A call to protect non-clinical frontliners in the fight against COVID-19: evidence from a seroprevalence study in the Philippines

Nimfa Putong,[5] Kristal An Agrupis,[1,2]* Annavi Marie Villanueva,[1,5] Shuichi Suzuki,[1,2] Ana Ria Sayo,[5] Efren Dimaano,[5] Ferdinand de Guzman,[5] Ruel Teaño,[5] Mary Jane Salazar,[2] Jan Wendzl Evangelista,[2] Alexis Dimapilis,[5] Jose Benito Villarama,[5] Koya Ariyoshi,[1] Kensuke Takahashi,[1,3] and Chris Smith[1,4]

[1]School of Tropical Medicine and Global Health, Nagasaki University, Japan
[2]San Lazaro Hospital—Nagasaki University Collaborative Research Office, Manila, Philippines
[3]Acute & Critical Care Unit, Department of Emergency Medicine, Nagasaki University Hospital, Nagasaki, Japan
[4]Department of Clinical Research, London School of Hygiene and Tropical Medicine
[5]San Lazaro Hospital, Manila, Philippines

Since the COVID-19 pandemic started in 2020, healthcare workers (HCW) and other hospital personnel have been regarded as "frontliners", and at increased risk of SARS-CoV-2 infection compared to the general population. As such, testing only symptomatic individuals or regular testing of HCWs who directly attend to COVID-19 patients or specimens may underestimate the extent of infection, and actual SARS-CoV-2 seroprevalence. Because of this, the World Health Organization has called for seroepidemiological surveys to assess the extent of infection amongst HCW and other populations to provide timely estimates of COVID-19 virus infection severity and inform public health responses and evidence-based policy decisions.[1]

We are conducting a longitudinal SARS-CoV-2 seroepidemiological investigation among employees of San Lazaro Hospital (SLH), a tertiary infectious disease referral hospital in Manila, Philippines. Here, we report the first phase of the study and the first estimates of SARS-CoV-2 seroprevalence amongst HCW in the Philippines. From March 8 to April 24, 2021, we invited all HCW (around ~1,200) in the hospital to be part of the study. We obtained blood samples for WANTAI SARS-CoV-2 Ab ELISA testing[2] (see supplementary material) and basic demographic data (name, age and sex) prior to COVID-19 vaccination roll-out from 525 hospital employees. Amongst them, ~60% of participants provided additional data on sociodemographic and clinical characteristics by answering and returning a questionnaire after the blood draw.

One hundred seventy eight HCWs (34%) were seropositive with an adjusted seroprevalence of 36% (95% CI: 30·0 - 38·1) using the Rogan and Gladen formula to account for the serological test sensitivity and specificity.[3] Differences in seropositivity HCWs were observed in different categories of education (p=0·006), household monthly income (p=0·001), occupation (p=0.009), and individuals with or without a history of previous confirmed COVID-19 infection (p<0·001) (Table 1). Healthcare support service staff (i.e. catering staff, janitorial service personnel, admission/receptionist clerks, drivers and security personnel) had increased odds of seropositivity compared with nurses (crude odds ratio [OR] 3.10, 95% CI 1.59-6.05, p-value=0.001), although statistical significance was lost after adjusting for age, income and education. HCWs in the highest income group had reduced odds of seropositivity (AOR 0.43, 95% CI 0.21 - 0.91, p-value=0.026) compared to the middle-income groups (Figure 1). The majority of the healthcare support service staff belonged to middle or low-income households. Our findings contrast with seroprevalence studies among HCWs in developed countries, where seroprevalence among those who had patient contacts were higher.[4,5] However, in our study it was not possible to determine whether infection was acquired inside or outside of the hospital.

We acknowledge some limitations to our analysis. Firstly, this is only a single-center study. Hence, we recommend that similar seroprevalence studies be conducted in different healthcare settings in the country. Secondly, in our study it was not possible to determine whether infection was acquired inside or outside of the hospital. Thirdly, certain occupations and male sex were predictors of missing data (i.e. less likely to return

Abbreviation: HCW, healthcare worker; SLH, San Lazaro Hospital

*Corresponding author: Kristal An Agrupis, San Lazaro Hospital-Nagasaki University Collaborative Research Office, Manila, Philippines.
E-mail address: agrupiskristalan@gmail.com (K.A. Agrupis).

Comment

the questionnaire). Finally, it is possible that our results presented in Table 1 may have been confounded with the effects of the missing data.

The findings in our study helped identify the non-clinical support service staff belonging to lower income households as having the highest risk for COVID-19 infection among the healthcare workforce. Their socioeconomic background, compounded by their nature of work, makes them the easiest target for COVID-19 infection. While it remains important to continue to protect clinical HCWs as essential assets against COVID-19, our findings provide a wake-up call to realign hospital policies to extend provision of periodic screening and hazard pay to these non-clinical front-liners who play significant roles in fighting COVID-19 but may be perceived to have lesser risk in acquiring the infection.

Author contributions

Nimfa Putong: methodology, resources, supervision, data interpretation, writing - review and editing; **Kristal An Agrupis:** conceptualisation, data curation, data interpretation, formal analysis, investigation, methodology, visualisation, writing - original draft; **Annavi Marie Villanueva:** conceptualisation, investigation, methodology, data interpretation, writing - review and editing; **Shuichi Suzuki:** conceptualisation, data curation, funding acquisition, project administration, resources, data interpretation, writing - review and editing; **Ana Ria Sayo:** resources, data interpretation, writing - review and editing; **Efren Dimaano:** data interpretation, writing - review and editing; **Ferdinand de Guzman:** data interpretation, writing - review and editing; **Ruel Teano:** data interpretation, writing - review and editing; **Mary Jane Salazar:** data curation, investigation, writing - review and editing; **Jan Wendzl Evangelista:** investigation, writing - review and editing; **Alexis Dimapilis:** data interpretation, writing - review and editing; **Jose Benito Villarama:** resources, data interpretation, writing - review and editing; **Koya Ariyoshi:** conceptualisation, methodology, supervision, data interpretation, writing - review and editing; **Kensuke Takahashi:** formal analysis, data interpretation, writing - review and editing; **Chris Smith:** conceptualisation, funding acquisition, methodology, resources, supervision, visualisation, data interpretation, writing - review and editing

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.lanwpc.2021.100353.

References

1 World Health Organization. Population-based age-stratified seroepidemiological investigation protocol for COVID-19 virus infection. (Ver 1.1). Available from: https://apps.who.int/iris/handle/10665/331656.
2 Wantai: COVID-19 Serology and Molecular Tests. WantaiBioPharm. [cited 2021 Aug 16]. Available from: http://www.ystwt.cn/covid-19/R.
3 Rogan WJ, Gladen B. Estimating Prevalence from the results of a screening test. *American Journal of Epidemiology* 1978 Jan 1;**107**(1):71–6.
4 Rudberg A-S, Havervall S, Månberg A, Jernbom Falk A, Aguilera K, Ng H, et al. SARS-CoV-2 exposure, symptoms and seroprevalence in healthcare workers in Sweden. *Nat Commun* 2020 Oct 8;**11**(1):5064.
5 Jespersen S, Mikkelsen S, Greve T, Kaspersen KA, Tolstrup M, Boldsen JK, et al. SARS-CoV-2 seroprevalence survey among 17,971 healthcare and administrative personnel at hospitals, pre-hospital services, and specialist practitioners in the Central Denmark Region. *Clin Infect Dis* 2020 Oct 3: ciaa1471.