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LETTER TO THE EDITOR

Successful Experience Using a Temporary Laboratory Booth and a Drive-Through Screening Center for the Outbreak of COVID-19 in Daegu, South Korea

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INTRODUCTION

Since the novel coronavirus known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first detected in Wuhan, China, in December 2019, coronavirus disease (COVID-19) has spread rapidly to other countries [1]. In Korea, the number of confirmed patients increased in February 2020, tracing back to a religious group called Shincheonji based in the city of Daegu [2]. COVID-19 has become a threat to public health and health care organizations including hospitals, due to its high infectivity resulting in the urgent need for immediate decision-making and efforts to prepare a mass screening system. The real-time reverse transcriptase polymerase chain reaction (RT-PCR) method is recommended for COVID-19 diagnosis [3]. However, SARS-CoV-2 is not known in detail yet, and the risk of transmission in hospitals must be taken seriously. Here, we share a successful experience in the operation of a temporary laboratory booth for COVID-19 in a container box as a component of a drive-through (DT) screening center outside a hospital.

Specimen collection is an essential step in the diagnosis of COVID-19. The headquarters of the Kyungpook National University Chilgok Hospital in Daegu, South Ko-

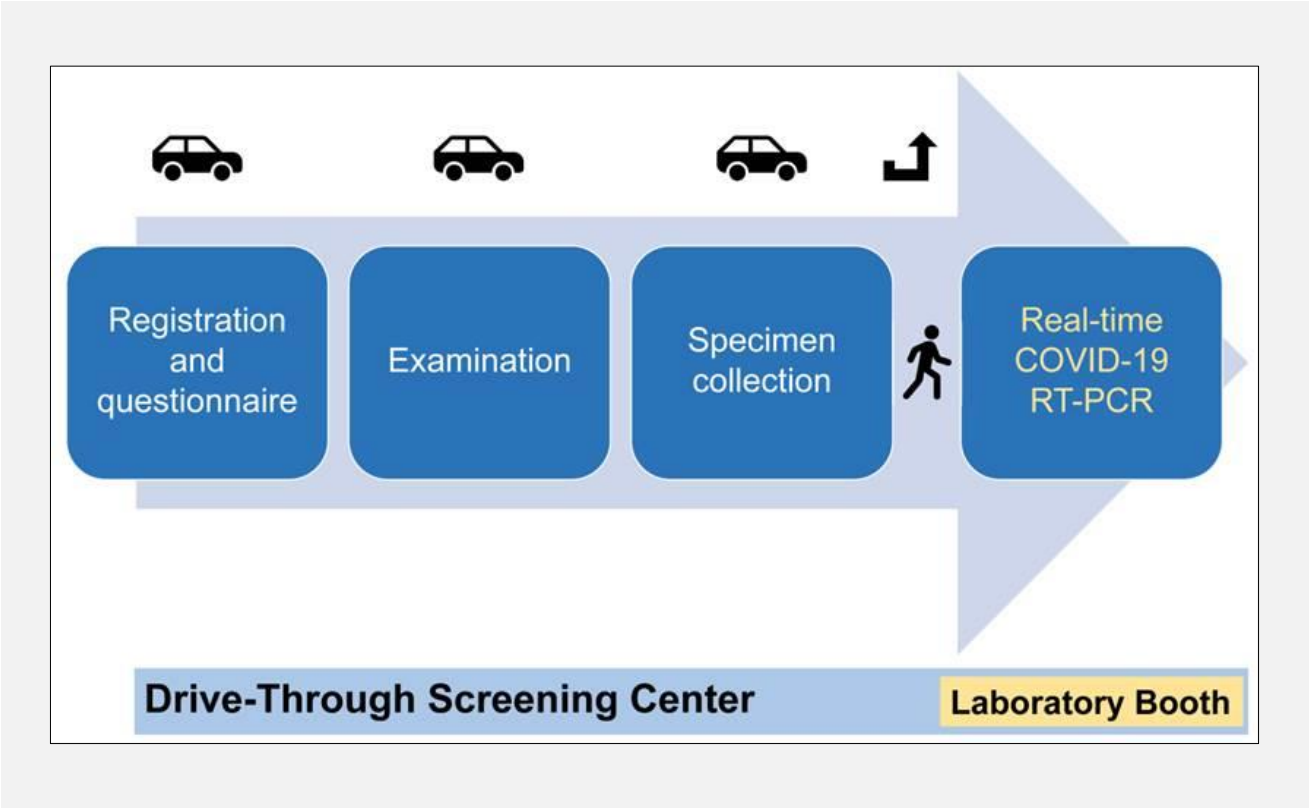

Figure 1. Scheme of a drive-through (DT) screening center for COVID-19, including a laboratory test booth.

rea, set up the first COVID-19 DT screening center in the country to fight against a massive community outbreak. The screening center was located in front of the hospital building, near the emergency room (ER), to speedily screen individuals suspected of having SARS-CoV-2 infection or patients under investigation and to keep our staff safe [4]. The ordinary workflow of the DT screening center was as follows: entrance, registration, medical history information and examination, specimen collection, instruction, and exit [4]. We added a laboratory test section for COVID-19 testing using real-time RT-PCR next to the specimen collection spot (Figure 1). A temporary laboratory booth within the DT screening center was built mainly to prevent the risk of spreading COVID-19 in the hospital and to shorten the turnaround time (TAT) of COVID-19 RT-PCR results.

The equipment of the temporary laboratory booth included a portable negative air machine, biosafety cabinet (BSC) class II, UV lamp, automated equipment for nucleic acid extraction, PCR machine, refrigerator, and computer for specimen and data management in a laboratory information system (LIS). The container booth was 3 m in width, 6 m in length, and 2.4 m in height - enough to accommodate all the equipment (Figure 2A, B). Following the guidelines of the Korean Society for Laboratory Medicine (KSLM) and the Korea Centers for Disease Control and Prevention (KCDC) [3], medical personnel wearing appropriate personal protective equipment collected the specimen, sealed and packed it in primary and secondary containers, and handed it to the laboratory staff after disinfecting the package surface. The testing personnel (also wearing protective equipment) handled the specimens in a class II BSC inside the booth [5,6]. Due to space limitations, nucleic acid extraction was performed outside the BSC. Tests were operated by selected laboratory staff wearing N95 masks, long-sleeved open-back gowns, disposable double gloves, face shields or goggles, surgical caps, and shoe covers. The real-time COVID-19 RT-PCR test was performed four times a day (7 AM, 10 AM, 4 PM, and 11 PM) to reduce the TAT of test results. After the procedure, all the working spots, including the bench, were thoroughly disinfected.

Generally, the laboratory where real-time COVID-19 RT-PCR testing can be performed is located inside a hospital building, not separated from other routine laboratory testing areas, creating concerns about laboratory contamination and infection of laboratory personnel. Moreover, the specimens for COVID-19 testing should be transported via a separate route by person to address the risk of specimen leakage inside the hospital, which could be disastrous to the patients or hospital staff [7]. The addition of a temporary laboratory booth for COVID-19 testing as a part of the DT screening center

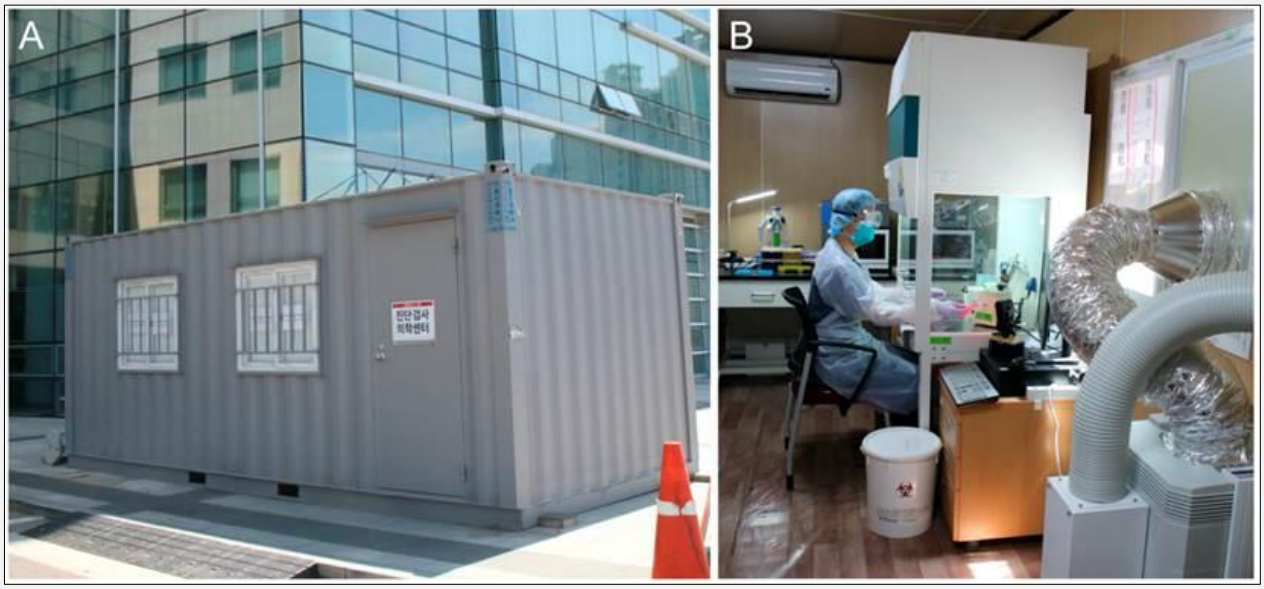

Figure 2.

A. Outside of a temporary laboratory booth for real-time COVID-19 RT-PCR testing, which was constructed within a container box 3 m in width, 6 m in length, and 2.4 m in height.
COVID-19 - coronavirus disease, RT-PCR - reverse transcriptase polymerase chain reaction.
B. Reception of specimen by a laboratory staff member from BSC class II to the computer LIS through the translucent BSC wall in a container box.
BSC - biosafety cabinet, LIS - laboratory information system.

was part of the effort to make the transportation distance of specimens as short as possible and also to fully use the natural outdoor air ventilation to prevent hospital infection. Moreover, specimens of the patients visiting the ER in need of COVID-19 testing could be sent immediately to the temporary laboratory due to its close distance.

Three months after starting the COVID-19 testing, we have worked without accidental infection, confirmed by a regular monthly evaluation of every laboratory personnel performing PCR. For small hospitals or health care organizations that do not have biosafety level 2 laboratories or independent spaces for such tests, operating a temporary laboratory booth in a container box can help to manage the ongoing COVID-19 pandemic and unexpected infectious disease outbreaks in the future.

Contributions:

Ji Yeon Ham drafted the article; Kyung-Min Lee and Nan Young Lee drafted figures and approved the final version to be published; Ki Tae Kwon, Gyu-Seog Choi and Jin Ho Sohn provided criticism of the manuscript and approved the final version; Kyung Eun Song designed this study and supervised the writing of this manuscript. All authors have read and approved the final draft of this paper.

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Ethical Approval:

Authors state that approval was not required.

Declaration of Interest:

None to declare.

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