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ORIGINAL ARTICLE

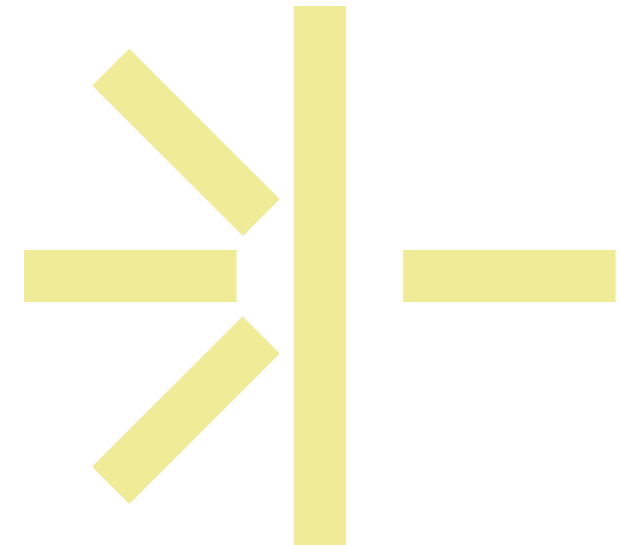
Antibody Status and Incidence of SARS-CoV-2 Infection in Health Care Workers

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Background

- Extent of protection from reinfection unclear
 - Almost 90 Mio people infected worldwide
 - Reported reinfections with SARS-CoV-2 rare
 - no documented cases of onward transmission from a re-infected case
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- ECDC Guidance: clinical management, infection prevention/control and contact tracing considerations are not likely to differ for a second infection as compared to individuals infected for the first time
 - BAG: Retestung bei Symptomen erst 3 Monate nach Erstinfektion erneut empfohlen

Figure 1. Reported cases of reinfection and key information



European Centre for Disease Prevention and Control. Reinfection with SARS-CoV: considerations for public health response: ECDC; 2020

Study aim/Methods

- Aim: Assess relative incidence of positive SARS-CoV-2-PCR and symptomatic infection in HCW who were seropositive and seronegative

- Prospective longitudinal cohort study of health care workers (HCW)
- 4 Oxford university hospitals in UK
- Testing of symptomatic HCW with SARS-CoV-2 PCR from march 2020
- Testing of asymptomatic HCW (SARS-CoV-2 PCR and serologic testing) from april 2020
- Follow up until end of November 2020

Table 1. Demographic Characteristics and SARS-CoV-2 PCR Testing for 12,541 Health Care Workers According to SARS-CoV-2 Anti-Spike IgG Status.*

Characteristic	Anti-Spike Seronegative at Baseline and throughout Follow-Up (N=11,276)	Anti-Spike Seronegative at Baseline, Converting to Seropositive† (N=88)	Anti-Spike Seropositive at Baseline (N=1177)
Age — yr			
Median (IQR)	38 (29–49)	41 (28–49)	38 (29–49)
Range	16–86	21–67	17–69
Gender — no. (%)‡			
Female	8360 (74.1)	68 (77)	835 (70.9)
Male	2900 (25.7)	20 (23)	339 (28.8)
Other	16 (0.1)	0	3 (0.3)
Race or ethnic group — no. (%)§			
White	8313 (73.7)	58 (66)	703 (59.7)
Asian	1719 (15.2)	20 (23)	287 (24.4)
Black	425 (3.8)	4 (5)	81 (6.9)
Chinese	121 (1.1)	0	9 (0.8)
Other	698 (6.2)	6 (7)	97 (8.2)
Role — no. (%)			
Nurse or health care assistant	3930 (34.9)	43 (49)	555 (47.2)
Physician	1671 (14.8)	4 (5)	184 (15.6)
Administrative staff	1452 (12.9)	10 (11)	95 (8.1)
Medical or nursing student	578 (5.1)	6 (7)	36 (3.1)
Laboratory staff	413 (3.7)	3 (3)	36 (3.1)
Physical, occupational or speech therapist	342 (3.0)	7 (8)	37 (3.1)
Porter or domestic worker	319 (2.8)	0	58 (4.9)
Security, estates, or catering staff	245 (2.2)	3 (3)	23 (2.0)
Other	2326 (20.6)	12 (14)	153 (13.0)
Symptoms resembling Covid-19 between February 1, 2020, and baseline serologic assay — no. (%)	2826 (25.1)	34 (39)¶	810 (68.8)
≥1 PCR test for symptoms before baseline — no. (%)	857 (7.6)	10 (11)	358 (30.4)
≥1 Positive PCR test with symptoms before baseline — no. (%)	19 (0.2)	5 (6)	239 (20.3)
Person-days of follow-up	2,036,358	7121 (while seronegative) 5076 (while seropositive)	152,983
Positive PCR during follow-up — no.			
Total	197	26	2
Symptomatic	106	17	0
Asymptomatic	91	9	2

- Classification according to baseline antibody status (12'541 HCW)
- At baseline:
 - HCW with positive antibody test, at risk for infection 60d after first positive test
 - 90.6% seronegative (88 with seroconversion)
 - 9.4% seropositive
- Follow up (median 200 d)
 - > 200 seronegative HCW with positive PCR
 - 100 asymptomatic
 - 2 seropositive (Anti-Spike IgG) HCW with positive PCR, both asymptomatic
 - 1 HCW with only Anti-nucleocapsid IgG, positive with symptoms
 - 2 of 3 discordant baseline antibody results > maybe false positive
 - 1 of 3 consistent with reexposure

Follow up

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Positive PCR during follow-up — no.			
Total	197	26	2
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Asymptomatic	91	9	2

- Follow up: median 200 days after negative test, resp. 139 days after positive test
- Seronegative: 223 HCW with positive PCR during follow up, 100 asymptomatic, 123 symptomatic
- 26 HCW with positive PCR, positive while seronegative
- 2 seropositive (Anti-Spike IgG) HCW with positive PCR, both asymptomatic
- 1 HCW with only Anti-nucleocapsid IgG

Table 2. Demographic, Clinical, and Laboratory Characteristics of Health Care Workers with Possible SARS-CoV-2 Reinfection.

Health Care Worker	Baseline Serologic Assay	No. of Days between Episodes*	Clinical Characteristics	Timing of PCR, Ct Value, and Assay	Follow-up Serologic Assay
Worker 1: White female physician, 25–29 yr of age	Anti-spike IgG: not detected Anti-nucleocapsid IgG: detected	160	1st episode: asymptomatic 2nd episode: symptomatic (mild, febrile illness)	1st episode: not done (before start of asymptomatic testing) 2nd episode: CN 10.6 (Abbott, assay), repeat extraction and PCR on same sample Ct 19.0 (Thermo Fisher assay)	Dual antibody seroconversion with a rise in anti-nucleocapsid IgG titer
Worker 2: White female nurse, 55–59 yr of age	Anti-spike IgG: detected Anti-nucleocapsid IgG: detected	190	1st episode: symptomatic (mild, Covid-19–like symptoms) 2nd episode: asymptomatic	1st episode: Ct 36.0 (PHE assay) 2nd episode: CN 21.2 (Abbott assay), repeat PCR on day 2 and day 4 both negative	No rise in antibody titers
Worker 3: White female administrator with patient contact, 50–54 yr of age	Anti-spike IgG: detected Anti-nucleocapsid IgG: not detected	199	1st episode: symptomatic (mild) 2nd episode: asymptomatic when tested (transient myalgia shortly after influenza vaccine 1 week earlier)	1st episode: PCR-negative 2nd episode: CN 12.6 (Abbott assay), repeat PCR on day 2 Ct 24.0 (Altona assay)	Dual antibody seroconversion, with a rise in anti-spike IgG titer

- HCW 1&3 with discordant baseline antibody results > suggesting false positive results
- HCW 2: Consistent with reexposure without symptoms, but also laboratory error possible (no rise in antibody titers)

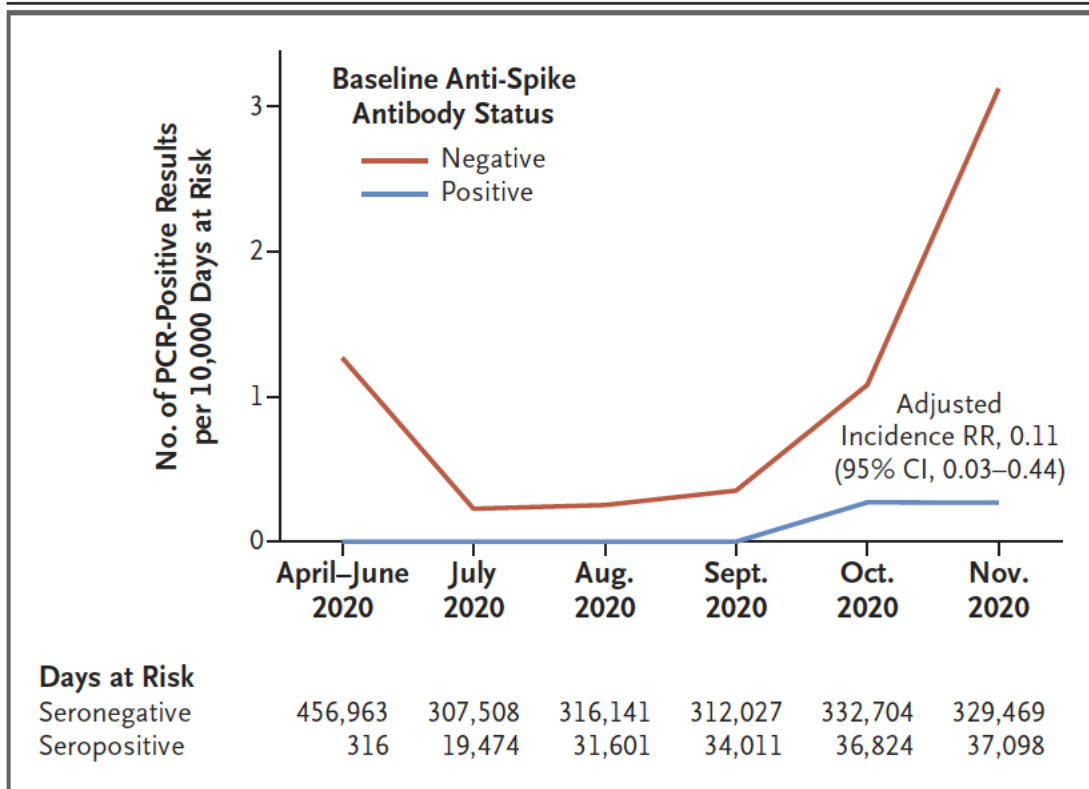


Figure 1. Observed Incidence of SARS-CoV-2–Positive PCR Results According to Baseline Anti-Spike IgG Antibody Status.

The incidence of polymerase-chain-reaction (PCR) tests that were positive for SARS-CoV-2 infection during the period from April through November 2020 is shown per 10,000 days at risk among health care workers according to their antibody status at baseline. In seronegative health care workers, 1775 PCR tests (8.7 per 10,000 days at risk) were undertaken in symptomatic persons and 28,878 (141 per 10,000 days at risk) in asymptomatic persons; in seropositive health care workers, 126 (8.0 per 10,000 days at risk) were undertaken in symptomatic persons and 1704 (108 per 10,000 days at risk) in asymptomatic persons. RR denotes rate ratio.

- Symptomatic testing similar in both groups
- Seronegative asymptomatic HCW attended screening more often
 - Offered every two weeks
 - in real every 10 to 13 weeks

Conclusion/Limitations

- Presence of antibodies substantially reduced risk of PCR confirmed SARS-CoV-2 infection over 31 weeks of follow up, suggesting protection from reinfection at least for 6 month
- Owing to low number of (re-)infection no characteristics can be determined
- T-Cell immunity not assessed
- Sequencing not done (not feasible)
- Ongoing follow up needed
- Asses immunity in other populations

- Clinical impact?
- (Re-)Testing of symptomatic patients with positive antibodies? only after a given timepoint?
- Vaccination of patients with positive antibodies?

Vielen Dank für die Aufmerksamkeit

