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Short Communication

Presence of SARS-CoV-2 RNA in isolation ward environment 28 days after exposure

Yunyun Zhou¹, Yuyang Zeng¹, Changzheng Chen*

Department of Ophthalmology, Renmin Hospital of Wuhan University, Wuhan, 430060, Hubei Province, People’s Republic of China

ABSTRACT

Recent studies have reported that surfaces and objects in the rooms of infected patients that are frequently touched by both medical staff and patients could be contaminated with SARS-CoV-2. In December 2019, Wuhan China suffered the earliest from this COVID-19 pandemic, and we took that opportunity to investigate whether the SARS-CoV-2 RNA exists in the ward environment after a long time from exposure. We found that on the 28th day following the discharge of COVID-19 patients, SARS-CoV-2 RNA could still be detected on the surfaces of pagers and in drawers in the isolation wards. Thorough disinfection of the ward environment was subsequently performed, after which these surfaces in the isolation wards tested negative for the presence of SARS-CoV-2 RNA. The findings remind us that the contaminated environment in the wards may become potential infectious resources and that despite a long time from exposure, the thorough disinfection in the COVID-10 units after is still necessary.

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The World Health Organization has defined Coronavirus Disease 2019 (COVID-19) as a disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The detection of SARS-CoV-2 RNA is one of the diagnostic standards for COVID-19 (National Health Commission of China, 2020a; Li et al., 2020). A previous study reported the transmission of Human coronaviruses (HCoVs) through contaminated surfaces and objects in healthcare settings (Bin et al., 2016). Surfaces and objects found in the rooms of infected patients that are frequently touched by both medical staff and patients could be contaminated with coronavirus (Booth et al., 2005; Guo et al., 2020), indicating that viral contamination in hospital wards may facilitate contact transmission of respiratory viruses. The detection of SARS-CoV-2 in isolation ward environments is particularly important in this context.

We report on the results of environmental monitoring in isolation wards of admitted COVID-19 patients. We found that on the 28th day following the discharge of COVID-19 patients, SARS-CoV-2 RNA could still be detected on the surfaces of pagers and in drawers in the isolation wards. Thorough disinfection of the ward environment was subsequently performed, including air and surface disinfection. The air disinfection was first performed by ultraviolet radiation for one hour, and then by evenly spraying 3% hydrogen peroxide or 5000 mg/L peroxycetic acid or 500 mg/L chlorine dioxide into the air using ultra-low volume sprayer for two h. The surface disinfection was performed by wiping surfaces of objects and ground using 1000 mg/L chlorine-containing disinfectants or tissues containing peroxycetic acid and hydrogen peroxide. Surfaces contaminated by small amounts of secretions (e.g., blood, secretions, vomit and excreta of the patient, etc.) were wiped clean using disposable absorbent material (e.g., gauze, dishcloth, etc.) with 5000 mg/L chlorine-containing disinfectants. Surfaces contaminated by large amounts of secretions were completely covered for more than 30 minutes using disposable absorbent material drenched with 5000 mg/L chlorine-containing disinfectants, careful clean up, and then thoroughly wiped using 1000 mg/L chlorine-containing disinfectants. Electronic products, such as office computers, were wiped using 75% alcohol or sanitary wipes containing double chain quaternary ammonium salt. These disinfection procedures were developed and approved by the expert team led by the infection control unit of our hospital and based on the New Coronavirus Pneumonia Prevention and Control Program (Trial 7th edition) published by the National Health Commission of China (National Health Commission of China, 2020b). After thorough
disinfection, all surfaces and objects in the isolation wards tested negative for the presence of SARS-CoV-2 RNA.

In this report, the presence of SARS-CoV-2 RNA was detected using real-time RT-PCR technology rather than using the live virus culture method for detection. Therefore, a positive result only confirmed the presence of gene fragments from SARS-CoV-2, 28 days after the possible exposure, and not whether live virus was still present in the ward environment at that point in time. A previous study has demonstrated that SARS-CoV-2 can survive in aerosol form for several hours and on the surface of objects for several days; for example, SARS-CoV-2 can survive on plastic and steel plates for 72 h and on cardboard for about 24 h (van Doremalen et al., 2020). Thus, monitoring the prevalence of SARS-CoV-2 contamination in patient treatment environments can help guide outbreak control and improve the management of COVID-19 transmission. After thorough disinfection, no SARS-CoV-2 RNA was detected in the isolation ward environment, indicating that the virus is susceptible to disinfectants. Therefore, the thorough disinfection of all COVID-19 treatment units should be emphasized.

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Conflict of interest

The authors declare no conflict of interest.

Ethical approval

Ethical approval was obtained from the Ethics Committees of Renmin Hospital of Wuhan University.

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