



# Severe Acute Respiratory Syndrome Coronavirus 2 Detection in the Radiology Department of Hospitals in Wuhan, China

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Dear Editor,

We have read the article by Chen et al. (1) published in the Korean Journal of Radiology with great interest concerning infection control and management strategy for coronavirus disease (COVID-19) in the department of radiology. Their valuable experiences provide important insights for those countries that are still fighting against COVID-19. Actually, at the beginning of the COVID-19 outbreak in Wuhan, we had initially attempted to assess the environment in the radiology department of hospitals in Wuhan. In this letter, we would like to report our findings

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regarding virus detection and observations on disinfection measures inside computed tomography (CT) suites.

We conducted environmental sampling in four CT rooms of two hospitals in Wuhan on February 1, 2020 and investigated their practices of disinfection. Three rooms (A, B, and C) were from a general hospital, and one (D) was from a specialty hospital of infectious diseases. Samples were collected 2 hours after routine cleaning with sterile pre-moistened swabs. A total of 200 environmental samples (50 swabs for each CT room) were collected from environmental surfaces and radiologists' personal protective equipment.

Real-time reverse-transcriptase polymerase chain reaction (RT-PCR) assay was performed using the AgPath-ID One-Step RT-PCR kit (Life Technologies). Two target genes, including the open reading frame lab and nucleocapsid protein, were simultaneously amplified and tested (2). Positive, indeterminate, and negative results were defined by a cycle threshold value of < 37, 37.0–39.9, and ≥ 40, respectively.

Table 1 shows the basic information of the four sites and the possible contaminated locations by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Six of 200 (3%) swabs were positive for the SARS-CoV-2 nucleic acid. All positive samples were from the general hospital. Positive samples were found both in CT and console rooms. Four of 200 (2%) samples showed indeterminate reactions, three from the general hospital and one from the specialty hospital.

Disinfection practices of the two hospitals were different. For sites A, B, and C, CT rooms were equipped with the Medical Plasma Air Disinfector (/PB600D, Shinva). Meanwhile, floors were cleaned using disinfectants (chlorine dioxide and sodium hypochlorite) thrice a day (8:00, 12:00, and 17:30). Surfaces of the equipment, CT bed, table-board, and four walls were wiped with disinfectants (sodium trichloroisocyanurate). In addition, frequently touched areas in the console room were cleaned with 75% (ethyl or isopropyl) alcohol. At site D, disinfection was performed using stationary germicidal ultraviolet disinfection lamps for 50 minutes according to diagnostic batches (batches of 20 patients each), and hydrogen peroxide solution was sprayed on surfaces and floors at 22:00.

The general hospital had setup triage stations and

**Table 1. Characteristics of Sampled Sites and Possible Contaminated Sites for Presence of SARS-CoV-2**

| Site | Patients Type       | Complete Isolation between Radiologists and Patients |           | Patients Number between Sampling and Routine Cleaning | Nucleic Acid Detection of Patients |              | Possible Contaminated Zone | Location of SARS-CoV-2 RNA               |                                                                |
|------|---------------------|------------------------------------------------------|-----------|-------------------------------------------------------|------------------------------------|--------------|----------------------------|------------------------------------------|----------------------------------------------------------------|
|      |                     | Corridor                                             | Scan Room |                                                       | Confirmed COVID-19                 | Non COVID-19 |                            | Positive                                 | Indeterminate                                                  |
|      |                     |                                                      |           |                                                       |                                    |              |                            |                                          |                                                                |
| A    | Febrile patients    | Yes                                                  | No        | 7                                                     | 7                                  | 0            | Scan room                  | Middle of CT bed, handrail of CT bed     | Inner surface of observation window (patient side), air outlet |
|      |                     |                                                      |           |                                                       |                                    |              | Console room               | Console table, shoe soles of radiologist | Shoe soles of radiologist                                      |
| B    | Emergency patients  | No                                                   | No        | 19                                                    | 11                                 | 8            | Scan room                  | Internal aperture of CT detector         | -                                                              |
|      |                     |                                                      |           |                                                       |                                    |              | Console room               | Floor (junction of inside and outside)   | -                                                              |
| C    | General patients    | Yes                                                  | No        | 8                                                     | 0                                  | 8            | -                          | -                                        | -                                                              |
| D    | COVID-19 inpatients | Yes                                                  | Yes       | 10                                                    | 10                                 | 0            | Scan room                  | -                                        | End of CT bed                                                  |

COVID-19 = coronavirus disease, CT = computed tomography, SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2

assigned three CT rooms (A, B, and C) for different patients. At sites A and B, both the scan room for patients and the console room for radiologists had positive-testing samples. It might be because radiologists were not completely isolated from patients in the scan room and contaminated the console room by moving in and out. At site C, all samples were negative, probably because all examinees were non-COVID-19 patients owing to the triage process. At site D, the console room had no positive samples. This is probably because radiologists were completely isolated from patients both in the corridor and in the scan room, making the console room relatively uncontaminated.

The possible contamination locations indicated that the viruses can deposit on surfaces within the room, including floors, walls, equipment, and even the air outlet. These findings are consistent with a recent study in which swabs taken from air exhaust outlets tested positive, suggesting that virus droplets may be displaced by airflows and deposited on equipment, such as vents (3). Therefore, we should be vigilant about the fact that the environment of the radiology department might be a potential medium of transmission.

Strict adherence to environmental and hand hygiene is a priority. Additionally, the setup of a triage station might decrease the risk of cross-infection inside CT suites. Moreover, radiologists operating in the console

room should be isolated from patients completely. Finally, radiologists must be well-informed of infection control protocols to be followed inside the CT suite in this epidemic situation. Considering the limitation of our findings, if the environment of radiology suites is assessed comprehensively, the following tips are provided: 1) besides surface sampling swabs, ambient air samples should also be collected; 2) to assess possible transmission risk, viruses should be cultured outside of the host to see whether they are viable and infectious or not.

#### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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We remember the sacrifice of all frontline medical workers who fought against COVID-19 in Wuhan.

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## Response

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To the Editor,

We sincerely appreciate your comment concerning our recent article "Infection Control and Management Strategy for COVID-19 in the Radiology Department: Focusing on Experiences from China" (1).

Nosocomial transmission of coronavirus disease (COVID-19) has been reported in many healthcare facilities (2, 3). Transmission may occur via droplets, contact, fomite, and airborne routes (4, 5). We appreciate Tang et al.'s work on severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) detection in the radiology department. In their study, the possible contamination location within computed tomography (CT) rooms included floors, walls, equipment, and even the air outlet. These findings may help us learn the extent of environmental contamination and mode of transmission in CT rooms. Furthermore, environment samples collected from both CT and console rooms at sites A and B, where radiologists were incompletely isolated from patients in scan rooms, tested positive for SARS-CoV-2. However, at site D, where radiologists were completely isolated from patients, the console room had no positive findings. These results suggest that complete isolation should be implemented between CT rooms and console rooms. As mentioned in our review (1), we recommend that radiographers stay in console rooms during the examination procedure. However, complete isolation is difficult if

patients have trouble ambulating, and radiographers might need to provide some help. At this time, radiographers should pay special attention to ensure the patients' safety while protecting themselves.

We are grateful to the findings of Tang et al. and believe their comments will enrich current knowledge and consolidate our infection control procedures in the future.

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