LETTER TO THE EDITORS

Seroprevalence of SARS-CoV-2 IgG antibodies in the current COVID-19 pandemic amongst co-workers at a UK renal transplant centre

John T. Black, Usman Haroon, Samuel C. Barnes, Mayaleh Sameh & Bagul Atul

Department of Renal Medicine & Transplant, University Hospitals of Leicester NHS Trust, Leicester, UK
E-mail: john.black@uhl-tr.nhs.uk

SARS-CoV-2 (COVID-19) is a novel coronavirus, first reported in Wuhan, China, in December 2019. As of 10 November 2020, there have been over 50.4 million reported cases of COVID-19 worldwide, leading to more than 1.2 million reported deaths [1]. In particular, COVID-19 poses a greater threat to those who have multiple comorbidities [2].

Allied healthcare professionals are considered a cohort at higher risk of contracting SARS-CoV-2 than the general population, given their occupational exposure to both patients and other patient-facing co-workers. COVID-19 detection has been tested through polymerase chain reaction (PCR) testing of nose and throat swabs. While highly specific (approximately 95%), the sensitivity can be quite variable, with an estimated false-negative rate of around 2–29% [3]. Serum antibody testing is considered a better way of assessment of previous COVID infection. Whether the presence of antibodies confers complete immunity remains unclear [4], and it is yet to be determined what proportion of those who test positive via PCR go on to generate antibodies (Fig. 1).

		SARS-CoV-2 antibody	
		Positive	**Negative**
SARS-CoV-2 RNA	**Positive**	**8** (4.0%)	**2** (1.0%)
	Negative	**1** (0.5%)	**28** (14.0%)
	Not done	**15** (7.5%)	**146** (73.0%)

Figure 1 Results from RNA PCR tests as compared to antibody testing.

As part of the current pandemic, there were a small number of cases within the renal transplant team. Appropriate PCR testing was carried out to identify and isolate staff in this high-risk environment for immunosuppressed patients.

The aim of this short article was to report the prevalence of COVID-19 amongst staff in a single UK renal transplant centre, as assessed by both PCR and serological testing. All staff in the renal transplant department was offered testing for COVID-19 IgG antibodies from 29/05/2020 until 03/08/2020. The cohort comprised of nurses, doctors, healthcare assistants, administrative staff and other allied healthcare professionals across both inpatient and outpatient settings. All study participants were volunteers. Nose/throat PCR was performed on staff members reporting symptoms (39/200), who were then sent home to self-isolate as per national government advice. Personal protective equipment worn by transplant healthcare co-workers included a standard surgical mask, a plastic apron and single-use disposable gloves as recommended by local infection control policy.

Informed, written consent from participants was obtained prior to testing for IgG serum antibodies. Antibody testing was conducted with the SARS-CoV-2 assay from Abbott International, who reported 100% sensitivity (95% confidence interval, 95.9–100) for samples ≥14 days postsymptom onset [5]. Public Health England validated this study and found the assay to have a sensitivity of 92.7% (85.6–97.0 confidence interval), with a specificity of 100% (99.1–100 CI) [5]. IgA antibodies were not tested because of test kit availability during this period, although this may be more accurate for future assessment of immunity because of their specificity in the respiratory tract.

Electronic staff records were accessed to obtain data. These data were anonymized by hospital number. The incidence of positive PCR tests and the prevalence of positive serology testing were collated. Statistical analysis was performed on data collected using simple percentages and means ± standard deviation (SD).

doi:10.1111/tri.13791

Two hundred NHS healthcare workers with a mean age of 45.3 ± 12.0 (50 males, 150 females) from the department of renal medicine and transplant surgery participated in this study. Following the initial outbreak, 39 members of front-line staff (19.5%) underwent nasal/throat RNA PCR testing irrespective of symptoms or exposure. Of those tested, 10/39 (26%) tested positive for SARS-CoV-2.

IgG antibody testing was rolled out in the Trust on 29/05/2020 and to date has been performed on 200 members of staff in the department. SARS-CoV-2 IgG antibody was detected in 24/200 co-workers, giving a seroprevalence amongst this cohort of 12.0%.

Comparing the data from antibody testing with the SARS-CoV-2, RNA PCR nose/throat swab showed eight staff members had a positive swab who went on to have positive antibody results. In our data, 28 co-workers (14.0%) who had a negative swab also were negative for antibodies.

The vast majority of co-workers were antibody-negative (88%). Interestingly, two symptomatic co-workers who received a positive nose/throat RNA PCR test subsequently went on to test negative for IgG antibodies (1%). This could be explained either by false-positive results from nose/throat PCR RNA testing or that exposure to SARS-CoV-2 acutely does not reliably guarantee seroconversion in the form of IgG antibodies. According to some estimates, the herd immunity threshold is approximately 67%, assuming an R_0 of 3 [6]. The data from this study illustrate very low seroconversion rates for staff members in a high-risk, exposed population. Rather than relying on herd immunity, it would be beneficial to vaccinate individuals once this is available.

Our data suggest that an overall small proportion of front-line co-workers from a high-risk healthcare environment developed SARS-CoV-2 IgG antibodies. Therefore, the assumption of herd immunity secondary to acute infection exposure remains questionable. Larger studies amongst healthcare co-workers are required to evaluate this further to assess the need for potential effective vaccination of healthcare co-workers in a high-risk group.

REFERENCES

1. WHO Coronavirus Dashboard [Internet]. World Health Organisation, 2020. [Cited 4th June 2020]. Available from: https://covid19.who.int/.
2. Yang J, Zheng Y, Gou X, *et al.* Prevalence of comorbidities and its effects in patients infected with SARS-CoV-2: a systematic review and meta-analysis. *Int J Infect Dis* 2020; **94**: 91.
3. Arevalo-Rodriguez I, Buitrago-Garcia D, Simancas-Racines D, *et al.* False-negative results of initial RT-PCR assays for COVID-19: a systematic review. *medRxiv* 2020.
4. Altmann DM, Douek DC, Boyton RJ. What policy makers need to know about COVID-19 protective immunity. *Lancet* 2020; **395**: 1527.
5. Public Health England. *Evaluation of the Abbott SARS-CoV-2 IgG for the Detection of Anti-SARS-CoV-2 Antibodies*. Public Health England, 2020.
6. Randolph H, Barreiro L. Herd immunity: understanding COVID-19 immunity. *Immunity* 2020; **52**: 737.