

Serological evidence of SARS-CoV-2 infection in a hospital-based cohort study of healthcare workers following the 2023 COVID-19 vaccination program

JOÃO ALMEIDA SANTOS¹⁻³, VÂNIA GAIO¹⁻³, PALMIRA AMARAL⁴, CAMILA HENRIQUES⁵, RAQUEL GUIOMAR⁵, AUSENDA MACHADO¹

¹Epidemiology Department, National Health Institute Dr. Ricardo Jorge, Lisboa, Portugal; ²Public Health Research Centre, National School of Public Health, NOVA University of Lisbon, Lisbon, Portugal; ³Comprehensive Health Research Centre, NOVA University of Lisbon, Lisbon, Portugal; ⁴Centro Hospitalar e Universitário de Tondela Viseu (Unidade Local de Saúde Viseu Dão Lafões), Viseu, Portugal; ⁵Infectious Diseases Department, National Health Institute Dr. Ricardo Jorge, Lisboa, Portugal. *Corresponding author: joao.santos@insa.min-saude.pt

BACKGROUND

Healthcare workers (HCWs) are a population group at high risk of acquiring SARS-CoV-2 infection through patient-to-HCW or HCW-to-HCW transmission, and potentially becoming sources for further transmission.¹ Screening asymptomatic healthcare workers enables early detection of infection and is intended to lower the transmission risk to patients and other professionals.² Therefore is essential to monitor these professionals in order to formulate immediate and long-term strategies to mitigate the impact of the disease in the healthcare setting.³

OBJECTIVE

To assess SARS-CoV-2 infection rates in HCWs at a central Portuguese hospital through serological tests performed before, 3 and 6 months after the 2023 COVID-19 booster vaccination program.

METHODS

A prospective cohort study was established through serological follow-up a group of HCWs from a central Portuguese hospital, with three testing moments: pre-COVID-19 vaccination (September/October 2023), 3 months (January/February 2024) and 6 months (April/May 2024) post-vaccination. IgG antibodies specific to SARS-CoV-2 nucleocapsid protein (anti-N) were measured. Data was analyzed through descriptive statistics and infection rates at each testing moment (0, 3 and 6 months).

RESULTS

At baseline, all participants (n=177, median age: 47 years, 77,4% females) had the complete primary COVID-19 vaccination, with 78% having received 2 additional booster doses prior to 2023 vaccination program.

Table 1. Characteristics of participant HCWs at each testing moment (0, 3 and 6 months).

	0 MONTHS	3 MONTHS	6 MONTHS
n	177	62	47
median age	47 yrs	49,8 yrs	51,0 yrs
female n(%)	137 (77,4)	48 (77,4)	35 (74,5)

Pre-vaccination, 48,6% (86/177) of HCWs had detectable anti-N IgG antibodies, of which 24,4% (21/86) self-reported having had a SARS-Cov-2 infection in 2022/2023.

After 3 months, 17,7% (n=11/62) had detectable anti-N IgG antibodies although being negative in the pre-vaccination testing. After 6 months, 4,3% (n=2/47) had detectable anti-N IgG antibodies but were negative in the previous two rounds.

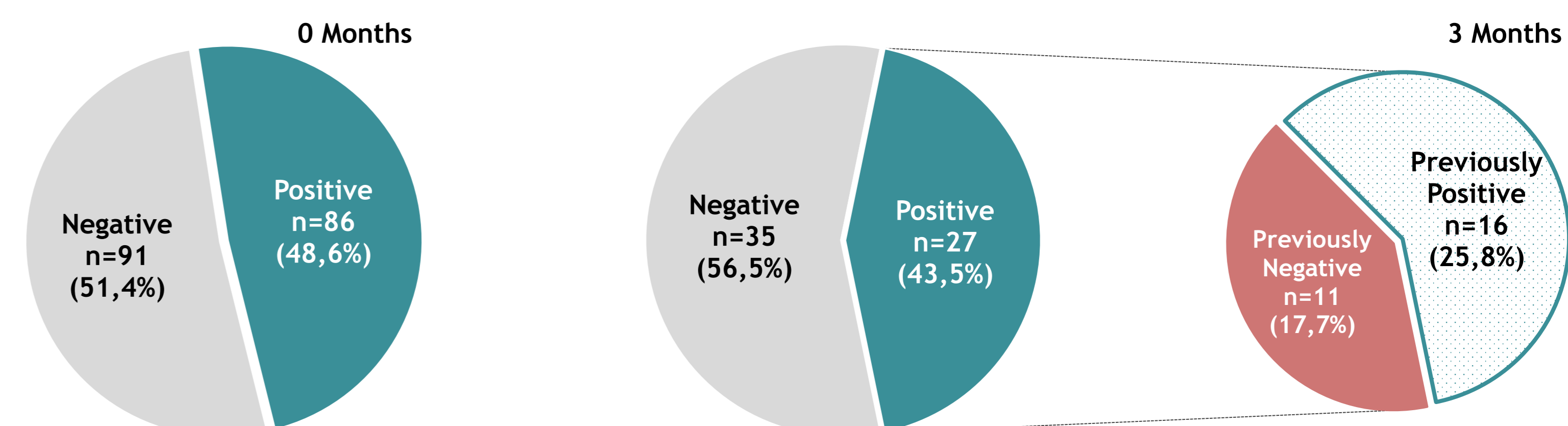


Figure 1. HCWs anti-N IgG results before 2023 COVID-19 booster vaccination moment (n=177).

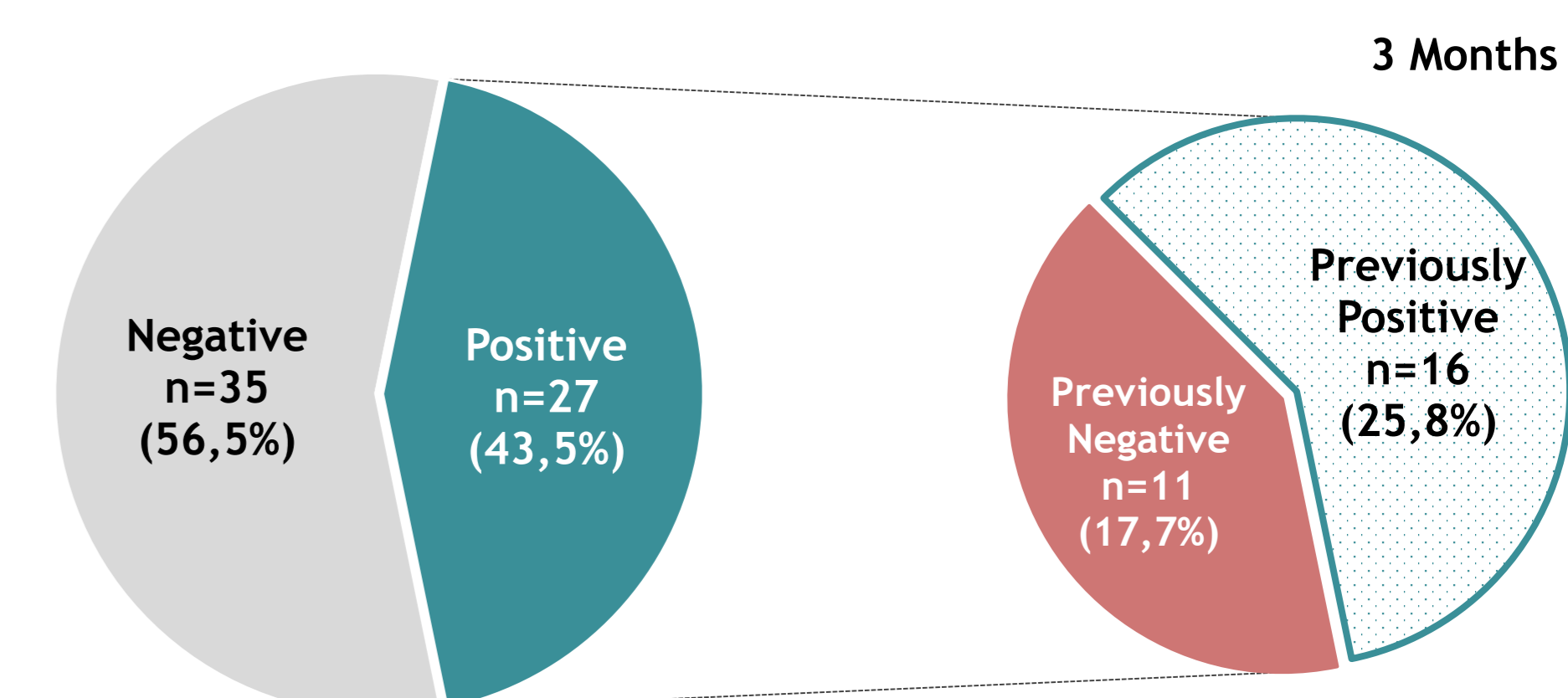


Figure 2. HCWs anti-N IgG results 3 months after the 2023 COVID-19 booster vaccination (n=62).

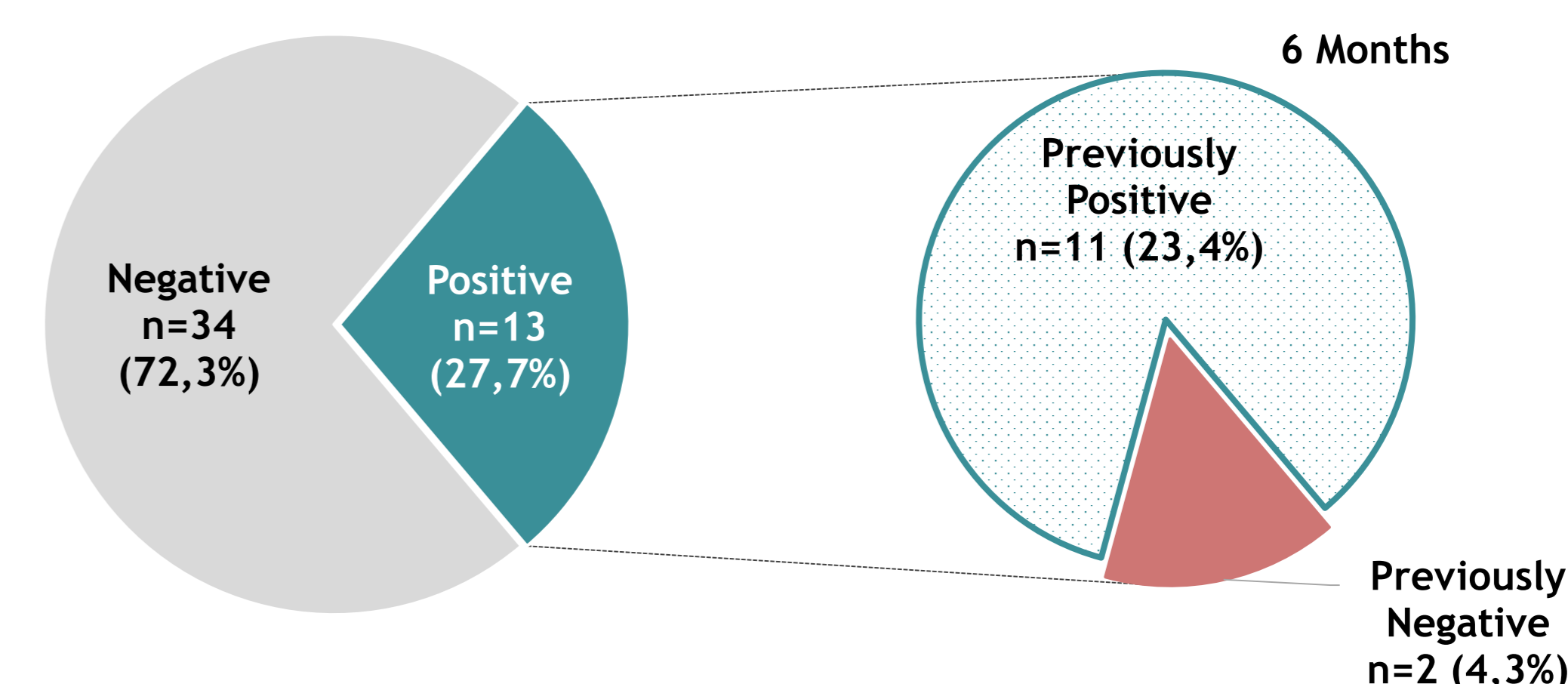


Figure 3. HCWs anti-N IgG results 6 months after the 2023 COVID-19 booster vaccination (n=47).

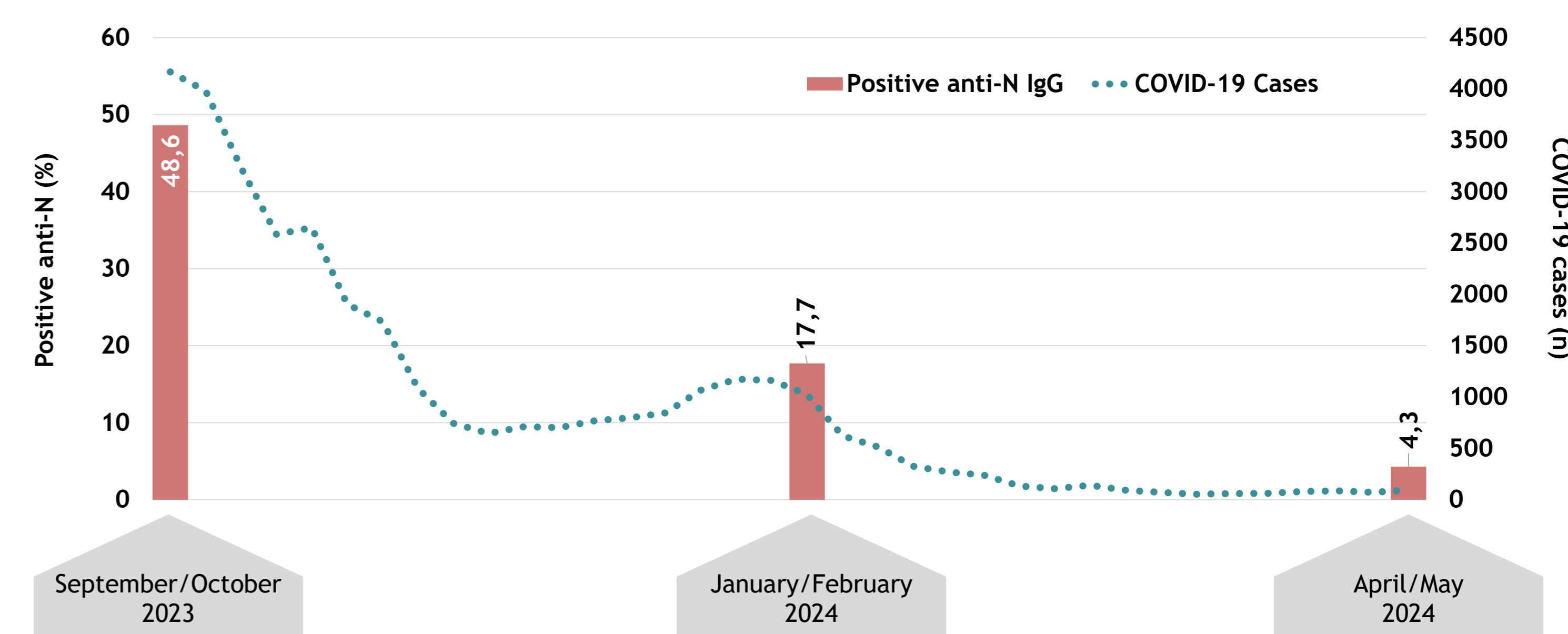


Figure 4. HCWs infection rates 0, 3 and 6 months after the 2023 COVID-19 booster vaccination and number of new COVID-19 cases in Portugal between September 2023 and May 2024 (From Our World in Data).

CONCLUSIONS

During the study period, several cases of SAR-CoV-2 infection (n=13) were serologically identified among the HCW monitored, without this professionals presenting concomitant signs and symptoms that would allow the identification of a potential infection.

These results support that monitoring the infection among HCW (regardless of history of symptoms) can provide valuable information for assessing the level of exposure among hospital personnel and identifying high-risk departments.

This information could enable the early implementation of interventions to help mitigate the impact of these infections. For instance, emphasizing and reinforcing the importance of personal protection standards for HCWs.

References: ¹ Grant JJ, Wilmore SMS, McCann NS, Donnelly O, Lai RWL, Kinsella MJ, et al. Seroprevalence of SARS-CoV-2 antibodies in healthcare workers at a London NHS Trust. *Infect Control Hosp Epidemiol.* 2021;42(2):212-4. ²Caballero N, Nieto MA, Suarez-Zamora DA, Moreno S, Remolina CI, Durán D, et al. Prevalence of SARS-CoV-2 infection and SARS-CoV-specific antibody detection among healthcare workers and hospital staff of a university hospital in Colombia. *IJID Reg.* 2022;3(Febuary):150-6. ³Musa S, Abdel Alem S, Amer K, Elnagdy T, Hassan WA, Ali MA, et al. Prevalence of SARS-CoV-2 infection and dynamics of antibodies response among previously undiagnosed healthcare workers in a university hospital: A prospective cohort study. *J Infect Public Health.* 2021;14(10):1466-73.