



Letter to the Editor

Absence of SARS-CoV-2 antibodies in health care workers of a tertiary referral hospital for COVID-19 in southern Vietnam



Dear Editor,

Recent reports (including those from this journal) showed the sero-prevalence of SARS-CoV-2 in health care workers worldwide was between 1.2% and 17.4%.^{1–4} Such knowledge is essential to assess the effectiveness of infection prevention measures and to minimize the risk of nosocomial infection.

In Vietnam, the first cases of coronavirus disease 2019 (COVID-19) were reported on 23rd January 2020. Since then there have been two major COVID-19 epidemic waves attributable to locally acquired infection, one in March/April and the second in July/August.⁵ In Ho Chi Minh City (HCMC), by 27th October 2020, 82 PCR confirmed cases of SARS-CoV-2 infection have been reported, with the last cases of the second wave occurring on 2nd August.

The Hospital for Tropical Diseases (HTD) in HCMC is a 660-bed tertiary referral hospital for patient with infectious diseases in southern Vietnam (population >40 million). HTD has 700 staff and two designated centres for COVID-19 patients located in the West and the East of HCMC. These two centres and the HTD main campus are run HTD members of staff, and are responsible for receiving and treating COVID-19 patients, especially those with severe infection, in southern Vietnam.⁶ As a reference laboratory, HTD is also responsible for SARS-CoV-2 testing in HCMC. By the end of August 2020, nearly 50,000 SARS-CoV-2 PCRs were conducted by the HTD laboratory.

During the last week of August, we conducted a sero-survey of SARS-CoV-2 antibodies amongst the HTD staff to assess the risk of nosocomial infection. We invited any hospital staff regardless of their occupations and the nature of their work to participate in the study. We collected demographics, occupation and information about SARS-CoV-2 exposure (caring for COVID-19 patients or conducting SARS-CoV-2 testing). For SARS-CoV-2 antibody measurement, we collected 5 ml plasma from each participant. We measured antibodies against the nucleocapsid (N) protein, a main immunogen of SARS-CoV-2 using Elecsys Anti-SARS-CoV-2 assay (Roche, Germany). The reported sensitivity and specificity this assay were 97.2% and 99.8% respectively.⁷ The institutional review board of HTD approved the clinical study.

Of 700 staff of HTD, 408 consented to enroll in the study (56% response rate). The study participants included all 97 staff who provided direct clinical care for COVID-19 patients, and all 34 staff whose work involved in processing respiratory samples from COVID-19 patients. The study participants aged from 20 to 60 years with a median of 32 years. Nurses were predominant, accounting for 35.3% (144/408), followed by medical doctors (64/408, 15.7%) and cleaners (42/408, 10.3%). More details about the characteris-

Table 1

Characteristics of the study participants.

Demography	
Age, y, median (range)	32 (20–60)
Sex (female/male), n/n	264/144
Type of occupation	N = 408
Nurse, n(%)	144 (35.3)
Medical doctor, n(%)	64 (15.7)
Cleaner, n(%)	42 (10.3)
Laboratory staff, n(%)	33 (8.1)
Non-lab technician, n(%)	22 (5.4)
Data entry clerk, n(%)	20 (5.0)
Pharmacist, n(%)	17 (4.2)
Maintenance staff, n(%)	6 (1.5)
Social worker, n(%)	7 (1.7)
Other, n(%)	9 (2.2)
Non-specified, n(%)	44 (10.8)
Types of SARS-CoV-2 exposure	N = 408
Providing care for COVID-19 patients*, n(%)	97 (23.8)
Handling respiratory samples from suspected COVID-19 patients, n (%)	34 (8.3)
No, n (%)	277 (67.9)
Fields of occupation	N = 15
COVID-19 patient ward, n(%)	3 (20)
Non-COVID-19 patient ward, n(%)	12 (80)

Note to: *including daily medical examination, performing intubation, taking swabs for follow up PCR diagnosis and facility cleaning.

tics of the study participants are presented in Table 1. None of the study participants had detectable antibodies against N protein.

Our study did not find evidence of SARS-CoV-2 antibodies in 408 HTD staff, including those providing care for COVID-19 patients or conducting laboratory diagnosis of SARS-CoV-2. The risk of nosocomial infection among health care workers is likely associated with the burden posed by the number admitted COVID-19 patients, especially those requiring mechanical ventilation. Of note, only one COVID-19 patient required mechanical ventilation at HTD since the start of the pandemic.

Other contributing factors may include early preparedness and experience gained from previous pandemics. Indeed, as part of COVID-19 response in Vietnam, HTD conducted safety training on COVID-19 patient management and laboratory safety for its designated staff in early January 2020; in advance of the first detection of SARS-CoV-2 in HCMC. To further reduce the risk of nosocomial infection, wearing a medical mask is mandatory for all COVID-19 patients, while being hospitalized. Additionally, many members of the current HTD staff have been frontline health care workers of several emerging infections over the last decades, including SARS in 2003, avian influenza A virus subtype H5N1 in 2004, pandemic flu caused by influenza A virus subtype H1N1 in 2009, and the current COVID-19 pandemic. Notably, previous surveillance did not find evidence of antibodies against SARS or avian influenza A virus subtype H5N1 in frontline health care workers in Vietnam.^{8,9}

Seasonal coronaviruses (OC43, NL63, HKU1 and 229E) are common causes of respiratory infection worldwide with seroprevalence increasing with age.¹⁰ It is likely that past infection with these coronaviruses might have occurred in a certain proportion of the study participants. Thus the results point to the potential of non-cross-reactivity between antibodies against these seasonal coronaviruses and the N protein of SARS-CoV-2 in the study participants. The extent to which sera collected from Vietnamese people prior to the COVID-19 pandemic could react with or neutralize SARS-CoV-2 merits further research.

In summary, antibodies against N protein of SARS-CoV-2 were not detected in 408 (56%) of health care workers of a major hospital for COVID-19 in southern Vietnam. While the results are reassuring, it remains important to conduct regular sero-surveys of SARS-CoV-2 in frontline health care workers to assess the risk of nosocomial infection. Such knowledge remains important to inform the implementation of infection prevention measures in health care settings.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

GT and LVT are supported by the Wellcome Trust of Great Britain (106680/B/14/Z and 204904/Z/16/Z, respectively). We are indebted to Ms Le Kim Thanh and the molecular diagnostic team of the Hospital for Tropical Disease for their support. We would like to thank Roche Diagnostics in Vietnam for kindly providing the diagnostic kit. Neither the funder nor Roche Vietnam had any role in the design of the study, the analysis, the contents of the manuscript, or the decision to publish.

References

1. Blairon L, Mokrane S, Wilmet A, Dessilly G, Kabamba-Mukadi B, Beukinga I, et al. Large-scale, molecular and serological SARS-CoV-2 screening of healthcare workers in a 4-site public hospital in Belgium after COVID-19 outbreak. *J Infect* 2020.
2. Chen Y, Tong X, Wang J, Huang W, Yin S, Huang R, et al. High SARS-CoV-2 antibody prevalence among healthcare workers exposed to COVID-19 patients. *J Infect* 2020;81(3):420–6.
3. Iversen K, Bundgaard H, Hasselbalch RB, Kristensen JH, Nielsen PB, Pries-Heje M, et al. Risk of COVID-19 in health-care workers in Denmark: an observational cohort study. *Lancet Infect Dis* 2020.
4. Korth J, Wilde B, Dolff S, Anastasiou OE, Krawczyk A, Jahn M, et al. SARS-CoV-2-specific antibody detection in healthcare workers in Germany with direct contact to COVID-19 patients. *J Clin Virol* 2020;128:104437.
5. Ministry of Health of Vietnam. Updated information about COVID-19 pandemic. Official page on acute respiratory infections COVID-19 [cited 2020 Oct. 27]. <http://ncov.moh.gov.vn>.
6. Chau NVV, Thanh Lam V, Thanh Dung N, Yen LM, Minh NNQ, Hung LM, et al. The natural history and transmission potential of asymptomatic SARS-CoV-2 infection. *Clin Infect Dis* 2020.
7. Ainsworth M, Andersson M, Auckland K, Baillie JK, Barnes E, Beer S, et al. Performance characteristics of five immunoassays for SARS-CoV-2: a head-to-head benchmark comparison. *Lancet Infect Dis* 2020.
8. Le DH, Bloom SA, Nguyen QH, Maloney SA, Le QM, Leitmeyer KC, et al. Lack of SARS transmission among public hospital workers, Vietnam. *Emerg Infect Dis* 2004;10(2):265–8.
9. Schultz C, Dong VC, Chau NV, Le NT, Lim W, Thanh TT, et al. Avian influenza H5N1 and healthcare workers. *Emerg Infect Dis* 2005;11(7):1158–9.
10. Dijkman R, Jebbink MF, El Idrissi NB, Pyrc K, Muller MA, Kuipers TW, et al. Human coronavirus NL63 and 229E seroconversion in children. *J Clin Microbiol* 2008;46(7):2368–73.

Nguyen Van Vinh Chau*, Le Mau Toan, Dinh Nguyen Huy Man,
Huynh Phuong Thao, Nguyen Phu Huong Lan, Dinh Thi Bich Ty,
Dinh Khac Hieu, Nguyen Thi My Tien, Nghiem My Ngoc, Le
Manh Hung, Nguyen Thanh Dung
Hospital for Tropical Diseases, Ho Chi Minh City, Vietnam

Tran Tan Thanh
Oxford University Clinical Research Unit, Ho Chi Minh City, Vietnam

Nguyen Thanh Truong
Hospital for Tropical Diseases, Ho Chi Minh City, Vietnam

Guy Thwaites
Oxford University Clinical Research Unit, Ho Chi Minh City, Vietnam
Centre for Tropical Medicine and Global Health, Nuffield Department
of Medicine, University of Oxford, Oxford, UK

Le Van Tan*
Oxford University Clinical Research Unit, Ho Chi Minh City, Vietnam

*Corresponding authors.

E-mail addresses: chaunvv@oucru.org (N.V.V. Chau),
tanlv@oucru.org (L.V. Tan)