



## Correspondence



# Glove-Wall System for Respiratory Specimen Collection and COVID-19 Mass Screening

Bo Kyung Koo <sup>1,2</sup>, Ji Hwan Bang <sup>1,3</sup>, Sun-Young Kim <sup>4</sup>, Eun Jin Kim <sup>4</sup>, and Sang-Won Park <sup>1,3,4</sup>

<sup>1</sup>Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Korea

<sup>2</sup>Division of Endocrinology, Department of Internal Medicine, Seoul National University Boramae Medical Center, Seoul, Korea

<sup>3</sup>Department of Internal Medicine, Seoul National University Boramae Medical Center, Seoul, Korea

<sup>4</sup>Infection Control Office, Seoul National University Boramae Medical Center, Seoul, Korea



Received: Apr 8, 2020

Accepted: Apr 12, 2020

### Corresponding Author:

Sang-Won Park, MD

Department of Internal Medicine, Seoul National University College of Medicine & Boramae Medical Center 20, Boramaero-5-gil, Dong-jak gu, Seoul 07061, Korea.

Tel: +82-2-870-2224


Fax: +82-2-870-3863

E-mail: hswon1@snu.ac.kr

Copyright © 2020 by The Korean Society of Infectious Diseases, Korean Society for Antimicrobial Therapy, and The Korean Society for AIDS

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.


### ORCID iDs

Bo Kyung Koo 


<https://orcid.org/0000-0002-6489-2656>

Ji Hwan Bang 


<https://orcid.org/0000-0002-7628-1182>

Sun-Young Kim 

<https://orcid.org/0000-0002-7183-3806>

Eun Jin Kim 

<https://orcid.org/0000-0003-3339-7238>

Sang-Won Park 

<https://orcid.org/0000-0002-0550-1897>

Dear Editor:

In response to the coronavirus disease 2019 (COVID-19) pandemic, Korea has devised an effective strategy for massive diagnostic testing combined with isolation [1-3]. Specimen collection for COVID-19 requires heavy personal protective equipment (PPE) which is exhausting for the examiner and difficult during mass screening. Therefore, we implemented the 'Glove-Wall system' at a screening clinic since 10th February 2020 first reported ever in the literature.

The Glove-Wall is composed of a translucent plate window with a pair of sleeved gloves (Fig. 1A). A physician determines the patient eligibility according to the COVID-19 criteria. Respiratory specimen is collected from the suspected patient in the Glove-Wall area where the examiner and examinee are completely separated (Fig. 1B). The examiner needs minimum PPE and does not need to change PPE between patients; therefore, the wait time is minimal. Specimen containers dropped into a collection box are sent to a laboratory as a batch after each session.

To secure the safety of the examinees side and prevent cross-contamination from the surrounding environment, the examiner disinfects the fixed gloves between patients using alcohol and quaternary ammonium wipes approved for coronavirus (Fig. 1C) [4]. Each examinee is instructed to perform hand hygiene with alcohol products before and after exit. After each session, the entire room is cleaned and disinfected with diluted sodium hypochlorite [4]. The fixed gloves are regularly replaced. Single use gloves are worn over the fixed sleeved thin gloves for every procedure (Fig. 1D).

To prevent airborne transmission from previous candidates and allow rapid air change, the examinee's space is designed to be small (2.5 m x 1.3 m x 2.5 m) with a volume of 8.1 m<sup>3</sup> and a 1 m x 2 m sized door leading to open air. For effective ventilation and filtration, a portable negative pressure machine is installed with an airflow rate at 530 m<sup>3</sup>/h and 65 air changes per hour that removes 99% of airborne contaminants in 5 minutes [5, 6]. The ventilation safety is secured during the 5-minute interval between patients.

About 1,000 diagnostic procedures were performed in a 5 week-period, and any procedure-related healthcare worker infection was not reported. The application may be flexible in

**Conflict of Interest**

No conflicts of interest.

**Author Contributions**

Conceptualization: BKK, EJK, JHB, SWP. Data curation: BKK, EJK, SWP. Methodology: BKK, EJK, JHB, SYK, SWP. Resources: EJK, SYK. Writing - original draft: BKK. Writing - review & editing: EJK, JHB, SWP. Supervision: JHB, SWP.



**Figure 1.** Glove-Wall system in a COVID-19 screening clinic.

**(A)** Collection of respiratory specimen for a COVID-19 test using Glove-Wall: The Glove-Wall completely separates the examinee and examiner. **(B)** The layout of a COVID-19 screening clinic in Boramae Medical Center. The physician room is separated from the examination room. **(C)** Surface disinfection and cleaning with alcohol and quaternary ammonium wipes. **(D)** Use of single-use gloves that are worn over the fixed sleeved gloves. Informed consent was obtained from the individuals in the image for the publication of this report.

different situations. Multiple units will be needed to handle large-scale testing. Additionally, the examinee's space can be modified as needed, for example, open air system can be adopted in warm climates.

In summary, the Glove-Wall system for respiratory specimen collection has improved examiner's safety, minimum PPE requirement, and limited examinee's safety.

**ACKNOWLEDGEMENTS**

We greatly appreciate all members of COVID-19 Boramae Task Force Team. Specially thanks to Eun Young Heo, Hui Jai Lee, Eunmi Jo, Su Hui Ko, Koung Jin Lee, Suk Hee Jung, Namhee Kim, Mi Seon Han, Doeg Kyeom Kim, and Jae Hyup Lee.

**REFERENCES**

1. Kucharski AJ, Russell TW, Diamond C, Liu Y, Edmunds J, Funk S, Eggo RM; Centre for Mathematical Modelling of Infectious Diseases COVID-19 working group. Early dynamics of transmission and control of COVID-19: a mathematical modelling study. *Lancet Infect Dis* 2020. [Epub ahead of print].

**CROSSREF**

2. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, Liu L, Shan H, Lei CL, Hui DSC, Du B, Li LJ, Zeng G, Yuen KY, Chen RC, Tang CL, Wang T, Chen PY, Xiang J, Li SY, Wang JL, Liang ZJ, Peng YX, Wei L, Liu Y, Hu YH, Peng P, Wang JM, Liu JY, Chen Z, Li G, Zheng ZJ, Qiu SQ, Luo J, Ye CJ, Zhu SY, Zhong NS; China Medical Treatment Expert Group for Covid-19. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020. [Epub ahead of print].

**CROSSREF**

3. Korean Society of Infectious Diseases; Korean Society of Pediatric Infectious Diseases; Korean Society of Epidemiology; Korean Society for Antimicrobial Therapy; Korean Society for Healthcare-associated Infection Control and Prevention; Korea Centers for Disease Control and Prevention. Report on the epidemiological features of coronavirus disease 2019 (COVID-19) outbreak in the Republic of Korea from January 19 to March 2, 2020. *J Korean Med Sci* 2020;35:e112.

**CROSSREF**

4. World Health Organisation (WHO). Laboratory biosafety guidance related to the novel coronavirus (2019-nCoV). Available at: [https://www.who.int/docs/default-source/coronaviruse/laboratory-biosafety-novel-coronavirus-version-1-1.pdf?sfvrsn=912a9847\\_2](https://www.who.int/docs/default-source/coronaviruse/laboratory-biosafety-novel-coronavirus-version-1-1.pdf?sfvrsn=912a9847_2). Accessed 20 March 2020.
5. Centers for Disease Control and Prevention (CDC). Guidelines for environmental infection control in health-care facilities 2003. Available at: <https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines-P.pdf>. Accessed 20 March 2020.
6. Jensen PA, Lambert LA, Iademarco MF, Ridzon RCDC. Guidelines for preventing the transmission of *Mycobacterium tuberculosis* in health-care settings, 2005. *MMWR Recomm Rep* 2005;54:1-141.

**PUBMED**