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Letter to the Editor

Rethinking environmental contamination and fomite transmission of SARS-CoV-2 in the healthcare



Dear Editor:

Experimental studies have reported prolonged survival of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on inanimate surfaces and objects under laboratory conditions (e.g., a large inoculum of 10^7 virus particles on a small surface). Extrapolating these findings into a real-life situation of the community may lead to an exaggerated risk of fomite transmission.¹ Despite no published studies on survival of viable SARS-CoV-2 on surfaces in actual patient care rooms, there are increasing studies that report contamination of environmental surfaces and shared objects with SARS-CoV-2 RNA. Ye et al. examined environmental contamination in patient care areas, including the intensive care unit (ICUs), isolation wards, and emergency department caring for coronavirus disease 2019 (COVID-19) patients with multiple symptoms and severity.² Of 626 environmental samples collected during the ongoing outbreak, 85 (13.6%) were positive for SARS-CoV-2 RNA by reverse transcription polymerase chain reaction (RT-PCR), with 31.9% (22/69) in the ICU and 13.9% (60/431) in hospital objects, demonstrating frequent contamination of the healthcare environment with SARS-CoV-2 RNA.² However, these results from environmental contamination studies should be assessed and interpreted with caution.

First, the contamination level of the healthcare environment with SARS-CoV-2 RNA is impacted by multiple factors, including COVID-19 patients status, hospital areas, sampling situation, cleaning and disinfection status in sampling, cleaning and disinfection practice, environmental sampling methods, detection methods of SARS-CoV-2, type of the contaminated healthcare environment, and contamination rate. Some studies described frequent environmental contamination, whilst others did not. Second, environmental contamination studies evaluated by both RT-PCR and viral culture demonstrated that viable SARS-CoV-2 was not detected in samples from environmental surfaces despite presence of environmental contamination with SARS-CoV-2 RNA.^{3–5} Also, virus detection does not necessarily represent an infectious dose of SARS-CoV-2. Colaneri et al. conducted environmental surface sampling after twice-daily cleaning with sodium hypochlorite at a concentration of 1000 ppm at various sites in potentially contaminated areas of an infectious disease emergency unit occupied by patients with respiratory symptoms receiving continuous positive airway pressure (CPAP).³ They described that two of 26 environmental samples (7.7%) obtained from plastic of the CPAP helmet close to the patient's airways with specific filters was positive for SARS-CoV-2 RNA, but viable SARS-CoV-2 was not detected from these environmental samples, suggesting that environmental contamination of SARS-CoV-2 after cleaning/disinfection may be infrequent in

healthcare settings. Third, no study has definitively demonstrated fomite transmission via environmental surfaces and objects in the healthcare. Although SARS-CoV-2 may be transmitted via direct and indirect contact by touching contaminated surfaces or medical equipment, followed by touching mouth, nose, or eyes, it remains unknown what portion of transmission is attributable to a fomite.

As seen in other human coronavirus (e.g., SARS-CoV, MERS-CoV) and epidemiologically-important pathogens, potential healthcare-associated transmissions via fomites were involved in practice failures of cleaning/disinfection.⁶ The bundle approach to support best practice of environmental hygiene comprise creating policies and procedures of environmental cleaning/disinfection; educating healthcare and environmental service staff; monitoring compliance of cleaning with feedback; choosing cleaning/disinfecting products properly; and applying a “no touch” technology into room decontamination.⁷ Recently, the researching effective approaches to cleaning in hospitals (REACH) study, a multicenter randomized trial demonstrated that an environmental cleaning bundle, consisting of five components of communication, training, audit, product, and technique, improved thoroughness of routine and discharge cleaning at frequent-touch points and led to a significant reduction in vancomycin-resistant enterococci infections.⁸ Until the risk of fomite transmission of SARS-CoV-2 in the healthcare is elucidated with further high-quality research on its survival and contamination as well as clinical evidence on fomite transmission, we should make efforts to improve cleaning/disinfection practice of environmental surfaces and medical equipment using disinfectants effective in inactivating SARS-CoV-2. It is necessary to facilitate science-based practice of environmental hygiene (e.g., standardization of hospital-wide cleaning and disinfection of noncritical environmental surfaces and medical devices per institutional policy), not only in ordinary times but also in emergency times such as the current COVID-19 era.

Declaration of Competing Interest

I declare no relevant competing interests.

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