## Letter to the Editor

# SARS-CoV-2 IgG seroprevalence among medical staff in a general hospital that treated patients with COVID-19 in Japan: retrospective evaluation of nosocomial infection control

*Sir,*

During the coronavirus disease (COVID-19) outbreak in Japan, our hospital, while accepting patients with COVID-19, implemented standard preventive infection control measures according to the World Health Organization guidelines [1]. We accepted the first patient with COVID-19 from the *Diamond Princess* cruise ship on 18th February 2020, and 52 inpatients with COVID-19 were treated at the hospital until 31st July 2020. In the fever clinic for all febrile outpatients and the outpatient clinic for returning patients, recent arrivals or people with exposure to a patient with COVID-19, 48 outpatients were diagnosed with COVID-19, of whom 23 were hospitalized at the hospital. After the first COVID-19 pandemic wave, we evaluated the seroprevalence of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) immunoglobulin G (IgG) antibodies among our hospital medical staff in samples analysed with chemiluminescent microparticle immunoassay technology (Architect SARS-CoV-2 IgG kit, Abbott, Abbott Park, IL, USA) of which results are reported as an Index (ratio of the chemiluminescent signal between the samples and a calibrator, S/C) with a manufacturer-recommended positivity cut-off index of 1.40 S/C.

We assessed 806 medical staff during an annual medical check-up conducted between 1st June and 30th July 2020. Apart from one staff member who had mild COVID-19 in April 2020, none of the staff had been confirmed to have COVID-19 at any time. The study sample comprised 229 men and 577 women, with a median age of 33 (range 21—83) years, including 66 doctors, 363 nurses, 40 pharmacists, 37 radiology technicians, 57 laboratory medical technologists, 58 rehabilitation therapists and 185 other occupations. In total, 136 medical staff had direct contact with patients with COVID-19 while equipped with standard personal protective equipment. Among them, 59 medical staff worked on the ward for patients with COVID-19; 19 in the fever clinic; two in the clinic for returning patients, recent arrivals or people with exposure to a patient with

COVID-19; and 56 in the emergency department. The remaining 670 medical staff worked in the hospital without direct contact with patients with COVID-19. Six medical staff had IgG antibodies against SARS-CoV-2 [0.74%, 95% confidence interval (CI) 0.27—1.61, 6/806; median index value 4.19 S/C (range 1.76—6.40)]; the background characteristics are presented in Table I. Five of these cases were unexpected as they had not been diagnosed previously. Four cases had been asymptomatic in the months preceding the test, and one (Case 2) visited our fever clinic twice in April with typical COVID-19 symptoms (fever and gustatory and olfactory disorders); however, she could not be tested for COVID-19 by polymerase chain reaction (PCR) as the indications for SARS-CoV-2 PCR testing were limited at that time in Japan. The four undiagnosed medical staff (Cases 2—5) worked in two adjacent wards on the same floor, where close contact could have occurred among medical staff. Therefore, it is possible that an undetected infection transmission among staff may have resulted in the small-scale infection cluster.

In our study, none of the medical staff who had direct contact with patients with COVID-19 had SARS-CoV-2 IgG antibodies, similar to the findings of previous reports [2,3]. The SARS-CoV-2 IgG seropositive rate was 0% (95% CI 0.00—2.68, 0/136) among medical staff with direct contact with patients with COVID-19, and 0.90% (95% CI 0.33—1.94, 6/670) among medical staff without direct contact with patients with COVID-19. This could be because the medical staff who worked in the COVID-19 ward were selected from the hospital's medical staff volunteers. Therefore, they could have had better medical professionalism and been more aware of infection prevention even outside the hospital; moreover, they may have been able to continue to limit their daily life outside of the hospital voluntarily. Furthermore, medical staff living alone were preferentially recruited to the COVID-19 ward to prevent the spread of infection to family members. This may also have reduced infection transmission from family members to medical staff.

As positive controls, we enrolled 27 Japanese patients who were hospitalized with a confirmed COVID-19 diagnosis by reverse transcriptase PCR testing [median age 57 years (range 21—83 years); 61.5% men]. Serum samples from these patients were collected at a median time of 17 (range 14—30) days after symptom onset. The seropositivity rate for SARS-CoV-2 IgG antibodies was 100% (95% CI 96.38—100.00, 27/27), with a median index value of 5.78 S/C (range 1.68—7.68), confirming the high sensitivity of the test, albeit in a small number of cases among the Japanese population.

In conclusion, appropriate infection control measures when providing care to patients with COVID-19 could prevent

**Table I**
Clinical features of six medical staff at the study hospital who had severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) immunoglobulin G (IgG) antibodies

|  | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Case 6 |
|---|---|---|---|---|---|---|
| Age (years) | 23 | 29 | 23 | 23 | 31 | 71 |
| Sex | Female | Female | Female | Female | Female | Female |
| Occupation | Nurse | Nurse | Nurse | Nurse | Nurse | Nursing assistant |
| Symptoms | Fever, olfactory disorder, headache | Fever, gustatory and olfactory disorders | - | - | - | - |
| SARS-CoV-2 IgG | 4.80 | 6.40 | 2.10 | 3.58 | 1.76 | 5.00 |
| Past infection | Confirmed by PCR test | Unconfirmed | Unconfirmed | Unconfirmed | Unconfirmed | Unconfirmed |
| Wards | A floor, west | B floor, west | B floor, west | B floor, west | B floor, east | C floor, west |
| Transmission | Sporadic | Small-scale nosocomial cluster in two adjacent wards on the same floor | | | | Sporadic |

PCR, polymerase chain reaction.

viral transmission among medical staff. This could be encouraging news for frontline staff fighting against this disease. To prevent a nosocomial COVID-19 cluster and continue appropriate infection control measures when treating patients with COVID-19, awareness of measures against community-acquired and nosocomial infections in situations that do not involve direct contact with patients with COVID-19 is crucial. Medical staff should be educated to embrace a new lifestyle outside the hospital to prevent infection, thereby preventing transmission of the virus in the hospital.

All medical staff provided written informed consent before study participation, and tacit informed consent was obtained from patients with COVID-19 through an opt-out notice on the institutional homepage. This study was reviewed and approved by the Tokushukai Group Ethics Committee (Approval Nos. TGE01475-008 and TGE01500-008).

## References

[1] World Health Organization. Rational use of personal protective equipment for coronavirus disease (COVID-19) and considerations during severe shortages: interim guidance. Geneva: WHO; 2020. Available at: https://www.who.int/publications/i/item/rational-use-of-personal-protective-equipment-for-coronavirus-disease-(covid-19)-and-considerations-during-severe-shortages [last accessed August 2020].

[2] Liu M, Cheng SZ, Xu KW, Yang Y, Zhu QT, Zhang H, et al. Use of personal protective equipment against coronavirus disease 2019 by healthcare professionals in Wuhan, China: cross sectional study. BMJ 2020;369:m2195.

[3] Nagano T, Arii J, Nishimura M, Yoshida N, Iida K, Nishimura Y, et al. Diligent medical activities of a publicly designated medical institution for infectious diseases pave the way for overcoming COVID-19: a positive message to people working at the cutting edge. Clin Infect Dis 2020. https://doi.org/10.1093/cid/ciaa694.

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