



The COVID-19 Pandemic Response System at University Level: The Case of Safe Campus Model at Ewha Womans University

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Key Words

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In response to the changes in the Coronavirus disease 2019 (COVID-19) epidemic situation, Ewha Womans University established Ewha Safe Campus (ESC), an on-campus infection outbreak management system, to allow students and faculty members to safely resume face-to face classes in 2022. The COVID-19 testing station, Ewha Safe Station, is the core element of ESC. Symptomatic students and faculty members perform a combo swab self-PCR test or receive a nasopharyngeal swab PCR test from experts to prevent the spread of COVID-19 through early detection and management. ESC is significant in that it detects infection risks and proactively implements preemptive measures in a university. The COVID-19 health response system model at the university level was applied for the first time in South Korea, reaching a milestone in the history of university health in South Korea. In particular, it is highly valuable that the test was free of charge, as it enabled all of the examinees to have easy access to the test through joint cooperation with the Seegene Medical Foundation. This is a successful example of cooperation between schools and private institutions for public health improvement. In the future, the direct and indirect effects of the establishment and implementation of ESC need to be evaluated and confirmed, and areas requiring improvements need to be identified in preparation for another infectious disease outbreak in the future.

Background

On March 11, 2020, the World Health Organization (WHO) declared the Coronavirus disease 2019 (COVID-19) a global pandemic [1]. As of January 31, 2022, the global cumulative numbers of confirmed cases and deaths of COVID-19 reached 376,854,195 and 5,695,057, respectively [2]. The first case of COVID-19 infection in South Korea was reported in January 2020 [3]. By the end of January 2022, there had been four epidemics in South Korea. As of January 31, 2022, the

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cumulative numbers of confirmed cases and deaths in South Korea were 845,610 and 6,755, respectively [4]. As the pandemic continued, the virus mutated, which affected South Korea. In the fourth epidemic, which lasted about six months starting in July 2021 in South Korea, the Delta variant was the major cause [3]. In November 2021, the South Korean government implemented Living with COVID, a phased recovery to “normal daily lives” [3]. In the end of January 2022, the Omicron variant, which is considered to have a higher transmission rate and lower severity rate than previous variants, spread. Living with COVID was maintained, with high vaccination rates and treatment dissemination [3]. In March 2022, the South Korean government requested the establishment of an autonomous preventative measure system for universities to mark the beginning of the semester which coincided with the fifth epidemic caused by the Omicron variant [5].

Establishment of the Ewha Safe Campus at Ewha Womans University

In response to the changes in the COVID-19 epidemic situation, Ewha Womans University (EWU) established Ewha Safe Campus (ESC), an on-campus infection outbreak management system, to allow students and faculty members to safely resume face-to-face classes in 2022. The COVID-19 testing station, Ewha Safe Station (ESS), is the core element of ESC. Symptomatic students and faculty members perform a combo swab (nasal and oral) self-PCR test or receive a nasopharyngeal swab (NPS) PCR test from experts to prevent the spread of COVID-19 through early detection and management.

1. The executive committee for Ewha Safe Campus (ESC)

With the Vice President of the EWU Office of General Administration as the chairperson, the executive committee for the establishment of ESC is comprised of the Medical School, Medical Center, Office of Faculty & Academic Affairs, Office of Student Affairs, Office of General Administration, Office of Facilities Management, Office of Information and Communications, Office of University Relations and Development, Office of Communications, and University Health Service Center. The executive committee divided and coordinated the work of each participating department and supervised the overall implementation of ESC.

2. Establishment of a cooperative system with external organizations

The tests were conducted free of charge under cooperation with the Seegene Medical Foundation, a specialized molecular diagnostics company that provided the diagnostic kit supply, which is essential for ESC operation. Unlike NPS specimen, which is a sample collection method for COVID-19 diagnosis that is considered to be the gold standard, but is uncomfortable and requires collection by professional, combo swabs have the advantage of minimal pain (minimally invasive) by self-collecting both nasal swab (scrubbing the inner surface of the nostril with a cotton swab) and oral swab (scraping the inner surface of the mouth with a cotton swab).

In addition to NPS, the US Centers for Disease Control and Prevention (CDC) permits the use of numerous other upper respiratory specimens, such as oropharyngeal swab, nasal swab, saliva, and nasal wash [6]. Numerous prior publications indicate that saliva is a suitable alternative specimen for COVID-19 diagnosis [6–9] and that combination specimens such as oropharyngeal swab and nasal swab have diagnostic performance comparable to NPS [7,10].

Furthermore, a cooperative system was established with Seodaemun Public Health Center in

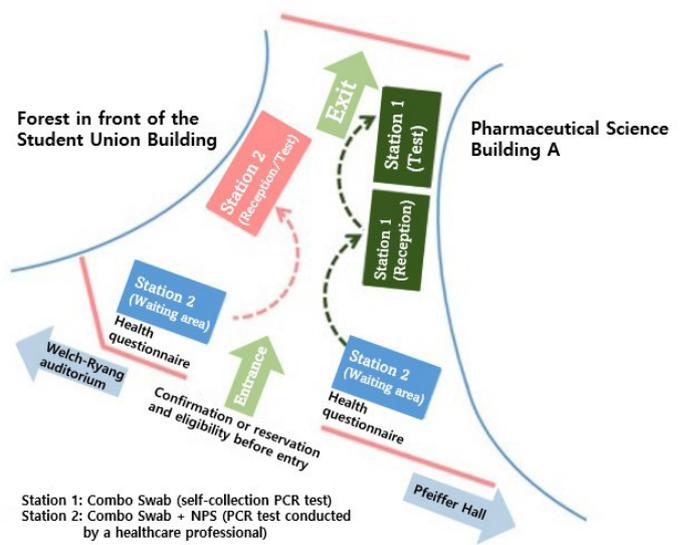
Seodaemun District Office for immediate reporting of ESS test results. The immediate reports were then systemized to enable prompt notification, basic epidemiological investigation, and management of the confirmed cases.

3. Installation and operation of Ewha Safe Station (ESS)

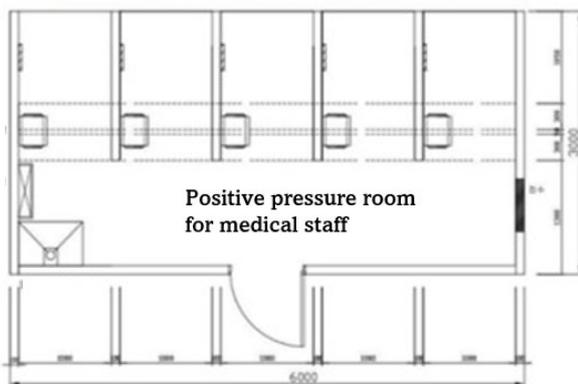
Installed on the EWU campus, the ESS was piloted on February 22, 2022, and the main test started on March 2nd (Fig. 1) and included students and all faculty members, including staff from service companies (Description of test stations 1 and 2).

After the executive committee discussion, the subjects were defined as follows:

- (1) Mandatory testing was required for those who were symptomatic, those who had close contact with confirmed cases, and students in dormitories.
- (2) Testing was highly recommended to those who used crowded facilities such as classes with potential droplet exposure, research facilities, the library, examination preparation classes,



Self-collection test booth (examinee side)



Self-collection test booth cross-sectional plan

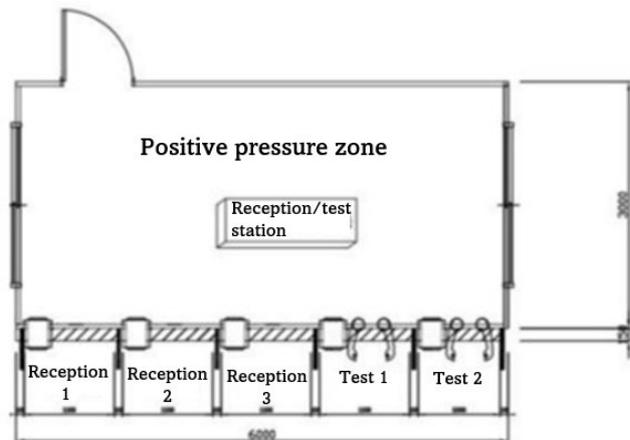


Fig. 1. The EWU COVID-19 testing areas (ESSs). The map of Ewha Safe Stations. The combo swab testing area and symptomatic testing area were separately operated. COVID-19, Coronavirus disease 2019.

and the gym.

(3) Those who tested negative but showed symptoms such as a fever over 37.5°C were required to get re-tested after three days.

(4) When there was a confirmed case, an epidemiological investigation was conducted to identify the mobility trends so the EWU Daily Life Recovery Support Headquarters could inform individual students via text messages. Testing was mandatory for those who had overlapped mobility trends with confirmed cases. Furthermore, for the early detection of asymptomatic patients, weekly tests for vaccinated students and biweekly tests for unvaccinated students were required.

In the ESC, patients with respiratory symptoms were collected Combo Swabs and NPS samples simultaneously, whereas subjects without respiratory symptoms were only collected Combo Swabs. The patient self-collected Combo Swabs under the observation of the health care experts, while the health care experts collected NPS. Patients who are symptomatic, have had close interactions or shared social activities with confirmed patients, and are positive in the Combo Swab test must take both the Combo Swab and the NPS test at the same time during their ESC visit. In all other instances, just the Combo Swab test was performed. The former should take the examination at ESS 2 while the latter should take it at ESS 1, hence reducing contact between subject groups with a high risk of confirmation and those with a relatively low risk.

All exams must be scheduled using Eureka's reservation system (Ewha Womans University Portal). 15-min reservations are restricted to 30 guests. Patients with abrupt onset of symptoms, however, can undergo an on-site test without reservation. The ESC was operational on weekdays from 9 a.m. to 4:30 p.m. for a total of 6 hours and 30 min, omitting one hour for lunch. The test results were communicated through text message before 7 p.m. on the same day or before 10 a.m. the next day. If the test result is positive, the appropriate public health facility is contacted and the subjects are instructed to take follow-up measures, including limits on school and any outside activities. If the student's enrollment was verified, she may seek a make-up class.

Conclusion and Recommendations

Although the elderly have high ratios of severe COVID-19 and death due to COVID-19, the young and middle-aged, who are socially active, have relatively high infection risks [11]. With active face-to-face contact, preventative measures need to be proactively prepared in universities. ESC from EWU is significant in that it detects infection risks and proactively implements preemptive measures in a university. As one of the factors that contributed to South Korea's successful COVID-19 response, early detection testing was applied at the university level, and the COVID-19 health response system model was applied for the first time in South Korea, reaching a milestone in the history of university health in South Korea. In particular, it is highly valuable that the test was free of charge, as it enabled all of the examinees to have easy access to the test through joint cooperation with the Seegene Medical Foundation. This is a successful example of cooperation between schools and private institutions for public health improvement. In the future, the direct and indirect effects of the establishment and implementation of ESC need to be evaluated and confirmed, and areas requiring improvements need to be identified in preparation for another infectious disease outbreak in the future.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Not applicable.

References

1. World Health Organization. Timeline: WHO's COVID-19 response [Internet]. Geneva (CH): World Health Organization; c2022 [cited 2022 Sep 23]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/interactive-timeline>
2. World Health Organization. WHO COVID-19 dashboard [Internet]. Geneva (CH): World Health Organization; c2020 [cited 2022 Sep 23]. Available from: <https://covid19.who.int/>
3. Korea Disease Control and Prevention Agency. Public Health Weekly Report: Korea Disease Control and Prevention Agency [Internet]. Cheongju (KR): Korea Disease Control and Prevention Agency; c2022 [cited 2022 Sep 23]. Available from: https://www.kdca.go.kr/board/board.es?mid=a30501000000&bid=0031&cg_code=C06
4. Korea Disease Control and Prevention Agency. COVID-19 [Internet]. Cheongju (KR): Korea Disease Control and Prevention Agency; c2019 [cited 2022 Jan 31]. Available from: https://ncov.kdca.go.kr/bdBoardList_Real.do?brdId=1&brdGubun=11&ncvContentSeq=&contSeq=&board_id=&gubun=
5. Ministry of Education. Ministry of Education [Internet]. Sejong (KR): Ministry of Education; c2022 [cited 2022 Oct 13]. Available from: <https://www.moe.go.kr/boardCnts/viewRenew.do?boardID=294&boardSeq=90598&lev=0&searchType=null&statusYN=W&page=30&s=moe&m=020402&opType=N>
6. Lee RA, Herigon JC, Benedetti A, Pollock NR, Denkinger CM. Performance of saliva, oropharyngeal swabs, and nasal swabs for SARS-CoV-2 molecular detection: a systematic review and meta-analysis. *J Clin Microbiol* 2021;59(5):e02881-20.
7. Nasiri K, Dimitrova A. Comparing saliva and nasopharyngeal swab specimens in the detection of COVID-19: a systematic review and meta-analysis. *J Dent Sci* 2021;16(3):799-805.
8. Takeuchi Y, Furuchi M, Kamimoto A, Honda K, Matsumura H, Kobayashi R. Saliva-based PCR tests for SARS-CoV-2 detection. *J Oral Sci* 2020;62(3):350-351.
9. Moraleda C, Domínguez-Rodríguez S, Mesa JM, García-Sánchez P, de la Serna M, Alonso-Cadenas JA, et al. Oral saliva swab reverse transcription PCR for Covid-19 in the paediatric population. *Arch Dis Child* 2022;1-8.
10. Wehrhahn MC, Robson J, Brown S, Bursle E, Byrne S, New D, et al. Self-collection: An appropriate alternative during the SARS-CoV-2 pandemic. *J Clin Virol* 2020;128:104417.
11. Salvatore PP, Sula E, Coyle JP, Caruso E, Smith AR, Levine RS, et al. Recent increase in COVID-19 cases reported among adults aged 18–22 years — United States, May 31–September 5, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69(39):1419-1424.