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Letter to the Editor

Screening for SARS-CoV-2 antibodies among healthcare workers in a university hospital in southern France


Dear Editor,

A recent study in this journal reported characteristics of healthcare workers (HCW) infected with SARS-CoV-2 in order to identify new cases as early as possible.¹ Here, we aimed to determine the serological status of HCW after the first wave of the epidemic, and the extent of their protective immunity. This is particularly important as this population will always be in the front line combating the probable continuation of the present epidemic.^{2,3} HCW can also be a source of transmission, introducing virus into a hospital harbouring many susceptible patients or co-workers.

From June 10, 2020 to July 10, 2020, 1 to 2 months after the end of lockdown in France, everyone who worked at Toulouse University Hospital ($n = 16\,571$) was invited for screening total serum antibodies by enzyme linked immunosorbent assay (ELISA) kit supplied by Wantai (Beijing Wantai Biological Pharmacy Enterprise Co., Ltd, China). The participation rate was 53% without associated bias. All sera from ELISA-positive personnel were screened for neutralizing antibodies.

The 8758 HCW who took part in the study (1719 (19.6%) males; 7039 females (80.4%)) had a median age of 40 years (interquartile range [IQR] 32–50). The ELISA test indicated that 276 HCW had SARS-CoV-2 antibodies, corresponding to an overall seroprevalence of 3.2% (95% confidence interval [CI] 2.8–3.5%). Seroprevalences in CHU units ranged from 0.7% to 7.3% (median: 3.6%) (Fig. 1.A) and varied from 0% to 9.2% (median: 3.4%) according to the professional status (Fig. 1.B). Physiotherapists were the caregivers with the highest seroprevalence rate (9.2%), just ahead of psychologists (5.5%) and physicians (5%). Midwives (0.9%), biologists (1.3%) and chemists (2.1%) had among the lowest seroprevalence rates. One third of the 276 COVID-positive HCW (84; 30.4%) were asymptomatic and 95.3% of HCW with SARS-CoV-2 antibodies had neutralizing antibodies (median 16, range: <2 to 256). Women had lower neutralizing antibody titers than men ($p = 0.02$) (Fig. 2.A) and asymptomatic HCW had lower neutralizing antibody titers than symptomatic workers ($p < 0.01$) (Fig. 2.B).

While only 3.2% of HCW developed total SARS-CoV-2 antibodies there was substantial variation between individual units. A previous study based on predictive models estimated that the burden of SARS-CoV-2 in Occitania was between 2.3% (95% CI: 1.4–4.2) and 2.4% (95% CI: 1.5–4.8).⁴ Our results are within the confidence intervals of these forecasts, suggesting that the virus load in the hospital population was globally similar to that of the regional population. Our seroprevalence results are higher than those found for HCW in a German reference hospital⁵ but similar to those of the study done in Wuhan approximately 4–8 weeks after the peak of infection.⁶ These discrepancies could be linked to

differences in the level of SARS-CoV-2 transmission in hospital setting from patients to HCW or between co-workers, but also within the community reflecting the local epidemics. However, the seroprevalence of staff working in high-risk units, such as emergency medicine (2.9%) and intensive care (3.1%), were below the median. The Public Health service (7.3%), the unit in charge of health training schools (6.9%), and the Infectious Diseases unit (6.7%) were among the most affected (seroprevalence >6%). Like us, the German study found that the seroprevalence of SARS-CoV-2 in the group most at risk (1.2%) was lower than in the group at medium risk (5.4%).⁵ The low seroprevalence in the most exposed units might indicate that the local hygiene standards were more rigorously enforced, while the higher seroprevalence in other lower-exposure units suggests that awareness of COVID-19 transmission must be improved, even in non-COVID-19 units. Perhaps our most important finding is that nearly one third of HCW who developed antibodies were asymptomatic. This is consistent with the results of a recent study reporting that 35.5% of health professionals from two tertiary-level maternity units in London, UK were asymptomatic⁷ and could have important implications for staff-to-staff and staff-to-patient transmission, since the asymptomatic individuals were not quarantined. In our study, the units with the highest proportions of asymptomatic seropositive staff were the Children's unit (57.1%), the Emergency Unit (55.6%) and General Administration (46.7%); these three units had seroprevalences among the lowest in the hospital. One hypothesis assumes that the hygiene guidelines were particularly well respected in these units. Another is that infected, asymptomatic individuals were less contagious than infected, symptomatic people. Most of the HCW who test positive by ELISA had neutralizing antibodies with titers of 2 to 256. However, we do not know the titre of neutralizing antibodies that would protect recovered patients from a secondary infection. Analogy with the common cold coronaviruses would suggest that protective immunity is incomplete and temporary, lasting only several months to a few years.⁸ We found that the 13 individuals harbouring total anti-SARS-CoV-2 antibodies but no neutralizing antibodies included 12 who were asymptomatic. The fact that asymptomatic individuals had significantly lower neutralizing antibodies titers than people who had contracted a symptomatic infection suggests that the protective immunity is lower in asymptomatic people and may eventually lead to reinfection with SARS-CoV-2. This relationship is supported by a study on asymptomatic SARS-CoV-2 cases who had a lower antibody response and titres that waned quickly.⁹ Although several recommendations to protect HCW and restrict the spread of SARS-CoV-2 in hospital setting have been made,¹⁰ our study did not evaluate adherence to local guidelines.

The variation of the seroprevalence of SARS-CoV-2 in HCW could be due to how well the hygiene measures installed to combat the transmission of SARS-CoV-2 are adhered to. Transmission

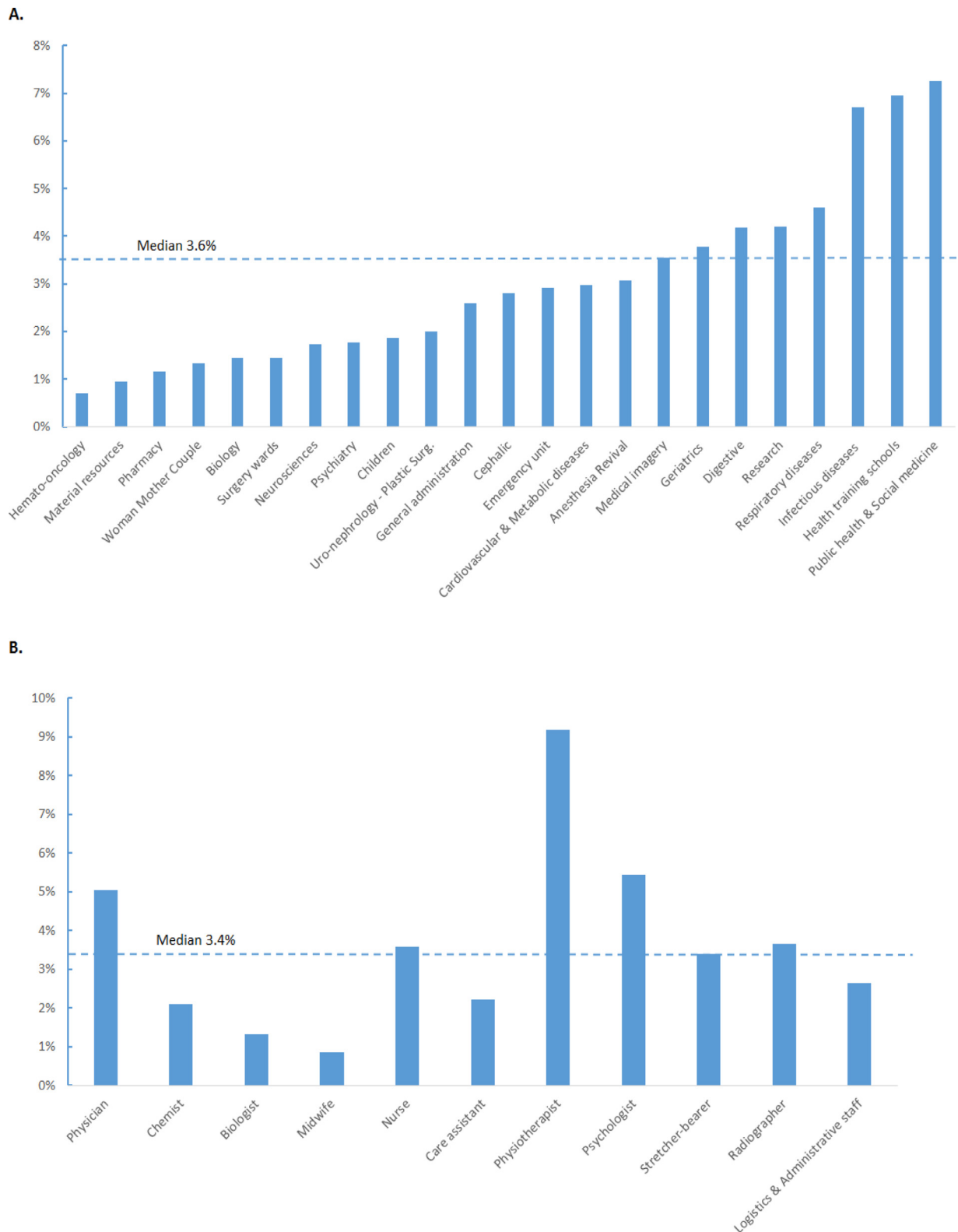


Fig. 1. Seroprevalence by ELISA in CHU units (A) and by occupation (B).

could be reduced by enhancing infection prevention training and communication within hospitals, particularly in units with little or no exposure to the virus and by introducing audits of hygiene prac-

tices. This is particularly important due to the large proportion of asymptomatic cases and the risk of uncontrolled transmission which is not detected.

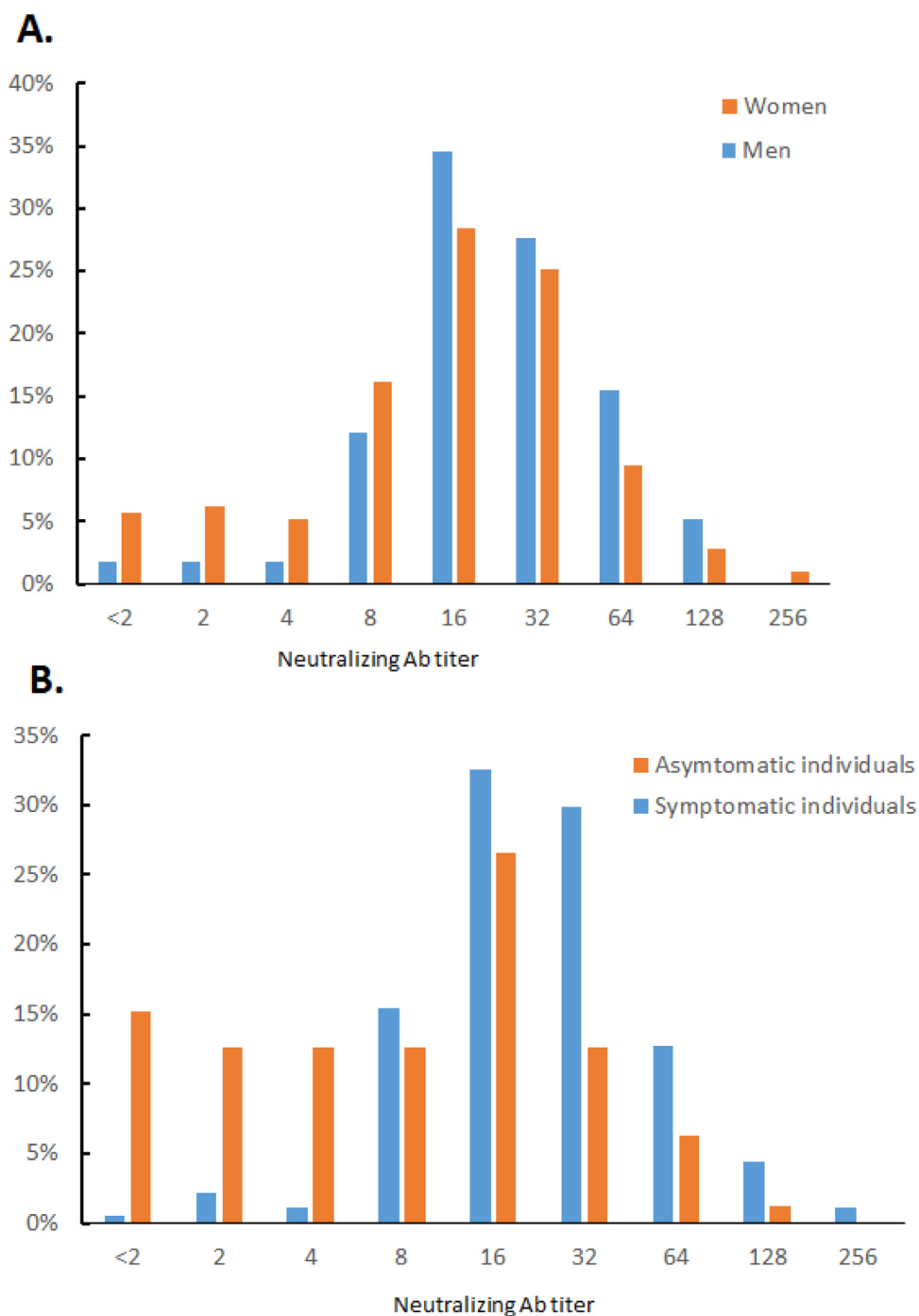


Fig. 2. Neutralizing Ab titers in ELISA positive-testing individuals.

Declaration of Competing Interest

The authors declare no competing interests.

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