of Feb 1. No other family members lived in the apartment. No travel history or contact with any confirmed cases or Family A. The two patients stayed in the apartment “most” of the period from Jan 24 to Jan 30.
 - **Apartment 2702 (Family C, n=2):** No other family members lived in the apartment. There was no travel history or contact with any confirmed cases or Family A. The two patients stayed in the apartment “most” of the period from Jan 24 to Jan 30.
 - None of the families knew one another.
- From Feb 11 to 14, 166 environmental samples and seven air samples were collected from, common areas, elevators and vents; however, all were negative for COVID-19. Three other residents shared the elevator with members of the index family without becoming infected.

PHO Reviewer's Comments

- The authors acknowledge that they cannot distinguish between transmission through the inhalation of fecal aerosols and transmission through the touching surfaces contaminated by fecal aerosols. Further work is needed to identify whether fecal aerosol transmission of COVID-19 through drainage pipes is via the inhalation route or through fomites.
- The authors, while finding a positive sample from inside a U-trap for a washbasin, have not demonstrated the presence of COVID-19 in air samples from drains or bathrooms. In addition, it is not clear if the flushing of the toilets in this apartment building is capable of creating aerosolized particles. The size of particles released by the gas tracer was not reported.

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Review of “Probable evidence of fecal aerosol transmission of SARS-CoV-2 in a high-rise building”. Toronto, ON: Queen’s Printer for Ontario; 2020.

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