

## SYNOPSIS

03/06/2020

# Review of “Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a symptomatic patient”

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## One-Minute Summary

- The authors report on results from environmental samples taken from the airborne infection isolation rooms of three patients with COVID-19 at Singapore’s dedicated coronavirus outbreak centre. Samples were collected **from environmental surfaces, air and staff personal protective equipment (PPE)**.
- All three patients were symptomatic with moderate (patient A) or mild disease (patient C) during sampling. Patient B had samples taken while symptomatic with moderate symptoms and was asymptomatic during their second day of sampling.
  - Quantitative measures of viral load (measured by RT-PCR) of clinical samples from patients A and B were much lower compared to that of patient C. Virus was not detected in Patient B when the patient was asymptomatic.
- All **environmental samples taken after routine cleaning** (rooms of patients A and B) tested **negative**.
- Of the 28 **environmental samples** taken before **routine cleaning** (room of patient C only), 61% tested positive. Of these samples:
  - 15 of 17 (88%) **patient room** samples tested positive, including two of three from the air exhaust outlets.
  - Three of five (60%) **private washroom** samples tested positive.
  - Zero of five (0%) samples from **anterooms** tested positive.
  - Zero of one (0%) sample from the **outside corridor** tested positive.
- Of 10 **PPE** samples, one of two samples collected from the front surface of the shoe\* tested positive. Samples from the front of gown, front of visor and N95 respirator all tested negative.
- All **air samples** were **negative**.
- The authors suggest that **COVID-19** may be transmitted by environmental surfaces, given the contamination detected in the study.

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## Additional Information

- The authors reported that high-touch surfaces in patient rooms were cleaned twice a day with 5,000 ppm sodium dichloroisocyanurate and the floor was cleaned once a day with the same disinfectant at 1,000 ppm.
- Environmental surfaces were swabbed on five days over a two-week period, either before routine cleaning (in the rooms of patient A and patient B) or after routine cleaning (in the room of the patient C). Sampling occurred during days four to 11 of illness in the patients.
- There are several limitations noted in this study, including:
  - **Viral culture was not performed on the samples to assess viability.**
  - The number of samples taken was small and the volume of air sampled represents only a small fraction of total air volume.
  - The high air exchanges in airborne infection isolation rooms are meant to swiftly remove any airborne contaminants present, so the air samples taken from that setting may not be generalizable to the general health care environment.
- \*The authors classified shoes as a staff PPE site and noted that shoe covers are not part of the PPE recommendations in use.

## PHO Reviewer's Comments

- Table 1 reports that the floor in the room of patient C was the most contaminated out of the 15 sites sampled. This may have contributed to the positive test result of the shoe's front surface.
- The fact that PPE was stored in the patient room (as seen in the supplementary map) may have increased the risk of contaminating the PPE.
- More information on the clinical activities performed by the physicians after exiting the patient room and before their PPE was swabbed would help to interpret the PPE swab results.
- Further studies are needed to determine the role of environmental surfaces as a route of COVID-19 transmission.

## Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Review of "Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a symptomatic patient". Toronto, ON: Queen's Printer for Ontario; 2020.

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