

UPDATE ALERTS

Update Alert 11: Epidemiology of and Risk Factors for Coronavirus Infection in Health Care Workers

This is the 11th and final update alert for a living rapid review on the epidemiology of and risk factors for coronavirus infection in health care workers (HCWs) (1). Updates were monthly through update alert 7 (2), bimonthly for updates 8 (3) and 9 (4), and then biannual. Searches for this update were done from 25 October 2021 to 24 May 2022 using the same search strategies as the original review. The update searches identified 8552 citations. We applied the same inclusion criteria used for prior updates, with previously (5) described protocol modifications to focus on risk factors for coronavirus infections and higher-quality evidence (studies reporting adjusted risk estimates).

The original rapid review included 34 studies on risk factors for coronavirus infections (3 studies on SARS-CoV-2) (1); 124 studies (122 studies on SARS-CoV-2) were added in prior updates (2–10). Twenty new studies on risk factors for SARS-CoV-2 infection were added for this update (Supplement Tables 1 to 8) (11–30). The studies were based on data collected through the end of 2020 in 10 studies (11–13, 15–17, 23, 24, 27, 30) and through June 2021 in 9 studies (14, 18–22, 25, 26, 29). One new study collected data in South Africa in November and December 2021 during the initial Omicron variant surge (28). Of the 20 new studies, 7 were cohort studies (14, 16, 20, 23, 25, 26, 29), 12 were cross-sectional studies (11–13, 15, 17–19, 22, 24, 27, 28, 30), and 1 was a case-control study (21) (Supplement Table 1). Ten studies were done in Europe, 3 in Africa, 1 in the Middle East, and 5 in North America. As with previously included studies, the new studies had methodological limitations, including potential recall bias, limited adjustment for potential confounders (including SARS-CoV-2 exposures), and low or unclear participation rates.

The new studies were generally consistent with prior updates on the association between demographic characteristics and risk for SARS-CoV-2 infection in HCWs (Supplement Table 2). There was no consistent association between age (16 studies [11, 13, 14, 16–27, 29]) or sex (16 studies [11, 13, 14, 16–27, 29]) and risk for SARS-CoV-2 infection. Seven new studies were consistent with prior evidence suggesting an increased risk for SARS-CoV-2 infection among Black or Hispanic HCWs compared with White or non-Hispanic HCWs (12, 13, 18, 20, 23, 26, 27). Sixteen new studies evaluated the association between various HCW roles and risk for infection, most commonly nurse versus physician (12–14, 17–27, 29, 30). Among 11 studies, 8 studies found that being a nurse was associated with a higher risk for SARS-CoV-2 infection than being a physician, and 3 studies found similar risk. The new studies did not change the overall finding of no clear association between nurse versus physician HCW role and risk for SARS-CoV-2 infection given inconsistency in findings, including prior studies showing physicians being at higher risk.

New for this update, 3 studies found that prior SARS-CoV-2 infection or positive vaccination status was associated with decreased risk for SARS-CoV-2 reinfection or infection among HCWs (Supplement Table 3) (26, 28, 29). In 1 study done during the Omicron variant surge, prior SARS-CoV-2 infection confirmed by polymerase chain reaction test was associated with decreased risk for reinfection (adjusted odds ratio, 0.55 [95% CI,

0.36 to 0.84]) (28). In this study, HCWs with 2 doses of the BNT162b2 vaccine were at decreased risk for infection compared with those who were unvaccinated, although the difference was not statistically significant (adjusted odds ratio, 0.59 [CI, 0.23 to 1.57]). One pre-Omicron study found that prior infection was associated with a reduced risk for reinfection among unvaccinated persons (adjusted incidence rate ratio, 0.15 [CI, 0.08 to 0.26]) and that full vaccination (2 doses) was associated with decreased risk versus no vaccination (adjusted incidence rate ratio, 0.10 [CI, 0.02 to 0.38]) (26); another pre-Omicron study found that full vaccination was associated with decreased risk versus no vaccination (adjusted hazard ratio, 0.37 [CI, 0.29 to 0.69]) (29).

Fourteen new studies reported on the association between exposures and likelihood of SARS-CoV-2 infection among HCWs (Supplement Table 4) (11–13, 15–22, 24, 26, 30). As in prior updates, greater exposure was generally associated with increased risk for SARS-CoV-2 infection. Thirteen studies found that direct contact with a patient with COVID-19 or working in a setting at high risk for exposure to a patient with COVID-19 was associated with increased risk for SARS-CoV-2 infection versus no direct contact or working in a lower-risk setting, but risk estimates were imprecise or not consistently statistically significant in most studies, and exposure definitions and comparisons varied (11–13, 15–22, 24, 26). No new study evaluated the association between education or training and risk for SARS-CoV-2 infection (Supplement Table 5).

Three new studies reported on the association between mask use and SARS-CoV-2 infection (Supplement Table 6). One new publication for a previously included study found that use of an N95 mask was associated with an increased risk for SARS-CoV-2 infection versus nonuse in a univariate analysis (odds ratio, 7.8 [CI, 4.0 to 15.2]) (16). However, N95 use was not included in the multivariate model, and the observed association is likely related to confounding from increased exposures or other factors in HCWs using N95 masks. Two other new studies of mask use are consistent with prior updates that suggest mask use reduces risk for SARS-CoV-2 infection, but risk estimates were not statistically significant (20, 23). Neither study reported mask type, and both were susceptible to potential recall bias.

Consistent with previously reviewed evidence, 1 new study found that appropriate use of personal protective equipment was associated with decreased risk for SARS-CoV-2 infection compared with suboptimal use when participating in several patient care activities (Supplement Table 7) (15). However, findings were limited by unclear definitions for “appropriate” and “suboptimal” personal protective equipment use.

A summary of all evidence identified through this final update is shown Supplement Table 8. Despite large numbers of studies and participants, evidence remains low for most risk factors because of limited evidence, methodological limitations, imprecision, and inconsistency. Moderate evidence indicates no association between age, sex, or HCW role (nurse vs. physician) and risk for SARS-CoV-2 infection; an association between Black race or Hispanic ethnicity (vs. White race or non-Hispanic ethnicity) and increased risk for SARS-CoV-2 infection; and an association between personal protective equipment use and decreased risk for SARS-CoV-2 infection.

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