Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Environmental virus surveillance in the isolation ward of COVID-19

Sir,

Since December 2019, novel coronavirus (SARS-CoV-2)-infected pneumonia (COVID-19) occurred in Wuhan and spread rapidly across the world [1]. Recent studies mainly focused on the epidemiological and clinical characteristics of patients with confirmed infection [1,2]. Little attention has been paid to environmental virus surveillance in the isolation ward of COVID-19. Thus, we conducted this study to evaluate the sites of environmental contamination on a COVID-19 isolation ward.

The isolation ward was divided into three zones (clean zone, contaminated zone, and semi-contaminated zone) with two access points for patients and medical staff, respectively. All medical staff took strict personal protective equipment and disinfection before entering and leaving the contaminated zone. The clean zone and contaminated zone were disinfected with 1000 mg/L chlorine dioxide for 30 min, including ground, wall, and surface objects. Air was disinfected using an air sterilizer according to the manufacturer's protocol and ventilated twice a day for 30 min each.

A total of 84 sites of the isolation ward had a surface virus nucleic acid tested by swab sampling. The sites included the surfaces of chairs, printer, keyboard, telephone, table, trolley, drawer, air sterilizer, personal digital assistant (PDA), blood sugar meter, blood pressure meter, corridor handrail, stair handrail, water-free hand sanitizer, wheelchair, fridge, washstand, and multiple sites in the patient room.

The RT–PCR assay for SARS-CoV-2 amplified simultaneously two target genes: open reading frame 1ab (ORF1ab) and the ORF for the nucleocapsid protein (N). Positive (pseudovirus with a fragment of ORF1ab and N) and negative (pseudovirus with a standard fragment) quality control samples were tested simultaneously. A cycle threshold (C_T) value of <37 was defined as a positive test according to the recommendation from the National Institute for Viral Disease Control and Prevention (China) [3]. All patients in the contaminated zone were COVID-19 confirmed patients with a positive nucleic acid test.

This study was approved by the ethics committee of Zhongnan Hospital of Wuhan University (No. 2020011).

Nucleic acid detection was positive in six (7.1%) locations. In the semi-contaminated zone, three sites had positive detection of SARS-CoV-2, namely the surface of the drawer in the nurse station, and the washstand and drawer in the treatment room. In the contaminated zone, no sites in the patient room tested positive but one PDA was positive for the virus. In the clean zone, two sites had positive virus detection, namely the surface of the telephone receiver in the physician office and a push button of the water-free hand sanitizer.

In this study, we performed viral nucleic acid tests on contaminated, semi-contaminated, and clean zones of the COVID-19 isolation ward. Most sites tested negative for SARS-CoV-2. Negative virus detection in the patients' room may reflect the effectiveness of daily disinfection. However, the drawer at the nurse station had a positive detection; the virus could have been brought to this location by the nurses' frequent journeys in and out to care for the patients. In addition, we were not surprised by the positive detection in the treatment room, where patients underwent additional treatments, and the virus load may have been too high to be completely eliminated by routine disinfection. When the result was obtained, we told the cleaning staff to disinfect the abovementioned positive sites twice a day, including disinfecting the surface with 2000 mg/L of chlorine dioxide, and spraying 1000 mg/L of chlorine dioxide to disinfect the air in the treatment room.

Surprisingly, as the most frequently touched sites in the clean area, the surface of the telephone receiver in the physician office and the press button of the water-free hand sanitizer, had positive virus detection. These findings indicated that daily disinfection should be strengthened in the clean area of isolation ward. Moreover, it is equally important to keep the hands sanitized by using hand sanitizers.

In conclusion, to avoid apparent and occult SARS-CoV-2 infections among the medical staff, daily disinfection should be strengthened in both the contaminated zone and the clean zone of the isolation ward.

Conflict of interest statement
None declared.

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H. Wang[a,1]
P. Mo[b,1]
G. Li[c,1]
P. Chen[d,1]
J. Liu[a]
H. Wang[a]
F. Wang[a,*]
Y. Zhang[b]
Q. Zhao[a]

[a]*Department of Gastroenterology, Zhongnan Hospital of Wuhan University, Wuhan, China*

[b]*Department of Infectious Diseases, Zhongnan Hospital of Wuhan University, Wuhan, China*

[c]*Department of Gastroenterology, Wuhan Red Cross Hospital, Wuhan, China*

[d]*Department of Gastroenterology, The Central Hospital of Enshi Autonomous Prefecture, Enshi, China*

* Corresponding author. Address: Zhongnan Hospital of Wuhan University, Gastroenterology and Infectious Diseases, #169, East Lake Road, Wuchang District, Wuhan, 430071, China. Tel.: +86 13545156372.
E-mail addresses: fanndywang@foxmail.com (F. Wang); 13871500289@163.com (Y. Zhang); qiuzhao@whu.edu.cn (Q. Zhao)

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[1] These authors contributed equally to this work.