

## Supplementary Material\*

Chou R, Dana T, Buckley DI, et al. Update alert 9: epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med.* 1 June 2021. [Epub ahead of print]. doi:10.7326/L21-0302

*Supplement Table 1.* Results of individual studies, risk factors for SARS-CoV-2 infection in HCWs

*Supplement Table 2.* Demographic characteristics and HCW role or position and risk for infection with SARS-CoV-2 in HCWs

*Supplement Table 3.* Exposure history and risk for infection with SARS-CoV-2 in HCWs

*Supplement Table 4.* Education or training, environmental and physical factors, and infection control policies and risk for infection with SARS-CoV-2

*Supplement Table 5.* Mask use and risk for infection with SARS-CoV-2 in HCWs

*Supplement Table 6.* Infection prevention and control factors (other than masks) and risk for infection with SARS-CoV-2 in HCWs

*Supplement Table 7.* Risk factors for SARS-CoV-2 infection in HCWs evidence map

References

\*This supplementary material was provided by the authors to give readers further details on their article. The material was reviewed but not copyedited.

**Supplement Table 1. Results of individual studies, risk factors for SARS-CoV-2 infection in HCWs**

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<b>Prospective cohort studies</b>			
<p>Abdelmoniem et al 2020 (30)</p> <p>Prospective cohort</p> <p>Egypt (Cairo); 1 university hospital; 1 to 14 June 2020</p>	<p>203 asymptomatic ED HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 32 y</li> <li>• 49% female</li> <li>• 37% physician, 44% nurse, 12% cleaning and transportation, 7% administration</li> <li>• 86% contact with confirmed or suspected COVID-19 patient</li> <li>• 13.9% SARS-CoV-2 infection (PCR)</li> </ul>	<p>Age: Mean 31.7 (cases) vs 31.9 (non-cases) years, p=0.86</p> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 16.1% (16/99)</li> <li>• Male: 12.5% (13/104) <ul style="list-style-type: none"> <li>○ Female vs. male: OR 1.35 (0.61-2.97)*</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse: 16.8% (15/89)</li> <li>• Physician: 9.4% (7/74) <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 1.95 (0.75-5.05)*</li> </ul> </li> <li>• Cleaner/transportation: 20.8% (5/24)</li> <li>• Radiology/lab: 0% (0/2)</li> <li>• Administration: 14.3% (2/14)</li> </ul> <p>Contact with COVID-19 infected patient (suspected or confirmed)</p> <ul style="list-style-type: none"> <li>• Contact: 12.5% (22/176)</li> <li>• No contact: 25.9% (7/27) <ul style="list-style-type: none"> <li>○ Contact vs. no contact: OR 0.41 (0.15-1.08)*</li> </ul> </li> </ul> <p>Proper hand hygiene practice</p> <ul style="list-style-type: none"> <li>• Yes: 14.1% (27/192)</li> <li>• No: 18.2% (2/11) <ul style="list-style-type: none"> <li>○ Yes vs. no: OR 0.74 (0.15-3.59)*</li> </ul> </li> </ul> <p>PPE use as recommended</p> <ul style="list-style-type: none"> <li>• Yes: 14.3% (27/189)</li> <li>• No: 14.3% (2/14) <ul style="list-style-type: none"> <li>○ Yes vs. no: OR 1.00 (0.21-4.72)</li> </ul> </li> </ul> <p>Comorbidities</p> <ul style="list-style-type: none"> <li>• Yes: 8.0% (2/25)</li> <li>• No: 15.2% (27/178) <ul style="list-style-type: none"> <li>○ Yes vs. no: OR 0.49 (0.11-2.18)</li> </ul> </li> </ul>	<p>No control for confounders; potential recall bias; 37% participation rate</p>
<p>Bahrs et al., 2021 (31)</p> <p>Prospective cohort</p> <p>Germany (Jena); 1 academic hospital</p>	<p>660 HCWs</p> <ul style="list-style-type: none"> <li>• Median age 40 y</li> <li>• 73.6% female</li> <li>• 32.6% nurses, 27.3% administration, 15.6% physicians, 2.7% nursing</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 2.7% (13/486)</li> <li>• Male: 2.9% (5/174) <ul style="list-style-type: none"> <li>○ Female vs. male: OR 0.93 (0.33-2.64)*</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Physician: 4.8% (5/103); reference</li> <li>• Nurse or care worker: 2.3% (5/215); adjusted OR 0.38 (0.10-1.34)</li> <li>• Cleaner: 16.7% (1/6); adjusted OR 2.75 (0.25-29.93)</li> </ul>	<p>20% participation rate; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
19 May to 19 June 2020	<ul style="list-style-type: none"> <li>assistants, 2.7%</li> <li>psychologists, 2.6%</li> <li>ergo therapists</li> <li>2.7% SARS-CoV-2 seropositive</li> </ul>	<ul style="list-style-type: none"> <li>Reception staff: 5.3% (1/19); adjusted OR 0.73 (0.07-7.32)</li> <li>Administrative staff: 3.3% (6/180); adjusted OR 0.51 (0.13-1.93)</li> <li>Other 0% (0/130)</li> </ul> <p>Work COVID-19 risk category</p> <ul style="list-style-type: none"> <li>High-risk (patient contact with confirmed COVID-19 patients or high number of suspected cases): 1.5% (2/137); reference</li> <li>Intermediate-risk (patient contact, no routine contact with confirmed or suspected COVID-19 patients): 2.9% (10/343); adjusted OR 1.97 (0.42-9.22)</li> <li>Low-risk (no patient contact): 3.3% (6/180); adjusted OR 2.10 (0.40-11.06)</li> </ul>	
<p>Barrett et al 2020 (32)</p> <p>Prospective cohort</p> <p>United States (New Jersey); 2 hospitals; 24 March to 7 April 2020</p>	<p>546 HCWs with increased risk of SARS-CoV-2 infection (<math>\geq 20</math> hours work/week, regular patient exposure and regular direct patient contact)</p> <ul style="list-style-type: none"> <li>Mean age not reported; 55% age 20-39 y, 37% age 40-59 y, 8% <math>\geq 60</math> y</li> <li>65% female</li> <li>38% physician, 41% nurse, 21% other HCW role</li> <li>14% COVID-19 symptoms in last week</li> <li>7.3% SARS-CoV-2 infection (PCR)</li> </ul>	<p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse: 11.1% (25/225)</li> <li>Physician (attending, resident or fellow): 2.4% (5/210) <ul style="list-style-type: none"> <li>Nurse vs. physician: <b>OR 5.12 (1.92-13.65)*</b></li> </ul> </li> <li>Other HCW role: 9% (10/111)</li> <li>Emergency department: 8.2% (20/245)</li> <li>Medical floor: 4.9% (9/185)</li> <li>Operating room: 9.7% (13/134)</li> <li>ICU: 2.2% (4/192)</li> <li>COVID-19 unit: 7.9% (5/63)</li> <li>Other unit: 5.5% (14/255)</li> </ul> <p>PPE use (estimated proportion of patients for which PPE [gloves, gown and surgical or N95 mask] used)</p> <ul style="list-style-type: none"> <li>&lt;25%: 4.6% (4/87)</li> <li>25-49%: 3.5% (2/59)</li> <li>50-74%: 6.7% (4/61)</li> <li>75-99%: 9.8% (4/41) 100%: 10.5% (25/238) <ul style="list-style-type: none"> <li>&lt;25% vs. 100%: OR 0.41 (0.14-1.22)*</li> </ul> </li> </ul> <p>Average number of patients with suspected or confirmed COVID-19 per shift</p> <ul style="list-style-type: none"> <li>0: 4.1% (6/148)</li> <li>&gt;0-&lt;5: 5.6% (9/162)</li> <li><math>\geq 5</math>: 10.6% (24/226)</li> <li>Missing data: 10% (1/10) <ul style="list-style-type: none"> <li>0 vs. <math>\geq 5</math> patients: <b>OR 0.36 (0.14-0.89)*</b></li> </ul> </li> </ul> <p>Estimated percentage of work-time spent in patients' rooms</p> <ul style="list-style-type: none"> <li>&lt;25%: 5.2% (11/210)</li> <li>25-49%: 6.0% (7/117)</li> <li>50-74%: 9.5% (11/116)</li> <li><math>\geq 75</math>%: 11.6% (11/95)</li> </ul>	<p>No control for confounders; potential recall bias</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
Blairon et al, 2020 (33)  Prospective cohort  Belgium (Brussels); 4 hospitals; 25 May to 19 June 2020	1499 asymptomatic HCWs <ul style="list-style-type: none"> <li>• Median age 45 y</li> <li>• 72.4% female</li> <li>• 39% nurse or other HCW, 22% physician or dentist, 21% pharmacist or administrative staff, 9% maintenance or technical worker, 4% imaging or lab worker, 5% other/not specified</li> <li>• 37% known exposure to COVID-19-infected patient</li> </ul>	○ <25% vs. ≥75%: OR 0.42 (0.18-1.01)*  Incidence of SARS-CoV-2 infection <ul style="list-style-type: none"> <li>• Nurse or other clinical HCW: 19.2% (113/588)</li> <li>• Physician or dentist: 11.8% (38/323)               <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 1.78 (1.20-2.65)*</li> </ul> </li> <li>• Pharmacist or administrative staff: 9.1% (29/320)</li> <li>• Maintenance or technical worker: 16.4% (22/134)</li> <li>• Imaging or lab worker: 6.6% (2/31)</li> <li>• Inpatient unit: 24.3% (97/399)</li> <li>• Intensive care unit: 13.2% (31/234)</li> <li>• COVID emergency unit: 14.6% (30/205)</li> <li>• Non-COVID emergency unit: 18.5% (34/184)</li> <li>• Other non-COVID patient contact: 14.4% (159/1106)</li> <li>• Other services with no patient contact: 10.5% (33/317)</li> <li>• Performed bronchoscopies: 4.9% (3/61)</li> <li>• Performed intubations: 9.2% (11/119)</li> <li>• Performed other high-risk procedure: 17.4% (37/213)</li> </ul>	48% participation rate; no control for confounders
Calcagno et al 2020 (34)  Prospective cohort  Italy (Turin); public hospitals and outpatient clinics; 17 April to 20 May 2020	5,444 HCWs (4,306 with HCW role data) <ul style="list-style-type: none"> <li>• Mean age 49 y</li> <li>• 75% female</li> <li>• 16% physician, 42% nurse, 11% nurse assistant, 10% health care personnel, 0.7% pharmacist, 12% administrative employee, 5% technical personnel, 4% laboratory personnel, 0.3% veterinarian</li> <li>• 6.9% SARS-CoV-2 seroprevalence</li> </ul>	HCW role <ul style="list-style-type: none"> <li>• Nurse: 8.2% (150/1833)</li> <li>• Physician: 7.8% (55/700)               <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 1.05 (0.76-1.44)*</li> </ul> </li> <li>• Nurse assistant: 9.2% (44/476)               <ul style="list-style-type: none"> <li>○ Nurse or nurse assistant vs. physician: OR 1.08 (0.79-1.47)</li> </ul> </li> <li>• Health care personnel: 6.7% (23/343)</li> <li>• Pharmacist: 3.4% (1/29)</li> <li>• Administrative employee: 3.3% (18/539)</li> <li>• Technical personnel: 6.9% (15/216)</li> <li>• Laboratory personnel: 11.5% (18/157)</li> <li>• Veterinarian: 0% (0/13)</li> </ul>	No control for founders; 73% participation rate; incomplete data for 21% of participants
Dillner et al 2021 (11)	12,928 HCWs <ul style="list-style-type: none"> <li>• Mean age not reported; 12% &lt;29</li> </ul>	Age <ul style="list-style-type: none"> <li>• &lt; 29 y: 16.4% (249/1522); reference</li> <li>• 30-39 y: 12.1% (383/3172); <b>OR 0.70 (0.59-0.83)*</b></li> </ul>	84% participation rate; no data on HCW role;

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Prospective cohort</p> <p>Sweden (Stockholm); university hospital; 23 April to 22 May 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>y, 25% 30-39 y, 25% 40-49 y, 24% 50-59 y, 15% ≥60 y</p> <ul style="list-style-type: none"> <li>79% female</li> <li>HCW role not reported</li> <li>11.4% SARS-CoV-2 seropositivity</li> </ul>	<ul style="list-style-type: none"> <li>40-49 y: 11.4% (370/3238); <b>OR 0.66 (0.55-0.78)*</b></li> <li>50-59 y: 10.2% (313/3066); <b>OR 0.58 (0.49-0.70)*</b></li> <li>≥60 y: 8.6% (166/1930); <b>OR 0.48 (0.39-0.59)*</b></li> </ul>	<p>no control for confounders</p>
<p>El Abdellati et al, 2021 (35)</p> <p>Prospective cohort</p> <p>Belgium (Antwerp); 1 psychiatric hospital; 3 to 17 June 2020</p>	<p>431 asymptomatic clinical and nonclinical HCW</p> <ul style="list-style-type: none"> <li>Age and sex not reported for entire cohort</li> <li>42.0% nurses, 31.3% non-clinical staff, 13.0% paramedical staff, 6.0% psychologists, 4.2% physicians, 3.5% other</li> <li>3.2% SARS-CoV-2 seropositivity</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>Mean 46.8 (cases) vs. 43.7 (non-cases) years, <math>p &gt; 0.05</math></li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 2.8% (10/355)</li> <li>Male: 5.3% (4/76) <ul style="list-style-type: none"> <li>Female vs. male: OR 0.52 (0.16 to 1.71)*</li> </ul> </li> </ul>	<p>No control for confounders; 47% participation rate</p>
<p>el-Boghdadly et al, 2020 (36)</p> <p>Prospective cohort</p> <p>Multinational (17 countries); 503 hospitals; 23 March to 2 June 2020</p>	<p>1718 HCWs involved in tracheal intubation of patients</p> <ul style="list-style-type: none"> <li>Mean age 41.5 years</li> <li>40.3% female</li> <li>Physician: 90.7%, non-physician 9.3%</li> <li>Anaesthesia: 83.1%, intensive care medicine: 14.6%, emergency</li> </ul>	<p>Laboratory-confirmed COVID-19 infection, self-isolation due to symptoms, or hospital admission with ≥1 symptom:</p> <ul style="list-style-type: none"> <li>Physician: 10.7% (166/1558)</li> <li>Non-physician: 11.2% (18/160)</li> <li>Anaesthesia: 10.5% (150/1428)</li> <li>Intensive care medicine: 12.4% (31/251)</li> <li>Emergency medicine: 10.7% (3/28)</li> <li>Other specialty: 0% (0/11)</li> </ul> <p>Unadjusted HR for laboratory-confirmed COVID-19 infection, self-isolation due to symptoms, or hospital admission with ≥1 symptom (95% CI)</p> <ul style="list-style-type: none"> <li>Age (year): 0.99 (0.98-1.01)</li> <li>Female vs. male: 1.44 (1.08-1.93)</li> </ul>	<p>Criteria for laboratory-confirmed COVID-19 diagnosis not reported; included outcomes based on symptoms without laboratory confirmation</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	medicine: 1.6%, other specialty 0.6%	<ul style="list-style-type: none"> <li>PPE WHO standard (yes vs. no), analyzed by procedure: 0.97 (0.63-1.51)</li> <li>Bag-mask ventilation (yes vs. no), analyzed by procedure: 0.81 (0.54-1.23)</li> <li>Supraglottic airway device (yes vs. no), analyzed by procedure: 1.40 (0.66-2.97)</li> </ul> Adjusted HR (95% CI) <ul style="list-style-type: none"> <li>Female vs. male: 1.36 (1.01-1.82)</li> </ul>	
Ferreira et al 2021 (37)  Prospective cohort  Canada (Toronto); 1 multisite acute and long-term care system; 17 April to 29 May 2020	1669 asymptomatic HCWs <i>Infection (PCR; n=1669)</i> <ul style="list-style-type: none"> <li>Mean age 40 y</li> <li>79% female</li> <li>39% nurse, 9% physician, 27% allied health, 24% other role, 1% role not reported</li> <li>0.5% SARS-CoV-2 infection</li> </ul> <i>Seropositive (n=996)</i> <ul style="list-style-type: none"> <li>Mean age 41 y</li> <li>78% female</li> <li>36% nurse, 10% physician, 26% allied health, 27% other role, 0.1% role not reported</li> <li>1.4% SARS-CoV-2 seropositive</li> </ul>	<i>Infection (PCR)</i> HCW role <ul style="list-style-type: none"> <li>Nurse: 1.2% (8/655)</li> <li>Physician: 0% (0/152)               <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 4.00 (0.23-69.75)*</li> </ul> </li> <li>Allied health: 2.2% (1/446)</li> </ul> Exposure <ul style="list-style-type: none"> <li>Direct care of COVID patient: 0.6% (3/472)</li> <li>No direct care of COVID patient: 0.6% (6/1083)               <ul style="list-style-type: none"> <li>Direct care vs. no direct care: OR 1.15 (0.29 to 4.61)*</li> </ul> </li> </ul> <i>Seropositive</i> HCW role <ul style="list-style-type: none"> <li>Nurse: 1.9% (7/361)</li> <li>Physician: 1.0% (1/101)               <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 1.98 (0.24-16.26)*</li> </ul> </li> <li>Allied health: 1.9% (5/261)</li> </ul> Exposure: <ul style="list-style-type: none"> <li>Direct care of COVID patient: 0.4% (1/255)</li> <li>No direct care of COVID patient: 1.9% (13/672)               <ul style="list-style-type: none"> <li>Direct care vs. no direct care: OR 0.20 (0.03-1.53)*</li> </ul> </li> </ul>	Participation rate ~14%; no control for confounders; some missing data; imprecise estimates
Grant et al, 2020 (38)  Prospective cohort  UK (London); multicenter health trust; March to May 2020	2004 HCWs <ul style="list-style-type: none"> <li>Mean age 40 y</li> <li>% female not reported</li> <li>67% clinical setting with prolonged direct patient contact, 9.8% clinical setting with less or no patient</li> </ul>	Incidence of SARS-CoV-2 infection seropositivity <ul style="list-style-type: none"> <li>Clinical setting with prolonged direct patient contact: 34.7% (467/1345)</li> <li>Clinical setting with less/no patient contact: 30.0% (59/197)</li> <li>Nonclinical setting with prolonged direct patient contact: 25.0% (27/108)</li> <li>Nonclinical setting with no/minimal patient contact: 22.6% (77/341)</li> <li>Working from home: 30.8% (4/13)</li> <li>COVID-19 ward with CPAP: 42.0% (84/200)</li> <li>COVID-19 ward, without CPAP (excluding ER): 41.3% (175/424)</li> <li>Operating theater: 33.6% (43/128)</li> </ul>	Limited information on demographic characteristics of HCWs; participation rate not reported

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>contact, 17.0% nonclinical setting and minimal/no patient contact, &lt;1.0% working from home</li> </ul>	<ul style="list-style-type: none"> <li>Non-COVID-19 ward: 28.9% (82/284)</li> <li>Any other non-ward environment: 26.0% (206/792)</li> <li>ICU: 25.0% (44/176)</li> </ul>	
<p>Hall et al 2021 (15)</p> <p>Prospective cohort</p> <p>United Kingdom (throughout England); NHS publicly funded hospitals; 18 June to 31 December 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>25,661 HCWs</p> <ul style="list-style-type: none"> <li>Median age 46 y</li> <li>84% female</li> <li>87% white, 7% mixed race, 2% Asian, 2% Black, 1% Chinese, 0.6% other race/ethnicity, 0.2% declined</li> <li>42% nurse of health care assistant, 15% administration, 11% physician, 6% specialist, 4% health care scientist, 2% midwife, 2% pharmacist, 1% estates, porters or security</li> <li>32.3% SARS-CoV-2 infection (PCR), seropositivity or both</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>Female: 31.6% (6840/21617); <b>OR 0.84 (0.78-0.90)*</b></li> <li>Male: 35.5% (1425/4010); reference</li> <li>Other: 38.2% (13/34); OR 1.12 (0.56-2.25)*</li> </ul> <p>Race/ethnicity</p> <ul style="list-style-type: none"> <li>White: 31.1% (6969/22404); reference</li> <li>Mixed race: 40.8% (724/1773); <b>OR 1.53 (1.38-1.69)*</b></li> <li>Asian: 45.0% (236/525); <b>OR 1.81 (1.52-2.15)*</b></li> <li>Black: 32.5% (134/412); OR 1.07 (0.87-1.31)*</li> <li>Chinese: 42.5% (147/346); <b>OR 1.64 (1.32-2.03)*</b></li> <li>Other ethnic group: 33.8% (51/151); OR 1.13 (0.81-1.58)*</li> <li>Not reported: 34.0% (17/50); OR 1.14 (0.64-2.05)*</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse or health care assistant: 34.4% (3751/10891); OR 0.94 (0.86-1.02)*</li> <li>Physician: 35.9% (999/2783); reference</li> <li>Administration: 27.9% (1090/3903); <b>OR 0.69 (0.62-0.77)*</b></li> <li>Specialist: 31.6% (489/1548); <b>OR 0.82 (0.72-0.94)*</b></li> <li>Scientist: 25.2% (225/894); <b>OR 0.60 (0.51-0.71)*</b></li> <li>Midwife: 29.1% (189/649); <b>OR 0.73 (0.61-0.88)*</b></li> <li>Pharmacist: 28.7% (112/390); <b>OR 0.72 (0.57-0.91)*</b></li> <li>Estates, porters or security: 37.1% (95/256); OR 1.05 (0.81-1.37)*</li> <li>Other role: 30.5% (1328/4347); <b>OR 0.79 (0.71-0.87)*</b></li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>Direct patient contact: 32.9% (7280/22112); <b>OR 1.25 (1.16-1.36)*</b></li> <li>No direct patient contact: 28.1% (998/3549); reference</li> </ul> <p>Medical conditions</p> <ul style="list-style-type: none"> <li>None: 32.4% (6195/19,125); reference</li> <li>Chronic respiratory conditions: 31.4% (1019/3248); OR 0.95 (0.88-1.03)*</li> <li>Chronic non-respiratory conditions: 33.1% (909/2746); OR 1.03 (0.95-1.12)*</li> <li>Immunosuppression: 28.6% (155/542); OR 0.84 (0.69-1.01)*</li> </ul> <p>Index of multiple deprivation</p> <ul style="list-style-type: none"> <li>5 (least deprived): 32.3% (1968/6094); reference</li> </ul>	<p>Potential recall bias; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• 4: 31.3% (1880/6005); OR 0.96 (0.89-1.03)*</li> <li>• 3: 31.2% (1823/5842); OR 0.95 (0.88-1.03)*</li> <li>• 2: 32.2% (1469/4563); OR 1.00 (0.92-1.08)*</li> <li>• 1 (most deprived): 36.1% (1054/2916); <b>OR 1.19 (1.08-1.30)*</b></li> </ul> Antibody status (incidence [per 1000 participants] of reinfection [antibody positive cohort] vs. new infection [antibody negative cohort]) <ul style="list-style-type: none"> <li>• Symptomatic: 6.0 vs. 64.8</li> <li>• All events: 18.7 vs. 98.0</li> </ul>	
Houlihan et al, 2020 (39)  Prospective cohort  UK (London); 1 acute care hospital; 26 March to 8 April 2020	200 frontline HCWs <ul style="list-style-type: none"> <li>• Median age 34.7</li> <li>• 61% female</li> <li>• 36% physician, 53% nurse or other frontline clinical staff, 11% other</li> <li>• 17% ER, 18% acute medical admissions, 22% ICU, 21% hematology, 22% other</li> </ul>	Incidence of SARS-CoV-2 infection (seropositive or PCR) <ul style="list-style-type: none"> <li>• Age &lt;30: 54% (31/57)</li> <li>• Age 30-39: 49% (34/70)</li> <li>• Age 40-49: 30% (12/30)</li> <li>• Age ≥50: 33% (10/30)</li> <li>• Female: 40% (49/122)</li> <li>• Male: 50% (38/76)               <ul style="list-style-type: none"> <li>◦ Female vs. male: OR 0.67 (0.38-1.20)*</li> </ul> </li> <li>• Physician: 44% (32/72)</li> <li>• Nurse or other frontline clinical staff: 43% (46/106)               <ul style="list-style-type: none"> <li>◦ Nurse or other frontline clinical staff vs. physician: OR 0.96 (0.52-1.75)*</li> </ul> </li> <li>• Other health care role: 41% (9/22)</li> <li>• ER: 38% (13/34)</li> <li>• Acute medical admissions: 51% (19/37)</li> <li>• ICU: 37% (16/43)</li> <li>• Hematology: 48% (19/40)</li> <li>• Other health care setting: 4% (18/43)</li> </ul>	Limited information on demographic characteristics of HCWs; selection of HCWs for testing unclear; no control for confounders
Kassem et al, 2020 (40) Prospective cohort  Egypt; gastroenterological unit of 1 hospital; 1 to 14 June 2020	74 HCWs in gastroenterology service with no reported household contact with infected persons <ul style="list-style-type: none"> <li>• Median age 42 y</li> <li>• 59.5% female</li> <li>• 40.5% physician, 37.8% nurses; 12.2% cleaning and transportation; 9.5% administration</li> </ul>	At least one positive test for SARS-CoV-2 infection (RT-PCR or RST) <ul style="list-style-type: none"> <li>• Female: 18.2% (8/44)</li> <li>• Male: 26.7% (8/30)               <ul style="list-style-type: none"> <li>◦ Female vs. male: OR 0.61 (0.20-1.86)*</li> </ul> </li> <li>• Physicians: 13.3% (4/30)</li> <li>• Nurses: 21.4% (6/28)               <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: OR 91.77 (0.44-7.09)*</li> </ul> </li> <li>• Patient transporters/cleaners: 33.3% (3/9)</li> <li>• Administrative: 42.9% (3/7)</li> <li>• Comorbidities: 18.8% (3/16)</li> <li>• Exposure to suspected or confirmed COVID-19 during work in last 2 weeks: 75% (12/16)</li> </ul>	59% participation rate; no control for confounders



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>Proper hand hygiene: 93.8% (15/16)</li> <li>PPE when indicated: Always 93.8% (15/16) vs. occasionally 6.2% (1/16)</li> </ul>	
<p>Leeds et al, 2020 (41) Prospective cohort</p> <p>UK (England); multicenter, including 2 main hospitals and 6 community hospitals; 1 to 28 April 2020</p>	<p>991 symptomatic HCWs</p> <ul style="list-style-type: none"> <li>Mean age 43 y</li> <li>85% female</li> <li>59% nurse, 7% allied health professional, 3% clinical support staff, 5% nonclinical staff (HCW role n=738)</li> </ul>	<p>Adjusted OR (95% CI) for SARS-CoV-2 infection (repeat PCR over 4 weeks):</p> <ul style="list-style-type: none"> <li>Age: 1.01 (0.99-1.03)</li> <li>Male: 1.03 (0.59-1.79)</li> <li>Frontline worker: 0.79 (0.53-1.17)</li> <li>Black, Asian, and minority ethnic: 1.08 (0.56-2.04)</li> </ul>	<p>Incomplete data on HCW role at baseline</p>
<p>Lumley et al, 2020 et al (42)</p> <p>Prospective cohort</p> <p>UK (Oxfordshire); 4 teaching hospitals; 27 March to 30 November 2020</p>	<p>12541 HCWs</p> <ul style="list-style-type: none"> <li>Median age 38 y</li> <li>74% female; 0.2% other</li> <li>72% white, 16% Asian, 4% Black, 1% Chinese, 6 other race/ethnicity</li> <li>36% nurse, 15% physician, 12% administrative staff, 5% medical or nursing student, 4% laboratory staff, 3% therapist, 3% porter or domestic worker, 2% security or catering, 20% other role</li> <li>9.4% SARS-CoV-2 seropositivity</li> </ul>	<p><u>SARS-CoV-2 seropositivity at baseline</u></p> <p>Age</p> <ul style="list-style-type: none"> <li>Median 38 years (positive at baseline) vs. 38-41 years (not positive at baseline)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 9.0% (835/9263)</li> <li>Male: 10.4% (339/3259) <ul style="list-style-type: none"> <li>Female vs. male: <b>OR 0.85 (0.75-0.97)*</b></li> </ul> </li> </ul> <p>Race/ethnicity</p> <ul style="list-style-type: none"> <li>White: 7.7% (703/9074); reference</li> <li>Asian: 14.2% (287/2026); <b>OR 1.97 (1.70-2.28)*</b></li> <li>Black: 15.9% (81/510); <b>OR 2.25 (1.75-2.89)*</b></li> <li>Chinese: 6.9% (9/130); OR 0.89 (0.45-1.75)*</li> <li>Other: 12.1% (97/801)</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse or health care assistant: 12.3% (555/4528)</li> <li>Physician: 9.9% (184/1860) <ul style="list-style-type: none"> <li>Nurse or health care assistant vs. physician: <b>OR 1.27 (1.07-1.52)*</b></li> </ul> </li> <li>Administrative staff: 6.1% (95/1557)</li> </ul>	<p>No control for confounders (for baseline seropositivity); unclear participation rate</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Medical or nursing student: 5.8% (36/620)</li> <li>• Laboratory staff: 8.0% (36/452)</li> <li>• Physical, occupational or speech therapist: 9.6% (37/386)</li> <li>• Porter or domestic worker: 15.4% (58/377)</li> <li>• Security, estates, or catering staff: 8.5% (23/271)</li> <li>• Other: 6.1% (153/2491)</li> </ul> <p><u>SARS-CoV-2 seroconversion incidence</u></p> <p>Sex</p> <ul style="list-style-type: none"> <li>• Male vs. female: adjusted IRR 1.03 (0.77-1.39)</li> </ul> <p>Baseline antibody status (vs. negative)</p> <ul style="list-style-type: none"> <li>• Anti-spike IgG positive: <b>adjusted IRR 0.3 (0.03-0.44)</b></li> <li>• Anti-nucleocapsid IgG positive: <b>adjusted IRR 0.11 (0.03-0.45)</b></li> <li>• Both anti-spike and anti-nucleocapsid IgG positive: <b>adjusted IRR 0.06 (0.01-0.46)</b></li> </ul>	
<p>Maltezos et al, 2020 (43)</p> <p>Prospective cohort</p> <p>Greece; HCWs throughout Greece; 13 March to 3 May 2020</p>	<p>3,398 HCWs exposed to a patient or colleague with COVID-19</p> <ul style="list-style-type: none"> <li>• Mean age 45 y</li> <li>• 71% female</li> <li>• 32% physician, 50% nurse, 18% other HCW role</li> <li>• 47% low-risk setting, 23% moderate-risk setting, 30% high-risk setting</li> </ul>	<p>Unadjusted OR (95% CI) for SARS-CoV-2 infection</p> <ul style="list-style-type: none"> <li>• High- vs. low-risk exposure: <b>5.26 (2.98-9.26)*</b></li> <li>• Medium- vs. low-risk exposure: 1.05 (0.45-2.45)*</li> </ul> <p>Adjusted OR (95% CI) for SARS-CoV-2 infection</p> <ul style="list-style-type: none"> <li>• Male vs female: <b>1.79 (1.03-3.13)</b></li> <li>• Administrative role vs other role: <b>3.34 (1.49-7.49)</b></li> <li>• High-risk exposure vs low or moderate risk exposure: <b>3.58 (1.94-6.58)</b></li> </ul> <p>Adjusted OR (95% CI) for COVID-19 diagnosis</p> <ul style="list-style-type: none"> <li>• Male vs female: <b>1.82 (1.04-3.20)</b></li> <li>• Administrative role vs other role: <b>3.06 (1.43-6.55)</b></li> <li>• High-risk exposure vs low or moderate risk exposure: <b>3.06 (1.43-6.55)</b></li> </ul>	<p>Unvalidated method used to categorize risk exposure (based on use of mask by patient and use of PPE by HCW); limited control for confounders</p>
<p>Milazzo et al 2021 (44)</p> <p>Prospective cohort</p> <p>Italy (Milan) University hospital;</p>	<p>679 HCWs</p> <ul style="list-style-type: none"> <li>• Median age 45 y</li> <li>• 76% female</li> <li>• 30% physician, 36% nurse, 11% other health care service worker; 13% health services assistants</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>• Per 1 year or more of increase: adjusted OR 0.99 (0.95-1.03)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 4.0% (18/452)</li> <li>• Male: 3.3% (5/153) <ul style="list-style-type: none"> <li>◦ Female vs. male: adjusted OR 1.27 (0.41-3.85)</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse: 2.8% (6/214)</li> </ul>	<p>44% participation rate; potential recall bias</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
21 February to 27 May 2020	(including cleaning); 10% socio-administrative <ul style="list-style-type: none"> <li>31% direct contact with infected patients</li> <li>7% direct contact with infected relatives</li> <li>62% trained in PPE use</li> <li>4.3% SARS-CoV-2 seropositive</li> </ul>	<ul style="list-style-type: none"> <li>Physician: 4.1% (8/194)               <ul style="list-style-type: none"> <li>Nurse vs. physician: adjusted OR 0.71 (0.22-2.27)</li> </ul> </li> <li>Health care service worker: 1.6% (1/63)</li> <li>Health service assistant: 5.3% (4/76)</li> <li>Socio-administrative staff: 6.9% (4/58)</li> </ul> Exposure <ul style="list-style-type: none"> <li>Contact with infected relative: 14.9% (10/67)</li> <li>No contact with infected relative: 2.4% (13/538)               <ul style="list-style-type: none"> <li>Contact vs. no contact with infected relative: <b>adjusted OR 8.12 (2.95-22.34)</b></li> </ul> </li> <li>Contact with infected patient (in previous 30 days): 3.5% (14/401)</li> <li>No contact with infected patient: 4.4% (9/204)               <ul style="list-style-type: none"> <li>Contact vs. no contact with infected patient: adjusted OR 1.19 (0.37-3.79)</li> </ul> </li> </ul> PPE <ul style="list-style-type: none"> <li>Trained in PPE use: 3.4% (16/469)</li> <li>Not trained in PPE use: 5.1% (7/136)               <ul style="list-style-type: none"> <li>Trained vs. not trained: adjusted OR 0.71 (0.25-2.13)</li> </ul> </li> <li>High/very high confidence with PPE use: 4.1% (18/434)</li> <li>Low/medium confidence with PPE use: 2.9% (5/171)               <ul style="list-style-type: none"> <li>High/very high vs. low/medium confidence: adjusted OR 0.96 (0.31-2.98)</li> </ul> </li> </ul>	
Mutambudzi et al, 2020 (45)  Prospective cohort  United Kingdom; HCWs throughout the United Kingdom; 16 March to 3 May 2020	11,353 HCWs participating in UK Biobank <ul style="list-style-type: none"> <li>Age, sex of HCWs not reported</li> <li>16% health care professionals, 12% medical support staff, 71% health associate professionals</li> <li>0.7% (76/10,718) diagnosed with SARS-CoV-2 infection</li> </ul>	Incidence of SARS-CoV-2 infection <ul style="list-style-type: none"> <li>Health care professionals: 0.7% (12/1,779)</li> <li>Medical support staff: 0.8% (10/1,286)</li> <li>Health associate professionals: 0.7% (54/7,653)</li> </ul>	<b>Not peer reviewed</b> No control for confounders; restricted to participants in UK Biobank study
Nguyen et al, 2020 (46)  Prospective cohort	99,795 frontline HCWs <ul style="list-style-type: none"> <li>Mean age, 42 years</li> </ul>	HR (95% CI) for SARS-CoV-2 infection Reported inadequate PPE availability vs. adequate: <b>1.24 (1.04-1.47)</b> <ul style="list-style-type: none"> <li>No exposure to COVID-19 patients: <b>1.54 (1.12-2.11)</b></li> </ul>	Potential selection bias, limited measurement of exposures/risk factors,

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
United Kingdom and United States; Start March 24 or 29, 2020, end date not reported	<ul style="list-style-type: none"> <li>83% female</li> <li>HCW role/position not reported</li> <li>4.0% 30-day incidence of SARS-CoV-2 infection</li> </ul>	<ul style="list-style-type: none"> <li>Exposure to suspected COVID-19 patients: <b>1.88 (1.25-2.84)</b></li> <li>Exposure to documented COVID-19 patients: <b>5.98 (4.61-7.77)</b></li> </ul> <p>Adjusted hazard ratio (95% CI) for SARS-CoV-2 infection</p> <p>Reported inadequate PPE availability vs. adequate: <b>1.23 (1.03-1.46)</b></p> <ul style="list-style-type: none"> <li>No exposure to COVID-19 patients: <b>1.53 (1.11-2.09)</b></li> <li>Exposure to suspected COVID-19 patients: <b>1.84 (1.22-2.78)</b></li> <li>Exposure to documented COVID-19 patients: <b>5.94 (4.57-7.72)</b></li> </ul> <p>Inpatient HCW (reference general population): <b>24.3 (21.8-27.1)</b></p> <ul style="list-style-type: none"> <li>Nursing homes: <b>16.2 (13.4-19.7)</b></li> <li>Outpatient clinics in hospital: <b>11.2 (8.44-14.9)</b></li> <li>Home health sites: <b>7.86 (5.63-11.0)</b></li> <li>Ambulatory clinics: <b>6.94 (5.12-9.41)</b></li> <li>Other health care setting: <b>9.52 (7.49-12.1)</b></li> </ul>	SARS-CoV-2 infection status based on self-report
Rashid-Abdi et al 2020 (47)  Prospective cohort  Sweden (Vasteras); 1 hospital; 4 May to 19 August 2020	131 infectious disease HCWs <ul style="list-style-type: none"> <li>Mean age 39 y</li> <li>84% female</li> <li>36% nurse, 19% physician, 40% nurse assistant, 5% other role</li> <li>19.1% SARS-CoV-2 seropositivity</li> </ul>	<p>Age: Mean 38 (cases) vs. 44 (non-cases) years, p not reported</p> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 22.7% (25/110)</li> <li>Male: 0% (0/21) <ul style="list-style-type: none"> <li>Female vs. male: OR 12.82 (0.75-219.19)*</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse: 21.3% (10/47)</li> <li>Nurse assistant: 24.5% (13/53)</li> <li>Physician: 8.0% (2/25) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 3.11 (0.62-15.47)*</li> <li>Nurse or nurse assistant vs. physician: OR 3.44 (0.75-15.68)*</li> </ul> </li> <li>Other role: 0% (0/6)</li> </ul> <p>Exposure to COVID-19</p> <ul style="list-style-type: none"> <li>At work: 20.0% (25/125)</li> <li>Outside of work: 10.5% (2/19) <ul style="list-style-type: none"> <li>At work vs. outside of work: OR 16.88 (3.79-75.19)*</li> </ul> </li> <li>None: 0% (0/5)</li> </ul>	No control for confounders; potential recall bias; participation rate unclear
Rasmussen et al 2021 (48)  Prospective cohort  Denmark (Copenhagen); hospital	347 HCWs <ul style="list-style-type: none"> <li>Mean age not reported</li> <li>% female not reported</li> <li>30% nurse, 23% physician, 5% secretary, 23%</li> </ul>	<p>HCW role</p> <p>Infection (PCR)</p> <ul style="list-style-type: none"> <li>Nurse: 1% (1/104)</li> <li>Physician: 5% (4/80) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.18 (0.02-1.68)*</li> </ul> </li> <li>Secretary: 0% (0/18)</li> <li>Theatre personnel: 0% (0/81)</li> <li>Cleaner: 0% (0/8)</li> </ul>	Some demographic data not reported; no control for confounders

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
otorhinolaryngology department; 27 March to 3 June 2020	<ul style="list-style-type: none"> <li>theatre personnel, 2% cleaner, 9% porter, 7% other role</li> <li>2.0% SARS-CoV-2 infection (PCR); 4.3% SARS-CoV-2 seropositive</li> </ul>	<ul style="list-style-type: none"> <li>Porter: 7% (2/31)</li> <li>Other role: 0% (0/25)</li> </ul> <p><i>Seropositive</i></p> <ul style="list-style-type: none"> <li>Nurse: 2% (2/104)</li> <li>Physician: 4% (3/80) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.50 (0.08-3.09)*</li> </ul> </li> <li>Secretary: 6% (1/18)</li> <li>Theatre personnel: 5% (4/81)</li> <li>Cleaner: 0% (0/8)</li> <li>Porter: 13% (4/31)</li> <li>Other role: 4% (1/25)</li> </ul>	
Schmidt et al, 2020 (49)  Prospective cohort  Germany; 1 neurologic hospital; 20 to 30 March 2020	<p>385 HCWs in a neurological center</p> <ul style="list-style-type: none"> <li>Mean age not reported; 14% age 18-29 y, 40% age 30-49 y, 44% age 50-64 y, 2% age ≥65 y</li> <li>80% female</li> <li>9% physician, 40% nurse, 21% therapist, 30% other health care role</li> </ul>	<p>Prevalence of SARS-CoV-2 seropositivity</p> <ul style="list-style-type: none"> <li>18-29 y: 1.9% (1/55)</li> <li>30-49 y: 4.8% (7/154)</li> <li>50-64 y: 1.8% (3/170)</li> <li>≥65 y: 0% (0/6)</li> <li>Male: 5.2% (4/77)</li> <li>Female: 2.3% (7/308)</li> <li>Physician: 8.8% (3/34)</li> <li>Nurse: 0% (0/154)</li> <li>Therapist: 3.8% (3/80)</li> <li>Other role: 4.3% (5/117)</li> </ul> <p>Unadjusted OR (95% CI) for SARS-CoV-2 seropositivity</p> <ul style="list-style-type: none"> <li>Female vs. male: 0.42 (0.12-1.49)*</li> <li>Nurse vs. physician: <b>0.03 (0.002-0.58)*</b></li> </ul>	73% participation rate; no control for confounders
Sims et al 2020 (50)  Prospective cohort  United States (Michigan); health system including 8 hospitals; 13 April to 28 May 2020	<p>20,614 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 43 y</li> <li>77% female</li> <li>40% nurse/nursing support, 19% physician</li> <li>8.8% SARS-CoV-2 seropositivity</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>Female: 8.8% (1,380/15,728)</li> <li>Male: 9.0% (423/4,700) <ul style="list-style-type: none"> <li>Female vs. male: OR 0.97 (0.87-1.09)*</li> </ul> </li> </ul> <p>Age (mean, years): 41.3 (cases) vs. 43.3 (non-cases), p&gt;0.05</p> <p>Race</p> <ul style="list-style-type: none"> <li>White: 7.7% (1235/16141)</li> <li>Asian/Pacific Islander: 11.4% (162/1419)</li> <li>Black: 19.6% (236/1203)</li> <li>Hispanic: 12% (47/388)</li> <li>Other: 10.3% (64/619)</li> </ul>	Participation rate 48%; potential recall bias; limited control for confounders

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>○ Black vs. white: <b>OR 2.95 (2.54-3.44)*</b></li> <li>○ Hispanic vs. white: <b>OR 1.66 (1.22-2.27)*</b></li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse/nursing support: 10.8% (902/8,352)</li> <li>• Physician: 7.0% (277/3,957) <ul style="list-style-type: none"> <li>○ Nurse/nursing support vs. physician: <b>OR 1.62 (1.41-1.86)*</b></li> </ul> </li> <li>• Respiratory therapy: 12.1% (37/306)</li> <li>• Phlebotomy: 14.6% (41/281)</li> <li>• Clinical support with patient contact: 8.0% (173/2162)</li> <li>• Facilities: 8.2% (41/500)</li> <li>• Administration: 6.8% (194/2,853)</li> <li>• Laboratory: 5.5% (44/800)</li> <li>• Security/safety: 6.6% (7/106)</li> <li>• Clinical support with no patient contact: 7.7% (102/1,325)</li> <li>• Direct patient contact: 9.5% (1,430/15,058)</li> <li>• No direct patient contact: 6.9% (388/5,584) <ul style="list-style-type: none"> <li>○ Direct vs. no direct patient contact: <b>OR 1.41 (1.25-1.58)*</b></li> </ul> </li> </ul> <p>Mask use</p> <ul style="list-style-type: none"> <li>• N95: 10.3% (532/5,165)</li> <li>• PAPR: 12.3% (8/65)</li> <li>• Surgical: 13.1% (171/1,305)</li> <li>• Other mask: 14.2% (11/77)</li> <li>• No mask: 17.5% (369/2,108) <ul style="list-style-type: none"> <li>○ Any mask vs. no mask: <b>OR 0.58 (0.50-0.66)*</b></li> <li>○ N95 or surgical mask vs. no mask: <b>OR 0.57 (0.50-0.66)*</b></li> <li>○ N95 vs. no mask: <b>OR 0.54 (0.47-0.62)*</b></li> <li>○ Surgical mask vs. no mask: <b>OR 0.71 (0.58-0.86)*</b></li> <li>○ N95 vs. surgical mask: <b>OR 0.76 (0.63-0.92)*</b></li> </ul> </li> </ul> <p>Diabetes</p> <ul style="list-style-type: none"> <li>• Yes: 5.8% (105/912)</li> <li>• No: 8.7% (1713/19,712) <ul style="list-style-type: none"> <li>○ Diabetes (yes vs. no): <b>OR 1.37 (1.11-1.69)*</b></li> </ul> </li> </ul> <p>Cardiovascular disease</p> <ul style="list-style-type: none"> <li>• Yes: 1.9% (33/395)</li> <li>• No: 8.8% (1785/20,219) <ul style="list-style-type: none"> <li>○ Cardiovascular disease (yes vs. no): <b>OR 0.94 (0.66-1.35)*</b></li> </ul> </li> </ul> <p>Chronic lung disease</p> <ul style="list-style-type: none"> <li>• Yes: 8.2% (58/710)</li> </ul>	

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• No: 8.8% (1760/19,904) <ul style="list-style-type: none"> <li>◦ Chronic lung disease (yes vs. no): OR 0.92 (0.70-1.20)*</li> </ul> </li> <li>Chronic kidney disease</li> <li>• Yes: 6.4% (5/78)</li> <li>• No: 8.8% (1813/20,536) <ul style="list-style-type: none"> <li>◦ Chronic kidney disease (yes vs. no): OR 0.71 (0.29-1.75)*</li> </ul> </li> <li>Hypertension</li> <li>• Yes: 9.3% (284/3064)</li> <li>• No: 8.7% (1534/17,550) <ul style="list-style-type: none"> <li>◦ Hypertension (yes vs. no): OR 1.07 (0.93-1.22)*</li> </ul> </li> <li>Immunosuppressed</li> <li>• Yes: 6.5% (25/383)</li> <li>• No: 8.9% (1793/20,231) <ul style="list-style-type: none"> <li>◦ Immunosuppressed (yes vs. no): OR 0.72 (0.48-1.08)*</li> </ul> </li> </ul>	
<p>Trieu et al, 2020 (51)</p> <p>Prospective cohort</p> <p>Norway (Bergen); 3 hospitals; testing began 6 March 2020</p>	<p>607 HCWs</p> <ul style="list-style-type: none"> <li>• Median age 39 years</li> <li>• 77% female</li> <li>• 29% physician, 47% nurse; 24% other</li> <li>• 5.3% SARS-CoV-2 seroprevalence</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>• Age 20-35 vs. 36-78 y: OR 1.5 (0.7-3.4)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female vs. male: OR 1.2 (0.6-2.2)</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Physician vs. other: OR 0.9 (0.4-2.0)</li> <li>• Nurse vs. other: OR 1.3 (0.7-2.7)</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• High vs. low-exposure occupational risk group: OR 1.2 (0.5-2.9)</li> <li>• Patient contact vs. no patient contact: OR 1.7 (0.7-4.3)</li> <li>• Patient contact and PPE use (vs. no patient contact) <ul style="list-style-type: none"> <li>◦ Patient contact, full PPE: OR 1.1 (0.5-2.7)</li> <li>◦ Patient contact, partial PPE: OR 2.5 (0.5-12.2)</li> </ul> </li> </ul>	<p>No control for confounders</p>
<p>Villanueva et al, 2020 (52)</p> <p>Prospective cohort</p> <p>The Philippines (Manilla); 1 hospital; 20 March to 20 April 2020</p>	<p>324 HCWs with known exposure of signs or symptoms</p> <ul style="list-style-type: none"> <li>• Mean age, 36 y</li> <li>• 67% female</li> <li>• 11% physician, 63% nurse, 19% nursing aid, 2% radiology tech, 4% lab, 1% clerk and other</li> </ul>	<p>Positive (PCR) of HCWs screened</p> <ul style="list-style-type: none"> <li>• 20-29 y: 2.3% (2/88)</li> <li>• 30-39 y: 2.9% (4/140)</li> <li>• 40-49 y: 2.9% (2/68)</li> <li>• 50-59 y: 0% (0/24)</li> <li>• 60-69 y: 0% (0/4)</li> <li>• Female: 2.8% (6/216)</li> <li>• Male: 1.9% (2/108) <ul style="list-style-type: none"> <li>◦ Female vs. male: OR 1.51 (0.30-7.63)*</li> </ul> </li> <li>• Physician: 2.7% (1/37)</li> <li>• Nurse: 2.0% (4/203)</li> </ul>	<p>27% participation rate; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 0.72 (0.08-6.66)*</li> <li>• Lab personnel: 25% (3/12)</li> <li>• Radiology tech, clerk, other: 0%</li> <li>• High risk: 4.1% (4/97)</li> <li>• Low risk: 1.8% (4/227)</li> </ul> <p>Of 8 positive tests</p> <ul style="list-style-type: none"> <li>• Care of COVID-19 patient: 12.5% (1/8)</li> <li>• Community/worker residence exposure: 87.5% (7/8)</li> <li>• At least one underlying disease: 100% (8/8)</li> </ul>	
<p>Vimercati et al 2021 (53)</p> <p>Prospective cohort</p> <p>Italy (Bari); 1 hospital; 8 April 2020 to 7 June 2020</p>	<p>2407 asymptomatic HCWs with close contact with COVID-19-positive patients</p> <ul style="list-style-type: none"> <li>• Mean age 46 y</li> <li>• 56% female</li> <li>• 34% nurse, 35% physician, 14% support operator, 2% health care professions, 15% other role</li> <li>• 5% COVID units; 4% ER; 15% ICU/anesthesiology; 3% ID; 57% other clinical units; 16% non-clinical units</li> <li>• Italian and CDC Biological Occupational Risk level: 27% high risk, 61% medium risk, 12% low risk</li> <li>• 0.75% SARS-CoV-2 infection, PCR; 11.5% IgM seropositive; 2.4% IgG seropositive</li> </ul>	<p><i>Infection (PCR)</i></p> <p>Age</p> <ul style="list-style-type: none"> <li>• Mean age, positive vs. negative: 43.2 y vs. 45.7 y; OR 0.98 (0.95-1.02)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 0.9% (12/1360)</li> <li>• Male: 0.6% (6/1047) <ul style="list-style-type: none"> <li>○ Female vs. male: OR 1.54 (0.58-4.13)*</li> </ul> </li> </ul> <p>HCW role:</p> <ul style="list-style-type: none"> <li>• Nurse: 0.5% (4/809)</li> <li>• Physician: 1.6% (13/831) <ul style="list-style-type: none"> <li>○ Nurse vs. physician: <b>OR 0.31 (0.10-0.96)*</b></li> </ul> </li> <li>• Support operator: 0.3% (1/347)</li> <li>• Health care professions: 0% (0/53)</li> <li>• Other role: 0% (0/367)</li> </ul> <p>Hospital unit:</p> <ul style="list-style-type: none"> <li>• COVID units: 0% (0/118)</li> <li>• ER: 0.9% (1/107)</li> <li>• ICU/anesthesiology: 1.1% (4/357)</li> <li>• ID: 0% (0/70)</li> <li>• Other clinical units: 0.9% (13/1373)</li> <li>• Non-clinical units: 0% (0/377)</li> </ul> <p>Risk level:</p> <ul style="list-style-type: none"> <li>• Low: 0% (0/281); reference</li> <li>• Medium: 0.8% (12/1452); OR 4.89 (0.29-82.76)*</li> <li>• High: 0.8% (5/653); OR 4.77 (0.26-86.6)*</li> </ul> <p><i>Seropositive, IgM</i></p> <p>Age</p>	<p>Participation rate unclear; limited control for exposures and no control for PPE use</p>



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Mean age, positive vs. negative: 43.3 y vs. 46.0 y; <b>OR 0.98 (0.97-0.99)</b></li> <li>Sex: <ul style="list-style-type: none"> <li>• Female 11.9% (162/1360)</li> <li>• Male: 11.0% (115/1047) <ul style="list-style-type: none"> <li>○ Female vs. male: adjusted OR 0.97 (0.75-1.27)</li> </ul> </li> </ul> </li> <li>HCW role: <ul style="list-style-type: none"> <li>• Nurse: 12.1% (98/809)</li> <li>• Physician: 13.6% (113/831) <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 0.88 (0.66-1.17)*</li> </ul> </li> <li>• Support operator: 10.1% (35/347)</li> <li>• Health care professions: 0.9% (5/53)</li> <li>• Other: 7.1% (26/367)</li> </ul> </li> <li>Hospital unit: <ul style="list-style-type: none"> <li>• COVID units: 15.3% (18/118)</li> <li>• ER: 3.7% (4/107)</li> <li>• ICU/anesthesiology: 14.6% (52/357)</li> <li>• ID: 2.9% (2/70)</li> <li>• Other clinical units: 13.3% (183/1373)</li> <li>• Non-clinical units: 4.2% (16/377)</li> </ul> </li> <li>Risk level: <ul style="list-style-type: none"> <li>• Low: 4.3% (12/281); reference</li> <li>• Medium: 12.3% (179/1452); adjusted OR 2.91 (1.57-5.39)</li> <li>• High: 11.6% (76/653); adjusted OR 2.84 (1.50-5.39)</li> </ul> </li> <li><i>Seropositive, IgG</i></li> <li>Age <ul style="list-style-type: none"> <li>• Mean age, positive vs. negative: 48.9 vs. 45.6; <b>OR 1.03 (1.00-1.059)</b></li> </ul> </li> <li>Sex: <ul style="list-style-type: none"> <li>• Female 2.1% (29/1360)</li> <li>• Male: 2.7% (28/1047) <ul style="list-style-type: none"> <li>○ Female vs. male: adjusted OR 0.73 (0.41-1.29)</li> </ul> </li> </ul> </li> <li>HCW role: <ul style="list-style-type: none"> <li>• Nurse: 2.1% (17/809)</li> <li>• Physician: 2.2% (18/831) <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 0.97 (0.50-1.89)*</li> </ul> </li> <li>• Support operator: 4.0% (14/347)</li> <li>• Health care professions: 1.9% (1/53)</li> <li>• Other: 1.9% (7/367)</li> </ul> </li> </ul>	

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		Hospital unit: <ul style="list-style-type: none"> <li>• COVID units: 2.5% (3/118)</li> <li>• ER: 2.8% (3/107)</li> <li>• ICU/anesthesiology: 1.7% (6/357)</li> <li>• ID: 1.4% (1/70)</li> <li>• Other clinical units: 2.8% (39/1373)</li> <li>• Non-clinical units: 0.8% (3/377)</li> </ul> Risk level: <ul style="list-style-type: none"> <li>• Low: 1.1% (3/281); reference</li> <li>• Medium: 2.7% (39/1452); OR 3.03 (0.90-10.21)</li> <li>• High: 2.0% (13/653); OR 2.32 (0.62-8.62)</li> </ul>	
Weinberger et al 2021 (54)  Prospective cohort  Germany (Munich); 1 university hospital; 24 Marth to 7 July 2020	300 HCWs <ul style="list-style-type: none"> <li>• Mean age 35 y</li> <li>• 67% female</li> <li>• 49% nurse, 32% physician, 6% laboratory staff, 6% other frontline HCW, 8% administrative staff</li> <li>• 4.7% SARS-CoV-2 seropositivity</li> </ul>	Exposure <ul style="list-style-type: none"> <li>• COVID-19 unit: 2.9% (4/140)</li> <li>• Non-COVID-19 unit: 11.1% (10/90)               <ul style="list-style-type: none"> <li>○ COVID-19 unit vs. non-COVID-19 unit: OR 0.24 (0.07-0.77)*</li> </ul> </li> </ul>	No control for confounders
<b>Retrospective cohort studies</b>			
Akinbami et al 2020 (55)  Retrospective cohort  United States (Detroit metropolitan area, Michigan); regional health care coalition; 18 May to 13 June 2020	16,397 asymptomatic HCWs, first responders and public safety personnel <ul style="list-style-type: none"> <li>• Mean age 42 y</li> <li>• 69% female</li> <li>• 86% HCW (39% nurse, 4% nurse assistant, 14% physician, 2% pharmacist, 1% physical therapist, 3% respiratory therapist, 6% administration/clerk,</li> </ul>	Age <ul style="list-style-type: none"> <li>• 18-24 y: 7.9% (54/686); reference</li> <li>• 25-34 y: 6.9% (337/4,885); adjusted OR 0.89 (0.56-1.39)</li> <li>• 35-44 y: 7.0% (278/3,977); adjusted OR 0.93 (0.57-1.52)</li> <li>• 45-59 y: 6.9% (360/5,222); adjusted OR 0.86 (0.53-1.40)</li> <li>• 60-64 y: 7.5% (83/1,106); adjusted OR 0.97 (0.58-1.62)</li> <li>• ≥65 y: 3.5% (18/521); <b>adjusted OR 0.41 (0.23-0.72)</b></li> </ul> Sex <ul style="list-style-type: none"> <li>• Female: 7.0% (787/11,251):</li> <li>• Male: 6.7% (345/5,146)               <ul style="list-style-type: none"> <li>○ Female vs. male: <b>adjusted OR 0.79 (0.65-0.95)</b></li> </ul> </li> </ul> Race/ethnicity <ul style="list-style-type: none"> <li>• Non-Hispanic white: 6.0% (771/12,858); reference</li> <li>• Non-Hispanic black: 16.3% (196/1,200); <b>adjusted OR 1.92 (1.52-2.43)</b></li> <li>• Non-Hispanic Asian: 7.3% (80/1,097); adjusted OR 0.97 (0.74-1.26)</li> </ul>	Potential recall bias; ~7% of participants were firefighters or police/corrections officers

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<p>2% clinical technician, 4% imaging technician, 2% laboratory technician, 4% midlevel clinician, 9% other role) 7% EMT, 2% firefighter, 5% police/ corrections officer</p> <ul style="list-style-type: none"> <li>6.9% SARS-CoV-2 seropositivity</li> </ul>	<ul style="list-style-type: none"> <li>Hispanic: 6.8% (30/440); adjusted OR 1.06 (0.76-1.48)</li> <li>Other: 7.2% (29/404); adjusted OR 0.95 (0.67-1.35)</li> </ul> <p>HCW</p> <ul style="list-style-type: none"> <li>Nurse: 7.7% (495/6,426) <ul style="list-style-type: none"> <li>Nurse vs. physician: <b>adjusted OR 1.52 (1.18-1.95)</b></li> </ul> </li> <li>Nurse assistant: 12.8% (82/641) <ul style="list-style-type: none"> <li>Nurse assistant vs. physician: <b>adjusted OR 1.88 (1.24-2.83)</b></li> </ul> </li> <li>Physician: 6.1% (140/2,297)</li> <li>Pharmacist: 4.4% (14/321)</li> <li>Physical therapist: 10.6% (25/235)</li> <li>Respiratory therapist: 8.3% (34/409)</li> <li>Administration/clerk: 8.0% (77/964)</li> <li>Clinical technician: 5.5% (20/365)</li> <li>Imaging technician: 4.2% (30/719)</li> <li>Laboratory technician: 3.4% (10/293)</li> <li>Midlevel clinician: 4.6% (26/566)</li> <li>Other HCW role: 7.0% (62/888)</li> <li>EMT: 5.2% (60/1,158)</li> <li>Firefighter: 6.7% (22/330)</li> <li>Police/corrections officer: 4.0% (31/785)</li> </ul> <p>Clinical setting (yes vs. no)</p> <ul style="list-style-type: none"> <li>Hospital emergency department: Adjusted OR 1.16 (1.00-1.35)</li> <li>Hospital ward: Adjusted OR 1.24 (0.97-1.58)</li> <li>Hospital intensive care unit: Adjusted OR 0.78 (0.66-0.91)</li> <li>Hospital operating room/surgical unit: Adjusted OR 0.63 (0.48-0.83)</li> <li>Other hospital location: Adjusted OR 0.87 (0.74-1.03)</li> <li>Emergency medical services: Adjusted OR 1.08 (0.70-1.66)</li> </ul> <p>Exposure to persons testing positive for COVID-19 (yes vs. no)</p> <ul style="list-style-type: none"> <li>Co-worker: 10.0% (680/6799): <b>1.45 (1.21-1.73)</b></li> <li>Household member: 34.3% (178/519); <b>adjusted OR 6.18 (4.81-7.93)</b></li> <li>Patient: 7.8% (810/10,389); adjusted OR 1.03 (0.87-1.22)</li> <li>Other person: 11.5% (312/2709); <b>adjusted OR 1.25 (1.08-1.45)</b></li> </ul> <p>PPE use (all the time vs. less than all the time)</p> <ul style="list-style-type: none"> <li>Gown: 6.9% (643/9,316); adjusted OR 1.14 (0.97-1.34)</li> <li>Gloves: 7.0% (832/11,887); adjusted OR 1.09 (0.90-1.30)</li> <li>N95: 6.9% (505/7,316); <b>adjusted OR 0.83 (0.72-0.95)</b></li> <li>PAPR: 7.6% (53/695); adjusted OR 1.10 (0.80-1.52)</li> <li>Goggles/face shield: 6.5% (428/6,581); adjusted OR 1.12 (0.94-1.32)</li> </ul>	

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Surgical mask: 6.6% (624/9,452); <b>adjusted OR 0.86 (0.75-0.98)</b></li> </ul> Aerosol generating procedure frequency <ul style="list-style-type: none"> <li>• 0 times: reference</li> <li>• 1-5 times: adjusted OR 1.04 (0.85-1.28)</li> <li>• 6-10 times: adjusted OR 0.83 (0.66-1.04)</li> <li>• 11-25 times: adjusted OR 0.89 (0.69-1.16)</li> <li>• &gt;25 times: adjusted OR 1.09 (0.89-1.34)</li> </ul>	
Algado-Selles et al 2020 (56)  Retrospective cohort  Spain (Alicante); 1 hospital and 12 primary care clinics; 2 March to 16 April 2020	784 symptomatic HCWs <ul style="list-style-type: none"> <li>• Mean age not reported; 88% &lt;age 60 y</li> <li>• 78% female</li> <li>• 27% physician, 34% nurse, 20% nursing assistant or technician, 20% other role</li> <li>• 19.9% SARS-CoV-2 infection (PCR)</li> </ul>	Age <ul style="list-style-type: none"> <li>• &lt;60 y: 19.5% (135/691)</li> <li>• ≥60 y: 22.6%% (21/93)               <ul style="list-style-type: none"> <li>○ &lt;60 vs ≥60: OR 1.2 (0.7-2.0); not included in multivariate model</li> </ul> </li> </ul> Sex <ul style="list-style-type: none"> <li>• Female: 19.2% (118/615)</li> <li>• Male: 22.5% (38/169)               <ul style="list-style-type: none"> <li>○ Female vs. male: OR 1.2 (0.8-1.8); not included in multivariate model</li> </ul> </li> </ul> HCW role <ul style="list-style-type: none"> <li>• Nurse: 18.1% (49/270)</li> <li>• Physician: 28.2% (60/213)               <ul style="list-style-type: none"> <li>○ Nurse vs. physician: <b>OR 0.57 (0.37-0.87)*</b></li> </ul> </li> <li>• Nurse assistant/technician: 14.6% (27/185)</li> <li>• Other role: 17.2% (20/116)</li> </ul> Department <ul style="list-style-type: none"> <li>• ED: 16.2% (6/37)</li> <li>• Pediatric: 8.3% (4/48)</li> <li>• Critical care unit: 25.0% (30/120)</li> <li>• Adult ward: 14.9% (42/281)</li> <li>• Primary care: 23.7% (23/97)</li> <li>• Non-COVID-19 ward: 25.4% (51/201)               <ul style="list-style-type: none"> <li>○ ED vs. non-COVID-19 ward: adjusted OR 0.7 (0.2-1.9)</li> <li>○ Pediatric vs. non-COVID-19 unit: adjusted OR 0.4 (0.1-2.2)</li> <li>○ Critical care vs. non-COVID-19 unit: adjusted OR 0.8 (0.3-1.7)</li> <li>○ Adult ward vs. non-COVID-19 unit: adjusted OR 0.7 (0.4-1.4)</li> <li>○ Primary care vs. non-COVID-19 unit: adjusted OR 1.1 (0.5-2.2)</li> </ul> </li> </ul> Contact type <ul style="list-style-type: none"> <li>• Close: 22.8% (119/523)</li> <li>• Occasional: 14.8% (27/182)</li> <li>• Unknown: 12.7% (10/79)               <ul style="list-style-type: none"> <li>○ Close vs. unknown: adjusted OR 2.1 (0.8-5.1)</li> </ul> </li> </ul>	Potential recall bias

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>○ Occasional vs. unknown: adjusted OR 1.4 (0.5-3.9)</li> <li>○ Close vs. occasional: OR 1.69 (1.07-2.67)*</li> </ul> PPE use (surgical mask or N95 [or equivalent] and eye protection for aerosol generating procedures) <ul style="list-style-type: none"> <li>• Yes: 13.7% (40/293)</li> <li>• No: 22.8% (112/491)</li> <li>○ Yes vs. no: <b>adjusted OR 0.45 (0.26-0.83)</b></li> </ul>	
Bai et al, 2020 (57)  Retrospective cohort  China (Wuhan); 1 hospital (neurosurgery department) prior to recognition of outbreak; December 25, 2019 to February 15, 2020	118 HCWs with potential exposure to COVID-19 patient <ul style="list-style-type: none"> <li>• Mean age, 31 years</li> <li>• 64% female</li> <li>• 25% physician, 75% nurse</li> <li>• 10.2% (12/118) diagnosed with COVID-19</li> </ul>	COVID-19 vs. no COVID-19 Age (years): <b>36.6 vs. 30.5, p=0.006</b> BMI (kg/m <sup>2</sup> ): 22.4 vs. 22.0, p=0.85 Contact frequency (median, contacts/day): 3.0 vs. 5.0, p=0.95 Contact duration (median, minutes/contact): 4.0 vs. 4.0, p=0.54  OR (95% CI) for COVID-19 <sup>†</sup> <ul style="list-style-type: none"> <li>• Female vs. male: 0.78 (0.23-2.64)</li> <li>• Current smoking (yes vs. no): 0.41 (0.02-7.49)</li> <li>• Current alcohol (yes vs. no): 0.37 (0.02-6.67)</li> <li>• Regular physical activity (yes vs. no): 2.12 (0.64-7.05)</li> <li>• Nurse vs. physician: 0.65 (0.18-2.34)</li> <li>• Working under pressure (yes vs. no): <b>4.24 (1.19-15.05)</b></li> <li>• Contact with index case (yes vs. no): <b>0.27 (0.08-0.94)</b></li> <li>• Air contact vs. no contact: 0.32 (0.07-1.50)</li> <li>• Direct contact vs. no contact: 0.22 (0.05-1.03)</li> <li>• Air or direct contact vs. no contact: 0.31 (0.03-3.01)</li> <li>• In same department as index case (yes vs. no): <b>62.70 (3.60-1092.46)</b></li> <li>• Chronic pulmonary disease (yes vs. no): 1.11 (0.13-9.76)</li> <li>• Chronic non-pulmonary disease (yes vs. no): 0.62 (0.03-11.65)</li> </ul>	<b>Not peer reviewed;</b> potential recall bias; no control for confounders; criteria for COVID-19 diagnosis not described; 4 infected HCWs without exposure data excluded
Banjeree et al 2020 (58)  Retrospective cohort  India (Kolkata); 1 hospital; 1 June to 31 August 2020	274 symptomatic HCWs or HCWs who had direct contact with a COVID-19 patient <ul style="list-style-type: none"> <li>• Mean age not reported</li> <li>• 40% female</li> <li>• HCW role not reported</li> <li>• 31% SARS-CoV-2 infection (PCR)</li> </ul>	Sex <ul style="list-style-type: none"> <li>• Female: 23.4% (32/109)</li> <li>• Male: 26.1% (43/165)               <ul style="list-style-type: none"> <li>○ Female vs. male: OR 0.85 (0.49-1.45)*</li> </ul> </li> </ul>	No control for confounders; limited demographic information; participation rate unclear

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Buchtele et al, 2020 (59)</p> <p>Retrospective cohort</p> <p>Austria (Vienna); stem cell transplant unit; 23 March to 17 April 2020</p>	<p>26 HCWs and staff with face-to-face exposure to SARS-CoV-2 infected colleague</p> <ul style="list-style-type: none"> <li>Age, sex not reported</li> <li>19.2% physician, 69.2% nurse, 11.5% cleaning staff</li> </ul>	<p>Incidence of SARS-CoV-2 infection (PCR)</p> <ul style="list-style-type: none"> <li>Physician: 0% (0/5)</li> <li>Nurse: 27.8% (5/18)</li> <li>Cleaning staff: 0% (0/3)</li> </ul> <p>Nurse vs. physician: OR 4.48 (0.21-95.60)*</p>	<p>No information on demographic or clinical characteristics of HCWs</p>
<p>Colaneri et al 2020 (60)</p> <p>Retrospective cohort</p> <p>Italy (Lombardy); 1 hospital; 22 February to 8 May 2020</p>	<p>1,477 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 45 y</li> <li>70% female</li> <li>31% physician, 39% nurse, 18% health care assistant, 12% administrative staff</li> <li>11.3% SARS-CoV-2 infection (PCR)</li> </ul>	<p>Age (mean, years): 46.3 (cases) vs. 44.9 (non-cases); p=0.43</p> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 10.3% (104/1007)</li> <li>Male: 13.6% (60/440) <ul style="list-style-type: none"> <li>Female vs. male: OR 0.73 (0.52-1.02)*</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse: 11.1% (63/568)</li> <li>Physician: 12.1% (54/446) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.91 (0.62-1.33)*; adjusted IRR 1.49 (0.97-2.30)</li> </ul> </li> <li>Health care assistant: 13.3% (34/255)</li> <li>Administrative staff: 7.3% (13/178)</li> </ul> <p>Clinical setting; p&lt;0.0001</p> <ul style="list-style-type: none"> <li>COVID-19 ward: 20.9% (97/465)</li> <li>Non-COVID-19 clinical ward: 7.3% (60/825)</li> <li>No patient contact: 4.5% (7/157)</li> </ul> <p>Contact with CPAP helmets</p> <ul style="list-style-type: none"> <li>Yes: 26.3% (73/278)</li> <li>No: 7.8% (91/1169) <ul style="list-style-type: none"> <li>Yes vs. no: <b>OR 4.22 (3.00-5.94)*</b></li> </ul> </li> </ul> <p>BMI (mean, kg/m<sup>2</sup>): 24.4 vs. 23.4; p=0.01</p> <p>Smoking; p&lt;0.0001</p> <ul style="list-style-type: none"> <li>Never: 15.7% (113/721)</li> <li>Former: 23.9% (33/138)</li> <li>Current: 7.3% (18/247)</li> </ul> <p>Hypertension</p> <ul style="list-style-type: none"> <li>Yes: 16.2% (16/99)</li> <li>No: 13.9% (148/1064)</li> </ul>	<p>Potential recall bias</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>○ Yes vs. no: OR 1.19 (0.68-2.09)*</li> <li>Alcohol consumption; p=0.34</li> <li>• None: 10.0% (34/340)</li> <li>• Moderate: 12.3% (83/677)</li> <li>• Not moderate: 6.7% (3/45)</li> <li>• High: 0% (0/0)</li> </ul>	
<p>Comelli et al 2021 (9)</p> <p>Retrospective cohort</p> <p>Italy (Brescia); one hospital; May 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>1893 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 44 y</li> <li>• 77% female</li> <li>• 43% nurse, 22% physician, 14% support staff, 7% pharmacist, 1% technician, 1% psychologist, 11% other role</li> <li>• 22.9% SARS-CoV-2 seropositive</li> </ul>	<p>Age (mean years), positive vs. negative: 45 vs. 44, p=0.01</p> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 22.6% (330/1459)</li> <li>• Male: 23.7% (103/434)</li> <li>○ Female vs. male: OR 0.94 (0.73-1.21)*</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• Work in COVID-19 unit or ED: 23.2% (234/1008)</li> <li>• Did not work in COVID-19 unit or ED: 22.5% (199/885)</li> <li>○ Work vs. did not work in COVID-19 unit or ED: OR 1.04 (0.84-1.29)*</li> <li>• Direct contact with confirmed COVID-19 case: 25.9% (284/1098)</li> <li>• No direct contact with confirmed COVID-19 case: 18.7% (149/795)</li> <li>○ Direct vs. no direct contact with confirmed COVID-19 case: <b>OR 1.51 (1.21-1.89)</b></li> </ul> <p>Underlying immunosuppression: 26.7% (12/45)</p> <ul style="list-style-type: none"> <li>• Underlying immunosuppression (yes vs. no): OR 1.23 (0.63-2.41)</li> </ul>	<p>48% participation rate among eligible HCWs; potential recall bias; no control for confounders</p>
<p>Folgueira et al, 2020 (61)</p> <p>Retrospective cohort</p> <p>Spain (Madrid); 1 hospital; 1 to 29 March 2020</p>	<p>2085 HCWs tested for SARS-CoV-2 infection</p> <ul style="list-style-type: none"> <li>• Age, sex, HCW role/position not reported</li> </ul>	<p>Incidence of SARS-CoV-2 infection, by department/hospital area</p> <ul style="list-style-type: none"> <li>• Intensive care unit: 52.3% (34/65)</li> <li>• Emergency department: 37.0% (50/135)</li> <li>• Surgery: 45.1% (79/175)</li> <li>• Oncology/hematology: 44.3% (31/70)</li> <li>• Medical areas without COVID-19: 37.4% (93/249)</li> <li>• Pediatrics/neonatal units: 48.6% (53/109)</li> <li>• Obstetrics/gynecology units: 39.5% (32/81)</li> <li>• Radiology: 38.0% (49/129)</li> <li>• Outpatient setting: 31.8% (14/44)</li> <li>• Administrative areas, clerical, informatics, communication, pharmacy: 55.2% (37/67)</li> <li>• Laboratories: 33.3% (28/84)</li> <li>• Kitchen: 38.3% (18/47)</li> </ul>	<p><b>Not peer reviewed</b>; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Garcia et al, 2020 (62)</p> <p>Retrospective cohort</p> <p>Spain (Madrid); 1 hospital; 24 February to 30 April 2020</p>	<p>1911 symptomatic HCWs tested for SARS-CoV-1</p> <ul style="list-style-type: none"> <li>• Median age 42 y</li> <li>• 80% female</li> <li>• 25.7% physician</li> <li>• 64.4% nurse</li> <li>• 1.3% nurse supervisor</li> <li>• 2.0% department head</li> <li>• 5.9% other role</li> </ul>	<p>Incidence of COVID-19</p> <p>High-risk setting: 9.1% (52/572)</p> <ul style="list-style-type: none"> <li>• Medical COVID-19 department: 18.7% (9/48)</li> <li>• ICU: 5.7% (13/226)</li> <li>• ED: 10.1% (30/298)</li> </ul> <p>Moderate-risk setting: 12.3% (94/761)</p> <ul style="list-style-type: none"> <li>• Outpatient clinic: 14.1% (25/177)</li> <li>• Obstetrics/gynecology: 5.4% (4/74)</li> <li>• Day unit: 10.5% (4/38)</li> <li>• Medical non-COVID-19 department: 16.1% (37/229)</li> <li>• Surgical unit: 9.9% (24/243)</li> </ul> <p>Low-risk setting: 8.6% (9/105)</p> <ul style="list-style-type: none"> <li>• Pathology: 6.2% (1/16)</li> <li>• Pharmacy: 10.0% (3/30)</li> <li>• Administrative, management, preventive medicine and social work: 8.5% (5.59)</li> </ul> <p>HCW role:</p> <ul style="list-style-type: none"> <li>• Physician: 13.0% (64/491)</li> <li>• Nurse: 10.2% (126/1231)</li> <li>• Nurse supervisor: 37.5% (9/24)</li> <li>• Any nursing role: 10.7% (135/1255)</li> <li>• Department head: 23.1% (9/39)</li> <li>• Other role: 4.4% (5/113)</li> <li>○ Nurse vs. physician: OR 0.76 (0.55-1.05)*</li> </ul>	<p>No control for confounders</p>
<p>Gras-Valenti et al 2020 (63)</p> <p>Retrospective cohort</p> <p>Spain (Alicante); 1 hospital and 12 primary care clinics; 24 April to 8 May 2020</p>	<p>4,179 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age not reported; 2% ≤24 y, 9% 25-29 y, 10% 30-34 y, 12% 40-44 y, 12% 45-49 y, 13% 50-54 y, 15% 55-59 y, 16% 60-64 y, 2% ≥65 y</li> <li>• 73% female</li> <li>• 23% physician, 28% nurse</li> <li>• 6.6% SARS-CoV-2 infection (PCR)</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 6.4% (197/3,065)</li> <li>• Male: 6.9% (77/1,114)</li> <li>○ Female vs. male: OR 0.93 (0.70-1.22)*</li> </ul> <p>Age</p> <ul style="list-style-type: none"> <li>• ≤24 years: 6.9% (5/72)</li> <li>• 25-29 years: 9.4% (36/383)</li> <li>• 30-34 years: 7.7% (29/375)</li> <li>• 35-39 years: 6.4% (26/408)</li> <li>• 40-44 years: 7.4% (36/487)</li> <li>• 45-49 years: 5.8% (29/503)</li> <li>• 50-54 years: 6.2% (34/553)</li> <li>• 55-59 years: 5.6% (36/645)</li> <li>• 60-64 years: 5.2% (36/688)</li> <li>• ≥65 years: 10.8% (7/65)</li> </ul>	<p>No control for confounders</p>



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse: 6.6% (78/1,186)</li> <li>• Physician: 8.7% (85/974)</li> <li>• Nurse vs. physician: OR 0.74 (0.53-1.01)*Caretaker: 6.8% (19/286)</li> <li>• Technician: 3.0% (4/127)</li> <li>• Administrative: 16.1% (/672)</li> <li>• Other housekeeping personnel: 3.8% (/158)</li> <li>• Other non-housekeeping personnel: 3.0% (/125)</li> </ul> <p>Clinical setting</p> <ul style="list-style-type: none"> <li>• Primary care: 18.1% (/757)</li> <li>• Urgent care: 7.6% (/318)</li> <li>• Critical care: 6.2% (/259)</li> <li>• Medical specialty: 13.0% (/545)</li> <li>• Surgical specialty: 20.2% (/846)</li> <li>• Other: 34.8% (1454)</li> </ul>	
<p>Heinzerling et al, 2020 (64)</p> <p>Retrospective cohort</p> <p>United States (California); 1 hospital with unsuspected COVID-19 case; February 2020</p>	<p>37 HCWs with exposure to COVID-19 patient and at least one aerosol-generating procedure</p> <ul style="list-style-type: none"> <li>• Median age, 39 years</li> <li>• 84% female</li> <li>• 7% physician, 51% nurse, 9% respiratory therapist, 9% phlebotomist, 7% certified nursing assistant, 7% environmental services worker, 5% nutrition services worker, 2% pharmacist, 2% other</li> <li>• 5.4% (2/37) diagnosed with COVID-19</li> </ul>	<p>Estimated time in patient room (median, minutes): 120 (IQR 120-420) vs. 25 (IQR 10-50), p=0.06</p> <p>Estimated time in patient room during aerosol generating procedures (median, minutes): 95 (IQR 0-160) vs. 0 (IQR 0-3), p=0.13</p> <p>OR (95% CI) for COVID-19 (PCR)*</p> <ul style="list-style-type: none"> <li>• Taking vital sign (yes vs. no): 7.71 (0.61-97.85)</li> <li>• Taking medical history (yes vs. no): 1.93 (0.15-24.46)</li> <li>• Performing physical examination: <b>21.82 (1.02-466.52)</b></li> <li>• Providing medication: 1.20 (0.10-14.79)</li> <li>• Bathing or cleaning patient: 0.97 (0.04-22.02)</li> <li>• Lifting or positioning patient: 0.92 (0.08-11.18)</li> <li>• Emptying bedpan: 8.00 (0.49-13.70)</li> <li>• Changing linens: 0.77 (0.03-17.01)</li> <li>• Cleaning patient room: 0.97 (0.04-22.02)</li> <li>• Peripheral line insertion: 3.19 (0.11-94.15)</li> <li>• Central line insertion: 3.19 (0.11-94.15)</li> <li>• Drawing arterial blood gas: 16.50 (0.73-372.83)</li> <li>• Drawing blood: 0.77 (0.03-17.01)</li> <li>• Manipulation of oxygen mask or tubing: 11.60 (0.88-153.29)</li> <li>• Manipulation of ventilator or tubing: 0.53 (0.02-11.30)</li> <li>• In room while high-flow oxygen delivered: 1.39 (0.11-17.24)</li> <li>• Collecting respiratory specimen: 1.29 (0.05-30.38)</li> </ul>	<p>Potential recall bias; no control for confounders; few cases and imprecise estimates; 6 tested HCWs were not interviewed and excluded from analysis</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>No use of N95 respirators, eye protection, gowns, or PAPR</li> </ul>	<ul style="list-style-type: none"> <li>Airway suctioning: 0.52 (0.02-11.30)</li> <li>Noninvasive ventilation (BiPAP, CPAP): <b>15.00 (1.09-205.50)</b></li> <li>Manual (bag) ventilation: 8.00 (0.49-130.70)</li> <li>Nebulizer treatments: <b>20.67 (1.42-300.55)</b></li> <li>Breaking ventilation circuit: 0.77 (0.03-17.01)</li> <li>Sputum induction: 3.19 (0.11-94.15)</li> <li>Intubation: 8.00 (0.49-130.70) <ul style="list-style-type: none"> <li>Performed or assisted (vs. no involvement): 8.00 (0.49-130.70)</li> <li>Present in room (vs. no involvement): 1.86 (0.07-46.97)</li> </ul> </li> <li>Bronchoscopy: 1.29 (0.05-30.38) <ul style="list-style-type: none"> <li>Performed or assisted (vs. no involvement): 1.29 (0.05-30.38)</li> <li>Present in room (vs. no involvement): 3.19 (0.11-94.15)</li> </ul> </li> <li>Any aerosol generating procedure: 2.53 (0.21-30.68)</li> <li>Always gloves during aerosol generating procedures: 3.10 (0.13-75.19)</li> <li>Always facemask (non-N95) during aerosol generating procedures: 0.77 (0.03-20.02)</li> <li>Always gloves during non-aerosol generating procedures: 4.40 (0.21-91.92)</li> <li>Always facemask (non-N95) during non-aerosol generating procedures: 1.29 (0.05-30.38)</li> <li>Longest single duration of time in room (reference &lt;2 minutes): 2 to 30 minutes: <b>32.00 (1.96-522.78)</b> <ul style="list-style-type: none"> <li>31 to 60 minutes: 1.86 (0.07-46.97)</li> <li>&gt;60 minutes: 8.00 (0.59-130.70)</li> </ul> </li> <li>Within 6 feet of index patient: 1.03 (0.05-23.49)</li> <li>Direct skin-to-skin contact with index patient: 0.45 (0.02-9.52)</li> <li>Index patient either masked or on closed system ventilator when contact occurred (reference never): Always: 0.20 (0.01-4.22) <ul style="list-style-type: none"> <li>Sometimes: 2.86 (0.24-34.66)</li> </ul> </li> </ul>	
Lai et al, 2020 (65)  Retrospective cohort  China (Wuhan); 1 hospital; 1 January-9 February 2020	9,648 HCWs <ul style="list-style-type: none"> <li>12% ≥45 y, 88% &lt;45 y</li> <li>74% female</li> <li>22% physician, 46% nurse, 32% health care assistant</li> </ul>	OR (95% CI) for COVID-19 (criteria not described)* <ul style="list-style-type: none"> <li>Age &lt;45 y vs. ≥45 y: 0.32 (0.21-0.48)</li> <li>Female vs. male: 0.91 (0.60-1.39)</li> <li>Nurse vs. physician: 1.16 (0.73-1.84) <ul style="list-style-type: none"> <li>Health care assistant vs. physician: 0.59 (0.33-1.04)</li> </ul> </li> <li>Clinic department for patients presumed not to have COVID-19 vs. fever clinic or ward: 3.00 (1.76-5.09)</li> <li>Department with no patient contact vs. fever clinic or ward: 1.81 (0.95-3.46)</li> </ul>	No control for confounders; incident rate ratios reported but unclear how duration of exposure estimated and results discrepant with data in study; criteria for COVID-19 not described

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>1.1% (110/9648) diagnosed with COVID-19</li> </ul>		
<p>Moscola et al, 2020 (66)</p> <p>Retrospective cohort</p> <p>United States (New York); multicenter health system; 20 April to 23 June 2020</p>	<p>40,329 HCWs</p> <ul style="list-style-type: none"> <li>Median age, 42 y</li> <li>73.7% female</li> <li>16.0% Black, 14.0% Hispanic, 0.8% multiracial</li> <li>9.3% physicians, 28.4% nurses</li> </ul>	<p>Positive seroprevalence for COVID-19 IgG antibodies</p> <ul style="list-style-type: none"> <li>18-39 y: 15.0% (2723/18,193)</li> <li>40-49 y: 14.1% (1100/7829)</li> <li>50-59 y: 12.3% (1055/8550)</li> <li>60-69 y: 11.4% (597/5215)</li> <li>≥ 70 y: 8.9% (48/542) <ul style="list-style-type: none"> <li>Adjusted RR (95% CI) vs. age 18-39 years: <ul style="list-style-type: none"> <li>40-49: 1.0 (0.97-1.02)</li> <li>50-59: 0.99 (0.97-1.02)</li> <li>60-69: 1.00 (0.98-1.03)</li> </ul> </li> </ul> </li> <li>≥70: 1.00 (0.94-1.07)</li> <li>Female: 13.7% (4062/29,725)</li> <li>Male: 13.8% (1461/10,604) <ul style="list-style-type: none"> <li>Female vs. male: adjusted RR, 1.05 (1.01-1.09)</li> </ul> </li> <li>American Indian: 17.0% (32/188)</li> <li>Asian: 11.9% (722/6082)</li> <li>Black: 23.5% (1513/6444)</li> <li>Hispanic: 19.6% (1108/5653)</li> <li>Pacific Islander: 17.2% (35/203)</li> <li>White: 9.6% (2057/21 428)</li> <li>Other/multiracial: 16.9% (56/331)</li> <li>Physicians: 8.7% (327/3746)</li> <li>Nurses: 13.1% (1503/11,468) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR, 1.58 (1.39-1.79)*</li> </ul> </li> <li>Allied health: 11.6% (949/8156) <ul style="list-style-type: none"> <li>Physician vs. allied health: adjusted RR,, 0.98 (0.95-1.00)</li> <li>Nurse vs. allied health: adjusted RR, 1.00 (0.98-1.01)</li> </ul> </li> <li>Administrative: 12.6% (1217/9645) <ul style="list-style-type: none"> <li>Administrative and clerical vs. allied health: adjusted RR, 1.01 (0.99-1.02)</li> </ul> </li> <li>Service/maintenance (included medical assistants): 20.9% (1527/7314) <ul style="list-style-type: none"> <li>Service/ maintenance vs. allied health: adjusted RR, 1.03 (1.00-1.05)</li> </ul> </li> <li>ED: 17.3% (533/3089)</li> <li>ICU: 9.9% (331/3355)</li> <li>Other hospital units: 17.1% (1706/9976)</li> <li>Other: 12.1% (2448/20)</li> </ul>	<p>56% of all eligible HCWs; 7 different assays used</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Direct patient care, no: 12.2% (1562/12 803)</li> <li>• Direct patient care, yes: 14.4% (3437/23 852)</li> <li>• Work in COVID-19 unit, no: 16.0% (2519/15 779)</li> <li>• Work in COVID-19 unit, yes: 12.3% (2247/18 332)</li> <li>• Self-report suspicion of virus exposure, low: 5.3% (1177/22 155)</li> <li>• Self-report suspicion of virus exposure, medium: 11.3% (1180/10 410)</li> <li>• Self-report suspicion of virus exposure, high: 59.2% (2726/4604)</li> <li>• PCR test negative: 10.33% (403/3892)</li> <li>• PCR test positive: 93.5% (2044/2186)</li> </ul>	
<p>Ng et al, 2020 (67)</p> <p>Retrospective cohort</p> <p>Singapore; February 2020</p>	<p>41 HCWs with exposure to COVID-19 patient and aerosol-generating procedures for ≥10 min at ≤2 m</p> <ul style="list-style-type: none"> <li>• Age, sex, and HCW role/position not reported</li> <li>• 0% (0/41) diagnosed with SARS-CoV-2 infection</li> </ul>	<p>Incidence of SARS-CoV-2 infection in exposed HCWs: 0% (0/41); no HCWs developed symptoms</p> <ul style="list-style-type: none"> <li>• Aerosol-generating procedures: endotracheal intubation (<math>n = 10</math>), extubation (<math>n = 2</math>), noninvasive ventilation (<math>n = 25</math>), other (<math>n = 4</math>)</li> <li>• Mask type during exposures: surgical mask, 85%; N95, 15%</li> </ul>	<p>No cases of COVID-19 occurred</p>
<p>Perez-Garcia et al 2020 (68)</p> <p>Retrospective cohort</p> <p>Spain (Alcalá de Henares); 1 hospital; 5 March to 30 May 2020</p>	<p>2,963 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 43 y</li> <li>• 80% female</li> <li>• 9% physician, 29% nurse, 22% nurse technician, 15% medical staff, 5% technical specialist, 6% hospital porter, 2% other HCW, 12% non-health care hospital personnel</li> <li>• 37% symptomatic</li> <li>• 36.5% SARS-CoV-2 infection (PCR or seropositivity)</li> </ul>	<p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse: 39.6% (340/859)</li> <li>• Physician: 33.1% (90/272) <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: OR 1.32 (0.99-1.77)*</li> </ul> </li> <li>• Nurse technician: 39% (250/641) <ul style="list-style-type: none"> <li>◦ Nurse or nurse technician vs. physician: <b>OR 1.31 (1.00-1.72)*</b></li> </ul> </li> <li>• Medical staff: 34.7% (154/444)</li> <li>• Technical specialist: 29.1% (41/141)</li> <li>• Hospital porter: 44.9% (83/185)</li> <li>• Other HCW: 26.4% (19/72)</li> <li>• Non-health care hospital personnel: 29.8% (104/349)</li> <li>• Health care personnel vs. non-health care personnel: <b>OR 1.40 (1.10-1.79)*</b></li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• Participation in aerosol-generating procedure vs. no participation: <b>OR 2.54 (1.71-3.77)^</b></li> <li>• Contact with co-worker: <b>OR 3.18 (2.64-3.82)^</b></li> </ul>	<p>Potential recall bias; some analyses did not control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Contact with relatives: <b>OR 2.16 (1.50-3.11)^</b></li> <li>• Close contact with COVID-19 infected person vs. casual contact: adjusted OR 1.32 (0.97-1.80)</li> <li>• Contact with COVID-19 patients (yes vs. no): <b>adjusted OR 1.69 (1.28-2.24)</b></li> </ul> <p>PPE use</p> <ul style="list-style-type: none"> <li>• Use of PPE (included cap, FFP2 mask [or FFP3 mask for aerosol generating procedures], disposable medical protective clothing, gloves, goggles/screens) vs. no use: <b>adjusted OR 0.56 (0.44-0.72)</b></li> </ul> <p>Smoker</p> <ul style="list-style-type: none"> <li>• Yes: 25.7% (98/382)</li> <li>• No: 38.1% (983/2581) <ul style="list-style-type: none"> <li>◦ Yes vs. no: <b>OR 0.56 (0.44-0.72)*</b></li> </ul> </li> </ul> <p>Hypertension</p> <ul style="list-style-type: none"> <li>• Yes: 49.5% (95/192)</li> <li>• No: 35.6% (986/2771) <ul style="list-style-type: none"> <li>◦ Yes vs. no: <b>OR 1.77 (1.32-2.38)*</b></li> </ul> </li> </ul> <p>Cardiovascular disease</p> <ul style="list-style-type: none"> <li>• Yes: 43.9% (25/57)</li> <li>• No: 36.3% (1056/2906) <ul style="list-style-type: none"> <li>◦ Yes vs. no: OR 1.37 (0.81-2.32)*</li> </ul> </li> </ul> <p>Chronic obstructive pulmonary disease</p> <ul style="list-style-type: none"> <li>• Yes: 49.6% (56/113)</li> <li>• No: 36.0% (1025/2850) <ul style="list-style-type: none"> <li>◦ Yes vs. no: <b>OR 1.75 (1.20-2.55)*</b></li> </ul> </li> </ul> <p>Pregnancy</p> <ul style="list-style-type: none"> <li>• Yes: 53.8% (14/26)</li> <li>• No: 36.3% (1067/2937) <ul style="list-style-type: none"> <li>◦ Yes vs. no: OR 2.04 (0.94-4.44)*</li> </ul> </li> </ul> <p>Immunosuppression</p> <ul style="list-style-type: none"> <li>• Yes: 50.0% (14/28)</li> <li>• No: 36.4% (1067/2935) <ul style="list-style-type: none"> <li>◦ Yes vs. no: OR 1.75 (0.83-3.69)*</li> </ul> </li> </ul>	
<p>Piapan et al, 2020 (69)</p> <p>Retrospective cohort</p>	<p>903 HCWs with known exposure to a COVID-19-infected patient</p> <ul style="list-style-type: none"> <li>• Mean age 45 y</li> <li>• 71% female</li> </ul>	<p>Adjusted OR (95% CI), prevalence of SARS-CoV-2 infection (PCR)</p> <ul style="list-style-type: none"> <li>• Female vs. male: 0.67 (0.45-1.02)</li> <li>• HCW role- <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: 0.9 (0.5-1.4)</li> <li>◦ Nurse's aide vs. physician: 1.4 (0.7-2.6)</li> <li>◦ Resident vs. physician: 1.3 (0.5-2.7)</li> </ul> </li> </ul>	<p>Potential recall bias</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
Italy (Trieste); regional HCWs with known COVID-19 exposure; 1 March to 6 April 2020	<ul style="list-style-type: none"> <li>28% physician, 43% nurse, 18% nurse's aide, 8% resident, 9% other role</li> <li>7% high-risk department, 13% moderate-risk department, 80% low-risk department</li> </ul>	<ul style="list-style-type: none"> <li>Other role vs. physician: 0.9 (0.4-2.0)</li> <li>Department- <ul style="list-style-type: none"> <li>High-risk vs. low-risk department: <b>67.9 (34.7-133)</b></li> <li>Medium-risk vs. low-risk department: 9.6 (5.6-16.5)</li> </ul> </li> <li>Contact - <ul style="list-style-type: none"> <li>Contact with colleagues and patients vs. contact with patients: <b>7.0 (3.7-13.3)</b></li> <li>Contact with colleagues vs contact with patients: 0.9 (0.54-1.5)</li> </ul> </li> <li>PPE - <ul style="list-style-type: none"> <li>Mask (FFP2-3 or surgical) vs. no mask: : 1.6 (0.9-2.9)</li> <li>FFP2-3 mask vs. surgical mask: <b>7.1 (3.0-16.7)</b></li> <li>Patient wearing mask: <b>7.1 (3.6-13.9)</b></li> </ul> </li> </ul>	
Ran et al, 2020 (70)  Retrospective cohort  China (Wuhan); 1 hospital serving outbreak; follow-up through 28 January 2020	72 HCW with acute symptoms <ul style="list-style-type: none"> <li>Median age, 31 y</li> <li>69% female</li> <li>53% clinicians and 47% nurses</li> <li>38.9% (28/72) diagnosed with COVID-19</li> </ul>	RR (95% CI) for COVID-19 (PCR) <ul style="list-style-type: none"> <li>High-risk vs. general department: <b>2.13 (1.45–3.95)</b></li> <li>High-exposure operation: 0.54 (0.19–1.53)</li> <li>Tracheal tube removal: 0.63 (0.06–7.08)</li> <li>CPR: 0.63 (0.06–7.08)</li> <li>Fiberoptic bronchoscopy: 0.63 (0.06–7.08)</li> <li>Sputum suction: 0.43 (0.12–1.55)</li> <li>Unqualified handwashing: <b>2.64 (1.04–6.71)</b></li> <li>Suboptimal handwashing before patient contact: <b>3.10 (1.43–6.73)</b></li> <li>Suboptimal handwashing after patient contact: <b>2.43 (1.34–4.39)</b></li> <li>Improper PPE (proper PPE defined as use of hospital masks, round caps, gloves, protective clothing, boot covers, and goggles or face shields): <b>2.82 (1.11–7.18)</b></li> <li>Increase in work hours: <b>log-rank P = 0.02</b> with interaction with high-risk department</li> </ul> Contact history: <ul style="list-style-type: none"> <li>Diagnosed family member: <b>2.76 (2.02–3.77)</b></li> <li>Suspected family member: 1.30 (0.31–5.35)</li> <li>Diagnosed patient: <b>0.36 (0.22–0.59)</b></li> <li>Suspected patient: <b>0.49 (0.27–0.89)</b></li> <li>Huanan seafood market: 0.63 (0.06–7.08)</li> </ul>	Potential recall bias; unclear if most risk estimates adjusted; reference group unclear for some estimates; some estimates imprecise; 11 of 83 cases dropped for invalid surveys
Shorten et al 2021 (22)  Retrospective cohort	4474 HCWs <ul style="list-style-type: none"> <li>Mean age 42 y</li> <li>78% female</li> <li>11% Asian/Asian British, 2% Black/Black British,</li> </ul>	Age, per 1-year change: adjusted OR 0.99 (0.98-0.994) Female vs. male: adjusted OR 1.06 (0.87-1.29) Race/ethnicity <ul style="list-style-type: none"> <li>White (UK or Republic of Ireland); reference</li> <li>Asian/Asian British: <b>adjusted OR 1.61 (1.27-2.04)</b></li> <li>Other white: adjusted OR 1.28 (0.79-2.05)</li> </ul>	Limited adjustment for confounders

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
United Kingdom (northwest England); NHS trust; 29 May to 4 July 2020  <b>Added for Update Alert #9</b>	0.5% Chinese; 2% mixed race, 70% white (UK and Republic of Ireland), 3% other white, 12% unknown race/ethnicity <ul style="list-style-type: none"> <li>• 61% nonclinical staff, 7% ED, 5% critical care, 27% other clinical role</li> <li>• 17.4% SARS-CoV-2 seropositive</li> </ul>	<ul style="list-style-type: none"> <li>• Black/Black British: <b>adjusted OR 2.08 (1.25-3.45)</b></li> <li>• Mixed race/ethnicity: adjusted OR 0.72 (0.35-1.49)</li> <li>• Chinese: adjusted OR 0.62 (0.18-2.14)</li> <li>• Unknown ethnicity: <b>adjusted OR 1.44 (1.14-1.82)</b></li> </ul> Exposure <ul style="list-style-type: none"> <li>• Clinical vs. nonclinical location: <b>adjusted OR 2.68 (2.27-3.15)</b></li> </ul>	
Sotgiu et al. 2020 (71)  Retrospective cohort  Italy (Milan); 1 hospital; 2 to 16 April 2020	202 HCWs <ul style="list-style-type: none"> <li>• Median age 45 y</li> <li>• 65% female</li> <li>• 47% physician, 26% nurse, 10% resident, 6% socio-sanitary worker, 2% administrative staff, 4% technicians, 4% hospital staff, 1% non-hospital staff</li> </ul>	Incidence of SARS-CoV-2 seropositivity <ul style="list-style-type: none"> <li>• Female, IgG: 6.1% (8/132); IgM: 9.1% (12/132)</li> <li>• Male, IgG: 10.0% (7/70); IgM: 24.3% (17/70)</li> <li>• Female vs. male (IgG): OR 0.58 (0.20-1.67)*</li> <li>• Age               <ul style="list-style-type: none"> <li>○ 20-29 y, IgG: 14.8% (4/27); IgM: 25.9% (7/27)</li> <li>○ 30-39 y, IgG: 2.3% (1/44); IgM: 9.1% (4/44)</li> <li>○ 40-49 y, IgG: 7.0% (4/57); IgM: 5.3% (3/57)</li> <li>○ 50-59 y, IgG: 9.8% (5/51); IgM: 15.7% (8/51)</li> <li>○ 60-69 y, IgG: 4.4% (1/23); IgM: 30.4% (7/23)</li> </ul> </li> <li>• Contact with COVID-19 patient, IgG: 7.6% (12/158); IgM: 13.9% (22/158)</li> <li>• No contact with COVID-19 patient, IgG: 6.8% (9/44); IgM: 15.9% (7/44)</li> <li>• HCW, IgG: 7.6% (15/197); IgM: 14.7% (29/197)               <ul style="list-style-type: none"> <li>○ Physician, IgG: 14.8% (7/115); IgM: 13.9% (16/115)</li> <li>○ Nurse/OSS, IgG: 7.8% (5/64); IgM: 10.9% (7/64)                   <ul style="list-style-type: none"> <li>▪ Nurse vs. physician (IgG): OR 0.76 (0.23-2.52)*</li> </ul> </li> <li>○ Other role: IgG 13.0% (3/23); IgM: 26.1% (6/23)</li> </ul> </li> <li>• Non-HCW, IgG: 0% (0/5); IgM: 0% (0/5)</li> </ul>	No control for confounders
Wang Q. et al, 2020 (72) Retrospective cohort  China (Hubei province); 107 hospital	5,322 HCWs <ul style="list-style-type: none"> <li>• Mean age, 34 years</li> <li>• 50% female</li> <li>• 45% surgeon, 55% nurse</li> </ul>	OR (95% CI) for COVID-19 (PCR) Level 2 protection (cap, N95 or higher, goggles/eye protection, gown, gloves, shoe covers) (yes vs. no): <b>0.03 (0.003-0.19)*</b>	<b>Not peer reviewed;</b> potential recall bias; no control for confounders

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
neurosurgery departments; January 20 to March 1, 2020	<ul style="list-style-type: none"> <li>2.2% diagnosed with COVID-19(120/5,442)</li> </ul>		
<p>Wang X. et al, 2020 (73)</p> <p>Retrospective cohort</p> <p>China (Wuhan); 1 hospital; January 2020</p>	<p>493 HCWs</p> <ul style="list-style-type: none"> <li>Mean age, 32 y</li> <li>87% female</li> <li>27% doctor, 73% nurse</li> <li>2.0% (10/493) diagnosed with COVID-19</li> </ul>	<p>Incidence of COVID-19</p> <ul style="list-style-type: none"> <li>Respiratory department: 0% (0/70)</li> <li>ICU: 0% (0/169)</li> <li>Infectious disease department: 0% (0/39)</li> <li>Hepatobiliary and pancreatic surgery department: 11% (8/74)</li> <li>Trauma and microsurgery department: 2% (1/44)</li> <li>Urology department: 1% (1/97)</li> </ul> <p>Unadjusted OR (95% CI) Nurse vs. doctor: <b>0.04 (95% CI 0.005 to 0.31)<sup>†</sup></b></p> <ul style="list-style-type: none"> <li>In department with N95 mask use (no vs. yes): <b>28.46 (1.65 to 488.48)<sup>*</sup></b></li> </ul> <p>Adjusted OR (95% CI) for COVID-19</p> <ul style="list-style-type: none"> <li>In department with N95 mask use (no vs. yes): <b>464.82 (97.73– ∞)</b></li> </ul>	<p>Mask and other PPE use based on department practice, not individual participant use; estimate for mask very imprecise</p>
<p>Wang X. et al 2020b (74)</p> <p>Retrospective cohort</p> <p>China (Wuhan); hospital neurosurgery department; 25 December 2019 to 15 February 2020</p>	<p>118 HCWs in neurosurgery unit</p> <ul style="list-style-type: none"> <li>Mean age 31 y</li> <li>64% female</li> <li>75% nurse, 25% physician</li> <li>10% SARS-CoV-2 infection (PCR)</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>Female: 9.3% (7/75)</li> <li>Male: 11.6% (5/43) <ul style="list-style-type: none"> <li>Female vs. male: OR 0.78 (0.23-2.64)<sup>*</sup></li> </ul> </li> </ul> <p>Age (mean, years): 36.6 (cases) vs. 30.5 (non-cases), p=0.006 BMI (mean, kg/m<sup>2</sup>): 22.4 (cases) vs. 22.0 (non-cases), p=0.85</p> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse practitioners: 2.4% (1/42)</li> <li>Nurse: 9.1% (8/88)</li> <li>Physician: 13.3% (4/30) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.65 (0.18-2.34)<sup>*</sup></li> </ul> </li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>Contact with COVID-19 index case: 7.3% (7/96)</li> <li>No contact with index case: 22.7% (5/22) <ul style="list-style-type: none"> <li>Contact vs. no contact with index case: <b>OR 0.27 (0.08-0.94)<sup>*</sup></b></li> </ul> </li> <li>Contact with infected co-worker: 28.6% (12/42)</li> <li>No contact with infected co-worker: 0% (0/76) <ul style="list-style-type: none"> <li>Contact vs. no contact with infected co-worker: <b>OR 62.70 (3.60-1092.46)<sup>*</sup></b></li> </ul> </li> </ul>	<p>No control for confounders; potential recall bias; 2 infected HCWs not included in analysis</p>



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<p>Night shift work</p> <ul style="list-style-type: none"> <li>• Yes: 17.3% (9/52)</li> <li>• No: 4.5% (3/66) <ul style="list-style-type: none"> <li>◦ Night shift work (yes vs. no): <b>OR 4.40 (1.12-17.18)*</b></li> </ul> </li> </ul> <p>Working under pressure</p> <ul style="list-style-type: none"> <li>• Yes: 19.0% (8/42)</li> <li>• No: 5.3% (4/76) <ul style="list-style-type: none"> <li>◦ Working under pressure (yes vs. no): <b>OR 4.24 (1.19-15.05)*</b></li> </ul> </li> </ul> <p>Smoking</p> <ul style="list-style-type: none"> <li>• Current smoker: 0% (0/9)</li> <li>• Not current smoker: 11.0% (12/109) <ul style="list-style-type: none"> <li>◦ Current smoker (yes vs. no): OR 0.41 (0.02-7.49)*</li> </ul> </li> </ul> <p>Alcohol</p> <ul style="list-style-type: none"> <li>• Current alcohol use: 0% (0/10)</li> <li>• No current alcohol use: 11.1% (12/108) <ul style="list-style-type: none"> <li>◦ Current alcohol use (yes vs. no): OR 0.37 (0.02-6.67)</li> </ul> </li> </ul> <p>Chronic pulmonary disease</p> <ul style="list-style-type: none"> <li>• Yes: 11.1% (1/9)</li> <li>• No: 10.1% (11/109) <ul style="list-style-type: none"> <li>◦ Chronic pulmonary disease (yes vs. no): OR 1.11 (0.13-9.76)*</li> </ul> </li> </ul> <p>Chronic non-pulmonary disease</p> <ul style="list-style-type: none"> <li>• Yes: 0% (0/6)</li> <li>• No: 10.7% (12/112) <ul style="list-style-type: none"> <li>◦ Chronic non-pulmonary disease (yes vs. no): OR 0.62 (0.03-11.65)*</li> </ul> </li> </ul>	
<p>Zhang G et al, 2020 (75)</p> <p>Retrospective cohort</p> <p>China (Wuhan); 1 university hospital; 25 December 2019 to 31 January 2020</p>	<p>237 HCWs with confirmed contact with a COVID-19 infected patient</p> <ul style="list-style-type: none"> <li>• Age, sex not reported</li> <li>• 28% physician, 72% nurse</li> <li>• 31% respiratory department, 31% hepatobiliary surgery, 38% neurology</li> </ul>	<p>Incidence of SARS-CoV-2 infection (PCR)</p> <ul style="list-style-type: none"> <li>• Physician: 14.9% (10/67)</li> <li>• Nurse: 1.2% (2/170) <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: OR 0.07 (0.01-0.32)*</li> </ul> </li> <li>• Respiratory department: 0% (0/73)</li> <li>• Hepatobiliary surgery: 14.9% (10/74)</li> <li>• Neurology: 2.2% (2/90)</li> </ul>	<p>Limited information on demographic characteristics; no control for confounders</p>
<b>Cross-sectional studies</b>			

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Abbas et al 2021 (4)</p> <p>Cross-sectional</p> <p>Pakistan (Lahore); 2 cancer hospitals; 29 to 31 July 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>2162 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 34 y</li> <li>• 29% female</li> <li>• 48% clinical staff, 52% nonclinical staff</li> <li>• 39.6% SARS-CoV-2 seropositivity</li> </ul>	<p>Age (per year): adjusted OR 1.00 (0.99 to 1.01)</p> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 32.3% (204/631); <b>adjusted OR 0.60 (0.49-0.73)</b></li> <li>• Male: 42.6% (653/1531); reference</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Clinical: 41.2% (470/1142); <b>adjusted OR 1.27 (1.06-1.53)</b></li> <li>• Nonclinical: 37.9% (387/1020); reference</li> </ul>	<p>66% participation rate; limited data on HCW role; did not control for exposures</p>
<p>Akinbami et al 2021 (5)</p> <p>Cross-sectional</p> <p>Hospital HCWs</p> <p>US (Rhode Island); 15 hospitals; 17 July to 28 August</p> <p><b>Added for Update Alert #9</b></p>	<p>8,370 asymptomatic hospital HCWs</p> <ul style="list-style-type: none"> <li>• Mean age not reported; 3% 18-24 y, 24% 25-34 y, 22% 35-44 y, 35% 45-59 y, 11% 60-64 y, 5% ≥65 y</li> <li>• 81% female</li> <li>• 82% white, 4% Asian, 3% Black; 7% Hispanic; 5% other/decline</li> <li>• 33% nurse, 5% nurse assistant, 12% physician, 1% physician assistant; 2% administration</li> <li>• 3.1% SARS-CoV-2 seropositive</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>• 18-24 y: 7.6% (21/275); reference</li> <li>• 25-34 y: 3.6% (71/1987); <b>adjusted OR 0.53 (0.31-0.92)</b></li> <li>• 35-44 y: 3.0% (56/1874); adjusted OR 0.46 (0.20-1.04)</li> <li>• 45-59 y: 2.8% (81/2890); <b>adjusted OR 0.50 (0.26-0.96)</b></li> <li>• 60-64 y: 2.5% (22/896); <b>adjusted OR 0.48 (0.23-0.97)</b></li> <li>• ≥65 y: 1.1% (5/448); <b>adjusted OR 0.26 (0.11-0.63)</b></li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 3.1% (212/6788); adjusted OR 0.85 (0.59-1.21)</li> <li>• Male: 2.8% (44/1582); reference</li> </ul> <p>Race/Ethnicity</p> <ul style="list-style-type: none"> <li>• White: 2.7% (182/6829); reference</li> <li>• Black: 7.0% (20/284); <b>adjusted OR 2.83 (1.77-4.51)</b></li> <li>• Asian: 3.2% (10/316); adjusted OR 1.16 (0.58-2.29)</li> <li>• Hispanic: 5.6% (31/554); <b>adjusted OR 1.70 (1.35-2.13)</b></li> <li>• Other race/ethnicity: 5.8% (11/191); adjusted OR 1.94 (0.89-4.22)</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Physician: 2.2% (22/1001); reference</li> <li>• Nurse: 4.2% (114/2733); <b>adjusted OR 1.66 (1.07-2.57)</b></li> <li>• Nurse assistant: 5.9% (23/392); adjusted OR 1.44 (0.85-2.43)</li> <li>• Physician assistant: 1.0% (1/100); adjusted OR 0.68 (0.22-2.12)</li> <li>• Reception/medical assistant: 4.1% (12/296); <b>adjusted OR 2.04 (1.18-3.52)</b></li> </ul> <p>Workplace (yes or no)</p> <ul style="list-style-type: none"> <li>• COVID-19 unit: 5.0% (72/1435); adjusted OR 1.29 (0.88-1.87)</li> <li>• General inpatient unit: 3.7% (138/3752); adjusted OR 1.04 (0.74-1.46)</li> <li>• ICU: 3.0% (37/1250); adjusted OR 0.78 (0.49-1.30)</li> <li>• Surgical unit: 2.5% (31/1234); adjusted OR 0.61 (0.41-0.91)</li> </ul>	<p>Participation rate not reported; potential recall bias; some imprecise estimates</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• ED: 2.4% (7/288); adjusted OR 0.49 (0.18-1.29)</li> <li>• Administrative office: 1.9% (21/1132); adjusted OR 0.76 (0.48-1.21)</li> <li>• Ambulatory health care/dental office: 2.3% (48/2122); adjusted OR 0.80 (0.60-1.09)</li> </ul> <p>Coworker exposure</p> <ul style="list-style-type: none"> <li>• No/unknown exposure to COVID-19-positive coworker: 2.1% (134/6299); reference</li> <li>• Exposure to COVID-19-positive coworker: 5.9% (122/2070); <b>adjusted OR 1.87 (1.36-2.58)</b></li> </ul> <p>Household member exposure</p> <ul style="list-style-type: none"> <li>• No/unknown exposure to COVID-19-positive household member: 2.4% (198/8156); reference</li> <li>• Exposure to COVID-19-positive household member: 27.2% (58/213); <b>adjusted OR 11.91 (8.43-16.83)</b></li> </ul> <p>Patient exposure</p> <ul style="list-style-type: none"> <li>• No/unknown exposure to COVID-19-positive patient: 2.0% (88/4422); reference</li> <li>• Exposed while not wearing PPE: 4.6% (60/1317); adjusted OR 1.28 (0.89-1.85)</li> <li>• Exposed while wearing PPE: 4.1% (108/2630); <b>adjusted OR 1.41 (0.99-2.00)</b></li> </ul> <p>Other exposure to COVID-19-positive person</p> <ul style="list-style-type: none"> <li>• No/unknown exposure: 2.5% (189/7542); reference</li> <li>• Exposed: 8.1% (67/827); <b>adjusted OR 1.63 (1.02-2.60)</b></li> </ul> <p>Frequency of aerosol-generating procedure (times/shift/week)</p> <ul style="list-style-type: none"> <li>• 0: 2.6% (108/4121); reference</li> <li>• 1-5: 3.7% (62/1679); adjusted OR 1.12 (0.76-1.62)</li> <li>• 6-10: 5.8% (22/380); adjusted OR 1.60 (0.87-2.92)</li> <li>• 11-25: 4.0% (11/277); adjusted OR 0.71 (0.36-1.40)</li> <li>• &gt;25 times: 5.2% (19/366); adjusted OR 1.24 (0.70-2.20)</li> </ul> <p>Use of PPE shortage protocol (reference: never used PPE)</p> <ul style="list-style-type: none"> <li>• No shortage: 4.9% (25/511); 1.23 (0.67-2.25)</li> <li>• Reuse: 2.3% (21/934); adjusted OR 0.55 (0.28-1.05)</li> <li>• Extended use: 3.1% (42/1341); adjusted OR 0.66 (0.42-1.04)</li> <li>• Reuse and extended use: 3.9% (104/2644); adjusted OR 0.84 (0.56-1.26)</li> </ul> <p>Education/training</p> <ul style="list-style-type: none"> <li>• No PPE donning/doffing training: 2.5% (5/199); reference</li> <li>• PPE donning/doffing training: 3.6% (184/5140); OR 1.45 (0.59-3.55)*</li> </ul>	
Akinbami et al 2021 (5)	1,494 asymptomatic nursing home HCWs	<p>Age</p> <ul style="list-style-type: none"> <li>• 18-24 y: 10.3% (7/68); reference</li> <li>• 25-34 y: 14.6% (37/254); adjusted OR 1.27 (0.59-2.73)</li> </ul>	Participation rate not reported; potential

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Cross-sectional</p> <p><i>Nursing home HCWs</i></p> <p>US (Rhode Island); 56 nursing homes; 17 July to 28 August</p> <p><b>Added for Update Alert #9</b></p>	<ul style="list-style-type: none"> <li>• Mean age not reported; 5% 18-24 y, 17% 25-34 y, 22% 35-44 y, 38% 45-59 y, 11% 60-64 y, 7% ≥65 y</li> <li>• 85% female</li> <li>• 78% white, 6% Black, 2% Asian; 9% Hispanic; 7% other/decline</li> <li>• 28% nurse, 20% nursing assistant, 0.7% physician</li> <li>• 13.1% SARS-CoV-2 seropositive</li> </ul>	<ul style="list-style-type: none"> <li>• 35-44 y: 13.7% (45/328); adjusted OR 1.21 (0.44-3.37)</li> <li>• 45-59 y: 13.7% (78/569); adjusted OR 1.61 (0.68-3.78)</li> <li>• 60-64 y: 11.8% (20/170); adjusted OR 1.94 (0.89-4.21)</li> <li>• ≥65 y: 8.6% (9/105); adjusted OR 1.75 (0.59-5.20)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 12.4% (157/1267); <b>adjusted OR 0.66 (0.46-0.94)</b></li> <li>• Male: 17.2% (39/227); reference</li> </ul> <p>Race/Ethnicity</p> <ul style="list-style-type: none"> <li>• White: 10.2% (119/1165); reference</li> <li>• Black: 27.6% (24/87); adjusted OR 1.60 (0.84-3.05)</li> <li>• Asian: 21.4% (6/28); adjusted OR 1.90 (0.99-3.66)</li> <li>• Hispanic: 21.5% (28/130); adjusted OR 1.90 (0.99-3.66)</li> <li>• Other race/ethnicity: 20.0% (8/40); <b>adjusted OR 2.57 (1.25-5.28)</b></li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Occupational/physical/speech therapist: 9.8% (16/163); reference</li> <li>• Nurse: 15.3% (63/413); adjusted OR 1.78 (0.93-3.42)</li> <li>• Nurse assistant: 19.9% (59/296); adjusted OR 2.06 (1.06-4.00)</li> </ul> <p>Workplace (yes vs. no)</p> <ul style="list-style-type: none"> <li>• COVID-19 unit: 24.1% (136/565); <b>adjusted OR 2.86 (1.61-5.10)</b></li> <li>• Non-COVID-19 unit: 10.2% (111/1088); adjusted OR 0.81 (0.51-1.28)</li> <li>• Administrative office: 5.5% (12/218); adjusted OR 0.77 (0.34-1.72)</li> </ul> <p>Coworker exposure</p> <ul style="list-style-type: none"> <li>• No/unknown exposure to COVID-19-positive coworker: 8.8% (83/944); reference</li> <li>• Exposure to COVID-19-positive coworker: 20.6% (113/550); adjusted OR 1.10 (0.71-1.72)</li> </ul> <p>Household member exposure</p> <ul style="list-style-type: none"> <li>• No/unknown exposure to COVID-19-positive household member: 10.9% (155/1418); reference</li> <li>• Exposure to COVID-19-positive household member: 54.0% (41/76); <b>adjusted OR 9.37 (4.75-18.50)</b></li> </ul> <p>Patient exposure</p> <ul style="list-style-type: none"> <li>• No/unknown exposure to COVID-19-positive patient: 6.0% (49/823); reference</li> <li>• Exposed while not wearing PPE: 16.2% (28/173); adjusted OR 1.10 (0.54-2.07)</li> <li>• Exposed while wearing PPE: 23.9% (119/498); <b>adjusted OR 2.18 (1.26-3.80)</b></li> </ul> <p>Other exposure to COVID-19-positive person</p> <ul style="list-style-type: none"> <li>• No/unknown exposure: 10.7% (142/1331); reference</li> <li>• Exposed: 33.1% (54/163); <b>adjusted OR 1.92 (1.26-2.91)</b></li> </ul> <p>Frequency of aerosol-generating procedure (times/shift/week)</p>	<p>recall bias; some imprecise estimates</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• 0: 10.8% (93/858); reference</li> <li>• 1-5: 21.9% (25/114); adjusted OR 1.59 (0.87-2.92)</li> <li>• 6-10: 19.4% (7/36); adjusted OR 1.46 (0.66-3.24)</li> <li>• 11-25: 17.4% (4/23); adjusted OR 0.96 (0.25-3.71)</li> <li>• &gt;25 times: 29.3% (12/41); adjusted OR 1.31 (0.63-2.74)</li> </ul> Use of PPE shortage protocol (reference: never used PPE) <ul style="list-style-type: none"> <li>• No shortage: 11.8% (28/238); adjusted OR 0.94 (0.46-1.94)</li> <li>• Reuse: 11.3% (21/186); adjusted OR 0.89 (0.42-1.87)</li> <li>• Extended use: 17.8% (45/253); adjusted OR 1.49 (0.77-2.87)</li> <li>• Reuse and extended use: 16.8% (83/495); adjusted OR 1.30 (0.66-2.58)</li> </ul> Education/training <ul style="list-style-type: none"> <li>• No PPE donning/doffing training: 20.0% (3/15); reference</li> <li>• PPE donning/doffing training: 15.0% (170/1135); OR 0.70 (0.20-2.52)*</li> </ul>	
Alkurt et al 2021 (6)  Cross-sectional  Turkey (Istanbul and Kocaeli); 3 hospitals; 30 May to 6 June 2020  <b>Added for Update Alert #9</b>	813 HCWs <ul style="list-style-type: none"> <li>• Mean age 34 y</li> <li>• 65% female</li> <li>• 27% nurse, 31% physician, 14% ward clerk and security, 12% lab and radiology technician, 10% cleaning staff, 5% administrative staff</li> <li>• 2.7% SARS-CoV-2 seropositive</li> </ul>	Sex <ul style="list-style-type: none"> <li>• Female: 13.3% (80/600)</li> <li>• Male: 11.7% (39/332)               <ul style="list-style-type: none"> <li>○ Female vs. male: OR 1.16 (0.77-1.74)*</li> </ul> </li> </ul> HCW role <ul style="list-style-type: none"> <li>• Nurse: 16.8% (45/268)</li> <li>• Physician: 10.8% (30/279)               <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 1.67 (1.02-2.75)*</li> </ul> </li> <li>• Ward clerk and security: 11.6% (15/129)</li> <li>• Lab and radiology technician: 6.5% (7/107)</li> <li>• Cleaning staff: 12.5% (12/96)</li> <li>• Administrative staff: 18.9% (10/53)</li> </ul> Exposure <ul style="list-style-type: none"> <li>• COVID-19 clinic: 15.2% (51/335)</li> <li>• Non-COVID-19 clinic: 27.8% (30/108)               <ul style="list-style-type: none"> <li>○ COVID-19 vs. non-COVID-19 clinic: <b>OR 0.46 (0.28-0.78)*</b></li> </ul> </li> <li>• ICU: 12.7% (10/79)</li> <li>• ED: 14.5% (8/55)</li> <li>• Administrative office: 12.0% (15/125)</li> </ul> Clinical factors <ul style="list-style-type: none"> <li>• Hypertension: 17.0% (7/41)               <ul style="list-style-type: none"> <li>○ Yes vs. no: OR 1.43 (0.62-3.31)*</li> </ul> </li> <li>• Diabetes mellitus: 20.7% (6/29)               <ul style="list-style-type: none"> <li>○ Yes vs. no: OR 1.82 (0.73-4.58)*</li> </ul> </li> <li>• Smoking: 6.1% (14/228)</li> </ul>	Participation rate not reported; no control for confounders

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>○ Yes vs. no: <b>OR 0.37 (0.32-0.67)*</b></li> <li>• Immunosuppressive drug: 22.2% (2/9)</li> <li>○ Yes vs. no: OR 3.16 (0.61-16.48)*</li> </ul>	
<p>Al Maskari et al, 2020 (76)</p> <p>Cross-sectional</p> <p>Oman; 1 tertiary care hospital; 18 March to 11 July 2020</p>	<p>4703 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age not reported</li> <li>• 29% female</li> <li>• 12% physician, 40% nurse, 20% paramedic, 28% administrative/support staff</li> </ul>	<p>SARS-CoV-2 infection (PCR)</p> <ul style="list-style-type: none"> <li>• Male: 2.2% (74/3299) <ul style="list-style-type: none"> <li>○ Female: 9.3% (130/1404)</li> </ul> </li> <li>• Female vs. male: OR 4.45 (3.32-5.96)*</li> <li>• Physician: 4.7% (26.556) <ul style="list-style-type: none"> <li>○ Nurse: 4.1% (77/1870)</li> </ul> </li> <li>• Nurse vs. physician: 0.88 (0.56-1.38)*</li> <li>• Paramedic: 2.8% (27/969)</li> <li>• Administrative/support staff: 5.6% (74/1308)</li> </ul>	<p>No control for confounders</p>
<p>Amendola et al, 2020 (77)</p> <p>Cross-sectional</p> <p>Italy (Milan); 1 pediatric hospital; 15 April 2020</p>	<p>663 asymptomatic HCWs (547 clinical and 116 nonclinical)</p> <ul style="list-style-type: none"> <li>• Mean age 44 y</li> <li>• 84% female</li> <li>• 83% clinical HCW, 17% nonclinical HCW <ul style="list-style-type: none"> <li>○ 32% physician, 32% nurse, 18% technician, 17% non-clinical hospital employee</li> </ul> </li> <li>• 27% labor and delivery, 12% pediatric unit, 10% outpatient clinic, 4% surgical unit, 8% pediatric ER, 7% NICU, 6% PICU, 11% administrative / pharmacy / lab, 15% other</li> </ul>	<p>SARS-CoV-2 seropositivity</p> <ul style="list-style-type: none"> <li>• Female: 4.3% (24/555)</li> <li>• Male: 9.3% (10/108) <ul style="list-style-type: none"> <li>○ Female vs. male: OR 0.44 (0.21-0.96)*</li> </ul> </li> <li>• Clinical HCW: 5.1% (28/547) <ul style="list-style-type: none"> <li>○ Physician: 4.7% (10/214)</li> <li>○ Nurse: 6.0% (13/216) <ul style="list-style-type: none"> <li>▪ Nurse vs. physician: OR 1.31 (0.56-3.05)*</li> </ul> </li> <li>○ Other health technicians: 4.2% (5/117)</li> </ul> </li> <li>• Non-clinical HCW: 5.2% (6/116)</li> <li>• Outpatient services: 6.3% (4/63)</li> <li>• Surgery: 22.2% (6/27)</li> <li>• Pediatric: 1.2% (1/80)</li> <li>• Pediatric ER: 1.8% (1/55)</li> <li>• NICU: 2.1% (1/47)</li> <li>• PICU: 14.3% (6/42)</li> <li>• Labor and delivery: 3.3% (6/181) 6 (3.31)</li> <li>• Administration/pharmacy/laboratory: 8.6% (6/70)</li> <li>• Others: 3.1% (3/98)</li> <li>• Direct contact with COVID-19 patient: 6.6% (20/304)</li> <li>• No known direct contact: 3.3% (8/243) <ul style="list-style-type: none"> <li>○ Direct vs. no direct contact with COVID-19 patient: OR 2.07 (0.89-4.78)*</li> </ul> </li> </ul>	<p>No control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>Among HCWs (n=547), 56% direct contact with COVID-19 patient, 44% no known direct contact</li> </ul>		
<p>Barallat et al 2020 (78)</p> <p>Cross-sectional</p> <p>Spain (Barcelona); HCWs in the Northern Metropolitan Area; 4 to 22 May 2020</p>	<p>7563 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 43 y</li> <li>76% female</li> <li>24% physician, 30% nurse, 11% nursing assistant, 6% health care support services, 16% administration, 8% other role</li> <li>9.4% SARS-CoV-2 seropositivity</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>18-34 y: 10.3% (209/2025); reference</li> <li>35-54 y: 9.0% (330/3664); OR 0.86 (0.72-1.03)*</li> <li>≥55 y: 10.1% (179/1771); OR 0.98 (0.79=-1.21)*</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 9.2% (522/5673)</li> <li>Male: 10.1% (181/1789) <ul style="list-style-type: none"> <li>Female vs. male: OR 0.90 (0.75-1.08)*</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse: 9.6% (216/2243)</li> <li>Nursing assistant: 11.9% (85/832)</li> <li>Physician: 27.0% (192/1821) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.90 (0.74-1.11)*</li> <li>Nurse or nursing assistant vs. physician: OR 0.92 (0.76-1.11)*</li> </ul> </li> <li>Health care support services: 4.6% (33/429)</li> <li>Administration: 10.5% (75/1181)</li> <li>Other role: 7.2% (51/616)</li> </ul>	<p>No control for confounders; 81% participation rate</p>
<p>Baker et al 2021 (79)</p> <p>Cross-sectional</p> <p>US (Atlanta); 1 academic health care system including 11 hospitals and 250 locations; 19 April 19 to 26 June 2020</p>	<p>10,275 HCWs</p> <ul style="list-style-type: none"> <li>Mean age not reported; 16% &lt;30 y, 31% 30-39 y, 22% 40-49 y, 19% 50-59 y, 12% ≥60 y</li> <li>78% female</li> <li>31% nurse, 18% physician, 19% other no patient contact; 15% other direct care; 7% advanced practice provider; 4% nurse tech; 3% radiology tech; 1% respiratory</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>≥60: 4.9% (57/1153); reference</li> <li>50-59: 5.2% (93/1805); unweighted adjusted OR 0.8 (0.6-1.2)</li> <li>40-49: 5.9% (125/2118); unweighted adjusted OR 0.9 (0.7-1.4)</li> <li>30-39: 5.8 (171/2953); unweighted adjusted OR 1.0 (0.7-1.4)</li> <li>&lt;30: 6.9 (109/1581); unweighted adjusted OR 1.2 (0.8-1.7)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 5.7% (428/7456); reference</li> <li>Male: 5.9% (127/2154); unweighted adjusted OR 1.3 (1.0-1.7)</li> </ul> <p>Race</p> <ul style="list-style-type: none"> <li>White: 4.3% (226/5263); reference</li> <li>Black: 8.3% (238/2860); unweighted adjusted OR 2.1 (1.7-2.6)</li> <li>Asian: 5.3% (60/1133); unweighted adjusted OR 1.3 (0.9-1.7)</li> <li>Multiracial: 7.6% (10/132); unweighted adjusted OR 1.8 (0.8-3.5)</li> </ul> <p>HCW role</p>	<p>35% participation rate; potential recall bias; limited measurement of exposures and PPE</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>therapist; 0.4% environmental services; 2% not specified</li> <li>• 30% Black, 55% white, 12% Asian, 1% multiracial, 0.3% American Indian/Alaska native, 0.2% Native Hawaiian/Pacific Islander, 2% not specified; 96% non-Hispanic</li> <li>• 5.7% SARS-CoV-2 seropositive</li> </ul>	<ul style="list-style-type: none"> <li>• Nurse: 5.9% (177/2976); unweighted adjusted OR 1.0 (0.7-1.4)</li> <li>• Physician: 5.0% (87/1753); unweighted adjusted OR 0.9 (0.6-1.4) <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 1.21 (0.93-1.58)*</li> </ul> </li> <li>• Other no patient contact: 5.5% (100/1812); reference</li> <li>• Other direct care: 6.2% (88/1423); unweighted adjusted OR 1.1 (0.7-1.5)</li> <li>• Advanced practice provider: 5.2% (36/698); unweighted adjusted OR 0.9 (0.6-1.5)</li> <li>• Nurse tech: 8.1% (28/346); unweighted adjusted OR 0.9 (0.5-1.5)</li> <li>• Radiology tech: 7.0% (21/302); unweighted adjusted OR 1.3 (0.7-2.2)</li> <li>• Respiratory therapist: not reported; unweighted adjusted OR 0.8 (0.3-1.7)</li> <li>• Environmental services: not reported; unweighted adjusted OR 1.3 (0.3-4.0)</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• No patient contact: 4.6% (43/941); reference</li> <li>• Home: 4.9% (13/267); unweighted adjusted OR 1.2 (0.6-2.2)</li> <li>• Other hospital area: 5.6% (52/926); unweighted adjusted OR 1.2 (0.8-2.0)</li> <li>• OR/procedure area: 5.7% (38/672); unweighted adjusted OR 1.2 (0.7-2.0)</li> <li>• Outpatient, clinical: 5.4% (90/1675); unweighted adjusted OR 1.4 (0.9-2.2)</li> <li>• Inpatient, not COVID-19 focused: 5.8% (93/1594); unweighted adjusted OR 1.4 (0.9-2.2)</li> <li>• COVID-19 focused: 6.7% (117/1750); unweighted adjusted OR 1.5 (1.0-2.4)</li> <li>• ED: 6.7% (67/1007); unweighted adjusted OR 1.5 (0.9-2.4)</li> </ul> <p>PPE use</p> <ul style="list-style-type: none"> <li>• As recommended: 5.9% (370/6320); reference</li> <li>• Not as recommended: 6.3% (14/221); unweighted adjusted OR 0.8 (0.4-1.4)</li> <li>• Unsure: 4.0% (22/546); <b>unweighted adjusted OR 0.6 (0.4-0.9)</b></li> <li>• Not applicable: 5.9% (149/2523); unweighted adjusted OR 1.1 (0.8-1.3)</li> </ul> <p>Community contact with confirmed/suspected positive people</p> <ul style="list-style-type: none"> <li>• No/not sure: 5.4% (478/8862); reference</li> <li>• Yes: 10.3% (77/748); <b>unweighted adjusted OR 1.7 (1.3-2.3)</b></li> </ul>	
<p>Bayle et al 2021 (7)</p> <p>Cross-sectional</p> <p>France (Paris); 4 nursing homes; 16 to 29 April 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>241 nursing home HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 40 y</li> <li>• 84% female</li> <li>• 63% nurse and nursing assistant, 3% medical staff, 6% allied health, 8% clerical, 14%</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 13.4% (27/202)</li> <li>• Male: 12.8% (5/39) <ul style="list-style-type: none"> <li>○ Female vs. male: OR 1.05 (0.38-2.92)*</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse and nursing assistant: 15.2% (23/151)</li> <li>• Medical staff: 0% (0/6) <ul style="list-style-type: none"> <li>○ Nurse and nursing assistant vs. medical staff: OR 2.38 (0.13-43.64)*</li> </ul> </li> <li>• Clerical staff: 0% (0/20)</li> <li>• Allied health: 13.3% (2/15)</li> </ul>	<p>Participation rate not reported; no control for confounders; imprecise estimates</p>



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	environmental staff, 5% food service <ul style="list-style-type: none"> <li>13.3% SARS-CoV-2 infection (PCR)</li> </ul>	<ul style="list-style-type: none"> <li>Environmental staff: 12.1% (4/33)</li> <li>Food service: 25.0% (3/12)</li> </ul>	
Clifton et al 2021 (8)  Cross-sectional  United States (New York City); COVID-19 government-administered treatment facility; 28 to 30 April 2020  <b>Added for Update Alert #9</b>	336 military HCWs <ul style="list-style-type: none"> <li>Median age 32 y</li> <li>40% female</li> <li>30% nurse, 7% physician or physician assistant, 28% medical support (LPN, medic, therapist or other specialty)</li> <li>1.8% SARS-CoV-2 infection (PCR)</li> </ul>	Sex <ul style="list-style-type: none"> <li>Female: 1.5% (2/135)</li> <li>Male: 2.0% (4/201)               <ul style="list-style-type: none"> <li>Female vs. male: OR 0.74 (0.13-4.10)*</li> </ul> </li> </ul> HCW role <ul style="list-style-type: none"> <li>Nurse: 1.0% (1/100)</li> <li>Physician or physician assistant: 0% (0/25)               <ul style="list-style-type: none"> <li>Nurse vs. physician or physician assistant: OR 0.77 (0.03-19.44)*</li> </ul> </li> <li>Medical support: 1.1% (1/94)</li> <li>Other role: 3.4% (4/117)</li> </ul> Exposure <ul style="list-style-type: none"> <li>Direct contact with COVID-19 patients: 0.9% (2/223)</li> <li>No direct contact with COVID-19 patients: 3.5% (4/113)               <ul style="list-style-type: none"> <li>Direct contact vs. no direct contact: OR 0.25 (0.04-1.37)*</li> </ul> </li> <li>Performed aerosol-generating procedures: 0% (0/26)</li> <li>Did not perform aerosol-generating procedures: 1.9% (6/310)               <ul style="list-style-type: none"> <li>Performed vs. did not perform aerosol-generating procedures: OR 0.88 (0.05-16.12)*</li> </ul> </li> <li>Reported break in PPE: 2.8% (1/36)</li> <li>Did not report break in PPE: 1.7% (5/300)               <ul style="list-style-type: none"> <li>Reported vs. did not report break in PPE: OR 1.69 (0.19-14.84)*</li> </ul> </li> </ul>	57% participation rate; no control for confounders; imprecise estimates
Dacosta-Urbieta et al, 2020 (80)  Cross-sectional  Spain (Galacia); 1 pediatric hospital; 14 to 16 April 2020	175 HCWs <ul style="list-style-type: none"> <li>Mean age not reported; 18% ≥55 y</li> <li>Gender not reported</li> <li>33% physician, 47% nurse/nurse's aide, 47%, 13% resident, 7% other role</li> </ul>	SARS-CoV-2 seropositivity <ul style="list-style-type: none"> <li>Nurse/nurse's aide: 4.8% (4/83)</li> <li>Physician/resident: 3.8% (3/80)               <ul style="list-style-type: none"> <li>Nurse/nurse's aide vs. physician/resident: OR 1.30 (0.28-6.00)*</li> </ul> </li> </ul>	No control for confounders
Dalla Volta et al, 2020 (81)  Cross-sectional	76 HCWs <ul style="list-style-type: none"> <li>Median age 46 y</li> <li>75% female</li> <li>49% nurse, 22% oncologist, 16%</li> </ul>	SARS-CoV-2 seropositivity <ul style="list-style-type: none"> <li>Physician/resident: 20.7% (6/29)               <ul style="list-style-type: none"> <li>Nurse: 5.4% (2/37)</li> </ul> </li> <li>Nurse vs. physician/resident: OR 0.22 (0.04-1.18)*</li> <li>Administrative: 50% (2/4)</li> </ul>	No control for confounders

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
Italy (Brescia); 1 oncology unit; 24 February to 19 May 2020	<ul style="list-style-type: none"> <li>resident, 1% psychologist, 7% data manager, 5% administrative</li> <li>80% asymptomatic</li> </ul>		
Davido et al 2021 (10)  Cross-sectional  France (Paris environs); 1 hospital; 5 March to 10 May 2020  <b>Added for Update Alert #9</b>	99 HCWs (symptomatic or contact with COVID-19 patient) <ul style="list-style-type: none"> <li>Median age 44 y</li> <li>73% female</li> <li>47% nurse or nursing assistant, 18% physician, 21% support staff, 13% administration</li> <li>28.3% SARS-CoV-2 infection (PCR)</li> </ul>	Age <ul style="list-style-type: none"> <li>&lt;44: 18.4% (9/49); reference</li> <li>&gt;44: 38.0% (19/50); <b>adjusted OR 6.7 (1.7-37.7)</b></li> </ul> Sex <ul style="list-style-type: none"> <li>Female: 30.6% (22/72); adjusted OR 1.25 (0.42-5.00)</li> <li>Male: 22.2% (6/27); reference</li> </ul> HCW role (excluding administration; n=86) <ul style="list-style-type: none"> <li>Nurse or nursing assistant: 36.2% (17/47); OR 1.98 (0.56-7.00)*</li> <li>Physician: 22.2% (4/18); reference</li> <li>Support staff: 28.6% (6/21)</li> </ul> Workplace exposure <ul style="list-style-type: none"> <li>COVID-19 unit: 26.9% (14/52); adjusted OR 0.7 (0.2-3.2)</li> <li>Non-COVID-19 unit: 38.2% (13/34); reference</li> </ul> Coworker exposure <ul style="list-style-type: none"> <li>No/unknown exposure to infected coworker: 26.5% (13/49); reference</li> <li>Exposure to infected coworker: 37.5% (12/32); OR 1.66 (0.64-4.32)*</li> </ul> Participated in procedure involving patient airway <ul style="list-style-type: none"> <li>Yes: 36.7% (11/30); adjusted OR 2.6 (0.6-12.5)</li> <li>No: 23.4% (11/47); reference</li> </ul> Mask use <ul style="list-style-type: none"> <li>Systematic use of mask: 22.2% (14/63); <b>adjusted OR 0.07 (0.003-0.56)</b></li> <li>No systematic use of mask: 85.7% (6/7); reference</li> </ul>	50% participation rate; potential recall bias; some missing data
Ebinger et al 2021 (82)  Cross-sectional  USA (Los Angeles); health system; beginning 11 May 2020 (end date not reported)	6,062 HCWs <ul style="list-style-type: none"> <li>Mean age 41 y</li> <li>68% female</li> <li>50% white race, 31% Asian, 6% Black, 13% other</li> <li>HCW role not reported</li> <li>3.5% SARS-CoV-2 seropositive</li> </ul>	Age <ul style="list-style-type: none"> <li>Per decade increase: <b>adjusted OR 0.80 (0.68 to 0.94)</b></li> </ul> Sex <ul style="list-style-type: none"> <li>Female: 3.4% (139/4113)</li> <li>Male: 3.7% (73/1949)               <ul style="list-style-type: none"> <li>Female vs. male: adjusted OR 0.84 (0.63-1.12)</li> </ul> </li> </ul> Race/ethnicity <ul style="list-style-type: none"> <li>Asian: 3.1% (57/1866)</li> <li>Black: 4.8% (18/372); <b>adjusted OR 2.02 (1.08-3.76)</b></li> <li>Hispanic/Latino: 5.3% (62/1159); <b>adjusted OR 1.98 (1.34-2.92)</b></li> </ul>	Some data discrepancies; potential recall bias

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Other: 4.2% (33/782)</li> <li>• White: 3.4% (104/3042); reference</li> </ul> Comorbidities <ul style="list-style-type: none"> <li>• Asthma: 1.9% (14/747); adjusted OR 0.25 (0.13 to 0.51)</li> <li>• Autoimmune disease: 1.7% (4/232)^</li> <li>• Cancer: 1.5% (3/198)^</li> <li>• Cardiovascular: 1.6% (2/129)^</li> <li>• COPD: 0% (0/84)^</li> <li>• Diabetes mellitus: 2.1% (8/378)^</li> <li>• HTN: 2.6% (26/993)^</li> <li>• BMI ≥30 kg/m<sup>2</sup>: 3.1% (32/1030)^</li> </ul> Exposure <ul style="list-style-type: none"> <li>• Regular contact with patients with COVID-19: 6.0% (86/1444)^</li> <li>• Work in unit housing/caring for patients with COVID-19: 5.5% (93/1693); <b>adjusted OR 1.61 (95% CI 1.18 to 2.18)</b></li> </ul>	
Eyre et al 2020 (83)  Cross-sectional  UK (Oxfordshire); Oxford University hospitals; 23 April to 8 June 2020	10034 asymptomatic HCWs <ul style="list-style-type: none"> <li>• Mean age not reported</li> <li>• 74% female; 0.05% transgender; 0.15% not reported</li> <li>• 72% white, 17% Asian, 4% Black, &gt;1% Chinese, 2% mixed race, 4% other/not reported</li> <li>• 40% nurse or health care assistant, 16% physician, 12% administration, 4% laboratory, 3% cleaning staff, 3% physical, occupational or speech/ language therapist, 2% security or catering, 21% other role</li> </ul>	<u>SARS-Cov-2 seropositivity or infection (PCR)</u> Age, per 10 years: OR 0.95 (0.90-1.00) Sex <ul style="list-style-type: none"> <li>• Female: 10.9% (812/7452)</li> <li>• Male: 12.2% (313/2562)               <ul style="list-style-type: none"> <li>◦ Female vs. male: OR 0.88 (0.76-1.01)^</li> </ul> </li> <li>• Transgender: 20.0% (1/5)</li> </ul> Race/ethnicity <ul style="list-style-type: none"> <li>• White: 9.5% (686/7237); reference</li> <li>• Asian: 16.8% (281/1673); <b>adjusted OR 1.51 (1.28-1.77)</b></li> <li>• Black: 18.0% (71/394); <b>adjusted OR 1.66 (1.25-2.21)</b></li> <li>• Chinese: 7.5% (7/93); adjusted OR 0.75 (0.34-1.67)</li> <li>• Mixed race/ethnicity: 11.6% (28/242); adjusted OR .23 (0.82-1.87)</li> </ul> HCW role <ul style="list-style-type: none"> <li>• Nurse/health care assistant: 14.2% (562/3971)</li> <li>• Physician: 10.9% (170/1557)               <ul style="list-style-type: none"> <li>◦ Nurse/health care assistant vs. physician: <b>OR 1.35 (1.12-1.61)*</b></li> </ul> </li> <li>• Administration: 7.2% (88/1218)</li> <li>• Laboratory staff: 8.2% (29/354)</li> <li>• Cleaning staff: 18.6% (60/323)</li> <li>• Therapist: 14.9% (47/316)</li> <li>• Security or catering: 11.8% (26/221)</li> </ul> Exposure	Potential recall bias; 73% participation rate; limited control of exposures and PPE

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>SARS-CoV-2 infection (seropositive or PCR): 11.2% (1128/10034)</li> </ul>	<ul style="list-style-type: none"> <li>Do not work in COVID-19 unit: 8.6% (631/7369); reference</li> <li>Work in COVID-19 unit: 22.6% (358/1586); <b>adjusted OR 2.47 (1.99-3.08)</b></li> <li>Work in any unit: 12.9% (139/1079); <b>adjusted OR 1.39 (1.04-1.85)</b></li> </ul> <p><u>SARS-CoV-2 seropositivity (based on presence of IgG antibodies n=9956)</u></p> <p>Sex (vs. female)</p> <ul style="list-style-type: none"> <li>Male: <b>adjusted OR 1.19 (1.01-1.40)</b></li> <li>Transgender: adjusted OR 3.32 (0.35-31.09)</li> </ul> <p>Race/ethnicity (vs. white)</p> <ul style="list-style-type: none"> <li>Asian: <b>adjusted OR 1.52 (1.29-1.80)</b></li> <li>Black: <b>adjusted OR 1.71 (1.28-2.28)</b></li> <li>Chinese: adjusted OR 0.67 (0.29-1.59)</li> <li>Mixed race/ethnicity: adjusted OR 1.30 (0.86-1.97)</li> </ul> <p>HCW role (vs. administration)</p> <ul style="list-style-type: none"> <li>Nurse/health care assistant: adjusted OR 1.33 (0.94-1.87)</li> <li>Senior physician: adjusted OR 0.84 (0.54-1.31)</li> <li>Junior physician: adjusted OR 1.05 (0.70-1.58)</li> <li>Laboratory staff: adjusted OR 0.96 (0.60-1.54)</li> <li>Cleaning staff: <b>adjusted OR 1.96 (1.26-3.04)</b></li> </ul> <p>Specialty (vs. other or none)</p> <ul style="list-style-type: none"> <li>Anaesthetics: adjusted OR 0.70 (0.39-1.25)</li> <li>ED: adjusted OR 1.06 (0.69-1.64)</li> <li>General, urologic, plastic or cardiovascular surgery: adjusted OR 0.90 (0.61-1.33)</li> <li>Hematology or oncology: adjusted OR 1.96 (1.32-2.92)</li> <li>Respiratory infectious disease: adjusted OR 0.76 (0.45-1.28)</li> <li>ICU: <b>adjusted OR 0.47 (0.30-0.74)</b></li> <li>Medicine: <b>adjusted OR 1.47 (1.02-2.11)</b></li> <li>Ob/Gyn: adjusted OR 0.68 (0.38-1.23)</li> <li>Ophthalmology, ENT surgery, or maxillofacial surgery: adjusted OR 0.73 (0.37-1.42)</li> <li>Pediatrics: adjusted OR 0.82 (0.55-1.24)</li> <li>Radiology: adjusted OR 0.90 (0.54-1.50)</li> <li>Specialist medicine: adjusted OR 0.87 (0.63-1.21)</li> <li>Trauma and orthopedics, rheumatology: <b>adjusted OR 1.83 (1.23 to 2.72)</b></li> </ul> <p>Exposure (vs. no)</p> <ul style="list-style-type: none"> <li>Exposure to known or suspected COVID-19 patient without PPE: <b>adjusted OR 1.47 (1.26-1.70)</b></li> <li>Work in COVID-19 patient area, yes: <b>adjusted OR 2.39 (1.91-3.00)</b></li> </ul>	

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Faico-Filho et al, 2020 (84) Cross-sectional</p> <p>Brazil (Sao Paolo); 1 hospital; 22 March to 22 April 2020</p>	<p>466 symptomatic HCWs</p> <ul style="list-style-type: none"> <li>• Median age 39 y</li> <li>• 72% female</li> <li>• 27% nurse technician, 11% nurse, 23% physician, 3% laboratory personnel, 19% administrative staff, 6% logistic worker, 10% other HCW role</li> </ul>	<ul style="list-style-type: none"> <li>• Work in any area: <b>adjusted OR 1.38 (1.03-1.84)</b></li> </ul> <p>Incidence of SARS-CoV-2 infection (PCR): 36.2% (169/466)</p> <ul style="list-style-type: none"> <li>• Direct patient contact: 33.8% (109/322) <ul style="list-style-type: none"> <li>○ Nurse or nurse technician: 40.1% (73/182)</li> <li>○ Physician: 24.2% (26/107)</li> <li>○ Laboratory personnel: 28.6% (4/14) <ul style="list-style-type: none"> <li>○ Nurse or nurse technician vs. physician: OR 2.09 (95% CI 1.23-3.55)</li> </ul> </li> </ul> </li> <li>• No direct patient contact: 41.7% (60/144) <ul style="list-style-type: none"> <li>○ Administrative staff: 31.1% (28/90)</li> <li>○ Logistic worker: 63.0% (17/27)</li> </ul> </li> </ul>	<p>Participation rate unclear; no control for confounders</p>
<p>Fletcher et al 2021 (12)</p> <p>Cross-sectional</p> <p>United States (Michigan); health system; 17 August to 4 September 2020 (Study Period 1)</p> <p><b>Added for Update Alert #9</b></p>	<p><u>Study Period 1</u> 1385 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 40 y</li> <li>• 80% female</li> <li>• 92% white, 2% Hispanic, 1% Black, 2% Asian-Pacific Islander, 0.7% Arabic, 2% other race/ethnicity</li> <li>• 51% clinical provider, 10% interprofessional, 8% ancillary role, 32% nonclinical role</li> <li>• 1.9% SARS-CoV-2 seropositivity</li> </ul>	<p>Age (years): mean 36 (cases) vs. 40 (non-cases), p=0.08</p> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 1.6% (18/1104); OR 0.56 (0.24-1.30)*</li> <li>• Male: 2.9% (8/279); reference</li> </ul> <p>Race/ethnicity</p> <ul style="list-style-type: none"> <li>• White: 1.6% (20/1274); reference</li> <li>• Hispanic/Latino: 2.9% (1/34); OR 1.90 (0.25-14.58)*</li> <li>• Black: 4.8% (1/21); OR 3.14 (0.40-24.51)*</li> <li>• Asian/Pacific Islander: 0% (0/22); OR 1.36 (0.08-23.19)*</li> <li>• Arabic: 10.0% (1/10); OR 6.97 (0.84-57.62)*</li> <li>• Other race/ethnicity: 12.5% (3/24); <b>OR 8.96 (2.47-32.47)*</b></li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Clinical provider: 2.4% (17/708); reference</li> <li>• Interprofessional: 0.8% (1/132); OR 0.31 (0.04-2.35)*</li> <li>• Ancillary: 1.0% (1/105); OR 0.39 (0.05-2.97)*</li> <li>• Nonclinical role: 1.6% (7/440); OR 0.66 (0.27-1.60)*</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• Exposed to COVID-19 outside of work but not in household: 5.7% (7/122); OR 0.54 (0.16-1.78)*</li> <li>• Exposed to COVID-19 in household: 10.2% (5/49); reference</li> </ul> <p>PPE use at work</p> <ul style="list-style-type: none"> <li>• Yes: 2.0% (26/1303); OR 0.98 (0.06-16.48)*</li> <li>• Sometimes: 0% (0/58)</li> <li>• No: 0% (0/23); reference</li> </ul> <p>Mask use</p>	<p>Approximately 50% participation rate; potential recall bias; some imprecise estimates; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>N95: 2.2% (10/453); OR 1.25 (0.55-2.85)*</li> <li>Surgical mask: 1.8% (14/792); reference</li> <li>CAPR: 0% (0/41); OR 0.65 (0.04-11.03)*</li> <li>Mix of N95 or CAPR: 2.0% (2/99); OR 1.15 (0.26-5.12)*</li> </ul>	
<p>Fletcher et al 2021 (12)</p> <p>Cross-sectional</p> <p>United States (Michigan); health system; 2 to 23 December 2020 (Study Period 2)</p> <p><b>Added for Update Alert #9</b></p>	<p><u>Study Period 2</u> 1445 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 40 y</li> <li>80% female</li> <li>90% white, 3% Hispanic, 2% Black, 2% Asian-Pacific Islander, 0.5% Arabic, 3% other race/ethnicity</li> <li>55% clinical provider, 15% interprofessional, 6% ancillary role, 23% nonclinical role</li> <li>13.7% SARS-CoV-2 seropositivity</li> </ul>	<p>Age (years): mean 38.9 vs. 40.3, p=0.13</p> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 13.8% (159/1156); OR 1.05 (0.72-1.53)*</li> <li>Male: 13.2% (38/288); reference</li> </ul> <p>Race/ethnicity</p> <ul style="list-style-type: none"> <li>White: 13.5% (176/1303); reference</li> <li>Hispanic/Latino: 20.5% (8/39); OR 1.65 (0.75-3.65)*</li> <li>Black: 26.1% (6/23); OR 2.26 (0.88-5.81)*</li> <li>Asian/Pacific Islander: 0% (4/33); OR 0.88 (0.31-2.54)*</li> <li>Arabic: 12.5% (1/8); OR 0.91 (0.11-7.48)*</li> <li>Other race/ethnicity: 7.7% (3/39); OR 0.53 (0.16-1.75)*</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Clinical provider: 13.4% (107/800); reference</li> <li>Interprofessional: 14.9% (33/222); OR 1.13 (0.74-1.72)*</li> <li>Ancillary: 10.6% (10/94); OR 0.77 (0.39-1.53)*</li> <li>Nonclinical role: 14.6% (48/329); OR 1.11 (0.77-1.60)*</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>Exposed to COVID-19 outside of work but not in household: 21.0% (48/229); <b>OR 0.56 (0.34-0.90)*</b></li> <li>Exposed to COVID-19 in household: 32/3% (43/133); reference</li> </ul> <p>PPE use at work</p> <ul style="list-style-type: none"> <li>Yes: 13.7% (189/1382); OR 0.36 (0.11-1.17)*</li> <li>Sometimes: 10% (5/50); OR 0.25 (0.06-1.12)*</li> <li>No: 30.8% (4/13); reference</li> <li>Sometimes: 10% (5/50); OR 0.70 (0.27-1.79)*</li> </ul> <p>Mask use</p> <ul style="list-style-type: none"> <li>N95: 14.5% (101/695); OR 1.18 (0.86-1.62)*</li> <li>Surgical mask: 12.6% (80/635); reference</li> <li>CAPR: 0% (7/31); OR 2.02 (0.84-4.85)*</li> <li>N95 or CAPR: 11.8% (10/85); OR 0.93 (0.46-1.86)*</li> </ul>	<p>Approximately 50% participation rate; potential recall bias; some imprecise estimates; no control for confounders</p>
<p>Fukuda et al 2021 (13)</p> <p>Cross-sectional</p>	<p>4147 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 37 y</li> <li>64% female</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>&lt;40 y: 0.3% (9/2706); reference</li> <li>≥40 y: 0.3% (5/1,441); OR 1.04 (0.35-3.12)*</li> </ul> <p>Sex</p>	<p>Participation rate not reported; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
Japan (Tokyo); university hospital; 6 July to 21 August 2021  <b>Added for Update Alert #9</b>	<ul style="list-style-type: none"> <li>32% nurse, 27% physician, 6% laboratory personnel, 8% paramedic, 12% administration, 15% researcher, 0.9% other</li> <li>0.3% SARS-CoV-2 seropositivity</li> </ul>	<ul style="list-style-type: none"> <li>Female: 0.4% (10/2649); OR 1.42 (0.44-4.52)*</li> <li>Male: 0.3% (4/1498); reference</li> </ul> HCW role <ul style="list-style-type: none"> <li>Nurse: 0.2% (3/1308); OR 0.51 (0.12-2.13)*</li> <li>Physician: 0.4% (5/1111); reference</li> <li>Laboratory personnel: 0% (0/236)</li> <li>Paramedic: 0.6% (2/314)</li> <li>Administrative staff: 0.6% (3/510)</li> <li>Researcher: 0.2% (1/632)</li> <li>Other role: 0% (0/36)</li> </ul>	
Fusco et al, 2020 (85)  Cross-sectional  Italy; single hospital; 23 March to 2 April 2020	115 HCWs in high-risk departments <ul style="list-style-type: none"> <li>Median age 43 y</li> <li>49% female</li> <li>23% physician, 50% nurse, 27% other</li> </ul> HCW role 92% direct patient care	Incidence of COVID-19 (SARS-CoV-2 infection or IgG seropositivity): 3.5% (4/115) <ul style="list-style-type: none"> <li>Female: 1.8% (1/55)</li> <li>Male: 5.1% (3/59)               <ul style="list-style-type: none"> <li>Female vs. male: OR 0.35 (0.03-3.43)</li> </ul> </li> <li>Physician: 3.8% (1/26)</li> <li>Nurse: 3.5% (2/57)               <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.91 (0.08-10.50)</li> </ul> </li> <li>Other HCW role: 3.1% (1/32)</li> <li>ED: 3.4% (2/59)</li> <li>Medical division: 1.8% (1/56)</li> <li>Direct patient care: 3.7% (4/107)</li> <li>No direct patient care: 0% (0/8)</li> <li>&gt;30 days exposure to patients with suspected or confirmed COVID-19: 4.3% (2/46)</li> <li>&lt;30 days exposure to patients with suspected or confirmed COVID-19: 2.9% (2/69)</li> <li>Participation in a PPE training event: 4.1% (4/98)</li> <li>No participation in a PPE training event: 0% (0/13)               <ul style="list-style-type: none"> <li>PPE training vs. no training: 1.27 (0.06-24.97)</li> </ul> </li> </ul>	No control for confounders; estimates imprecise
Garralda Fernandez et al 2021 (86)  Cross-sectional  Spain (Fuenlabrada); 1	2439 HCWs <ul style="list-style-type: none"> <li>Mean age 42 y</li> <li>78% female</li> <li>HCW role not reported</li> <li>19.9% SARS-CoV-2 seropositivity or infection (PCR)</li> </ul>	Sex <ul style="list-style-type: none"> <li>Female: 18.5% (353/1911)</li> <li>Male: 25.0% (132/528)               <ul style="list-style-type: none"> <li>Female vs. male: <b>OR 0.68 (0.54-0.85)*</b></li> </ul> </li> </ul> HCW role (n/N not reported; vs. administrative staff and management) <ul style="list-style-type: none"> <li>Doctor: 25.4%; OR 2.13 (1.53-2.96)</li> <li>Nurse assistant: 22.0%; OR 1.77 (1.26-2.49)</li> <li>Security: 21.1%; OR 1.68 (1.02-2.78)</li> </ul>	No control for confounders; 81% participation rate

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
teaching hospital; 14 April to 13 May		<ul style="list-style-type: none"> <li>• Nurse: 19.4%; OR 1.51 (1.09–2.09)</li> <li>• Technician: 18.1%; OR 1.39 (0.87–2.21)</li> <li>• Cleaners: 16.9%; OR 1.27 (0.68–2.39)</li> </ul>	
<p>Goenka et al 2020 (87)</p> <p>Cross-sectional</p> <p>India (region not described); 1 hospital; 12 July to 23 August 2020</p>	<p>1,122 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age not reported; 59% age 30-50 y</li> <li>• 34% female</li> <li>• 23% physician, 20% nurse, 20% housekeeping, 9% technician, 7% administrative, 6% lab assistant/ pharmacist, 6% ward executive, 4% dietician, 4% other role</li> <li>• 11.9% SARS-CoV-2 seropositivity</li> </ul>	<p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse: 9.4% (21/224)</li> <li>• Physician: 3.9% (10/255) <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: adjusted OR 1.61 (0.62-4.35)</li> </ul> </li> <li>• Housekeeping: 26.1% (59/226)</li> <li>• Technician: 12.1% (12/99)</li> <li>• Administration: 8.0% (6/75)</li> <li>• Lab assistant/pharmacist: 15.3% (11/72)</li> <li>• Dietician: 18.4% (9/49)</li> <li>• Ward executive: 7.0% (5/71)</li> <li>• Other role: 2.0% (1/51)</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• High-risk HCW (work in COVID-19 unit or ICU or regularly involved in testing or investigating of COVID-19 patients): 19.9% (27/136)</li> <li>• Intermediate-risk HCW (workers not meeting high-risk or low-risk criteria): 11.1% (101/911)</li> <li>• Low-risk HCW (no direct contact with patients or their belongings): 8.0% (6/75) <ul style="list-style-type: none"> <li>◦ High-risk vs. low-risk: adjusted OR 0.93 (0.13-6.79)</li> <li>◦ Intermediate-risk vs. low-risk: adjusted OR 0.75 (0.11-5.15)</li> </ul> </li> </ul> <p>Time spent in hospital in a week</p> <ul style="list-style-type: none"> <li>• &lt;48 hours: 14.0% (102/731)</li> <li>• 48 hours or more: 7.8% (29/373) <ul style="list-style-type: none"> <li>◦ &lt;48 vs. 48 hours or more: <b>OR 1.92 (1.25-2.97)*</b></li> </ul> </li> </ul> <p>Diabetes</p> <ul style="list-style-type: none"> <li>• Yes: 9.2% (6/65)</li> <li>• No: 12.1% (128/1057) <ul style="list-style-type: none"> <li>◦ Diabetes (yes vs. no): OR 0.74 (0.31-1.74)*</li> </ul> </li> </ul> <p>Hypertension/coronary artery disease</p> <ul style="list-style-type: none"> <li>• Yes: 4.7% (5/107)</li> <li>• No: 12.7% (129/1015) <ul style="list-style-type: none"> <li>◦ Hypertension/coronary artery disease (yes vs. no): <b>OR 0.34 (0.13-0.84)*</b></li> </ul> </li> </ul> <p>Lung disease</p> <ul style="list-style-type: none"> <li>• Yes: 9.7% (3/31)</li> <li>• No: 12.0% (131/1091) <ul style="list-style-type: none"> <li>◦ Lung disease (yes vs. no): OR 0.79 (0.24-2.62)*</li> </ul> </li> </ul>	<p>Potential recall bias; no control for confounders for some analyses; participation rate unclear</p>



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<p>BCG vaccine</p> <ul style="list-style-type: none"> <li>• Yes: 7.3% (41/561)</li> <li>• No: 16.9% (13/77) <ul style="list-style-type: none"> <li>◦ BCG vaccine (yes vs. no): <b>OR 0.39 (0.20-0.76)*</b></li> </ul> </li> </ul> <p>MMR vaccine</p> <ul style="list-style-type: none"> <li>• Yes: 8.6% (29/336)</li> <li>• No: 8.2% (25/303) <ul style="list-style-type: none"> <li>◦ MMR vaccine (yes vs. no): OR 1.05 (0.60-1.84)*</li> </ul> </li> </ul> <p>Hydroxychloroquine prophylaxis</p> <ul style="list-style-type: none"> <li>• Adequate dose (400 mg/week for &gt;6 weeks): 1.3% (1/77)</li> <li>• Inadequate dose: 11.2% (18/160)</li> <li>• Not received: 12.3% (115/885) <ul style="list-style-type: none"> <li>◦ Hydroxychloroquine prophylaxis with adequate dose vs. inadequate dose or no prophylaxis: <b>OR 0.09 (0.01-0.65)*</b></li> </ul> </li> </ul>	
<p>Gupta et al 2021 (14)</p> <p>Cross-sectional</p> <p>India (New Delhi); one hospital; 22 June to 24 July 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>3739 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 34 y</li> <li>• 41% female</li> <li>• 32% nurse, 18% physician, 20% paramedical staff, 11% technical staff, 14% administration</li> <li>• 13.0% SARS-CoV-2 seropositive</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 11.7% (178/1519)</li> <li>• Male: 13.9% (309/2220) <ul style="list-style-type: none"> <li>◦ Female vs. male: OR 0.82 (0.67-1.00)</li> </ul> </li> </ul> <p>Age</p> <ul style="list-style-type: none"> <li>• 18-35 y: 13.1% (272/2073)</li> <li>• &gt;35 y: 12.9% (215/1666) <ul style="list-style-type: none"> <li>◦ 18-35 vs. &gt;35: OR 1.01 (0.86-1.18)</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse: 9.8% (117/1198)</li> <li>• Physicians: 5.4% (36/661) <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: <b>OR 1.88 (1.28-2.77)*</b></li> </ul> </li> <li>• Administration: 19.6% (105/537)</li> <li>• Technical staff: 17.9% (71/397)</li> <li>• Paramedical: 17.2% (128/743)</li> <li>• Research staff: 14.8% (30/203)</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• Active COVID duty: 11.7% (110/943)</li> <li>• Not active COVID duty: 13.5% (377/2796) <ul style="list-style-type: none"> <li>◦ Active vs. not active COVID duty: OR 0.84 (0.67-1.05)</li> </ul> </li> <li>• Contact with COVID-19 positive individuals: 15.6% (196/1260)</li> <li>• No contact with COVID-19 positive individuals: 11.7% (291/2479) <ul style="list-style-type: none"> <li>◦ Contact vs. no contact: <b>OR 1.38 (1.14-1.68)</b></li> </ul> </li> </ul> <p>PPE (n=1773)</p>	<p>82% participation rate; potential recall bias; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Reported PPE breach: 12.7% (38/300)</li> <li>• No report of PPE breach: 13.1% (193/1473)               <ul style="list-style-type: none"> <li>○ PPE breach vs. no breach: OR 0.96 (0.66-1.40)</li> </ul> </li> </ul>	
<p>Herzberg et al 2021 (88)</p> <p>Cross-sectional</p> <p>Germany (Schleswig-Holstein); single hospital; March to June 2020</p>	<p>871 asymptomatic HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 40 y</li> <li>• 75% female</li> <li>• 17% physician, 34% nurse, 11% students or trainees</li> <li>• 2.6% SARS-CoV-2 seropositivity</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>• Age, per 10 years: adjusted OR 1.50 (1.19 to 1.90)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female vs. male: adjusted OR 0.91 (0.42-2.00)</li> </ul> <p>Other population characteristics</p> <ul style="list-style-type: none"> <li>• Body mass index, per increase of 5 kg/m<sup>2</sup>: <b>adjusted OR 0.72 (0.56-0.94)</b></li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• Direct patient care, yes vs. no: adjusted OR 0.85 (0.41 to 1.74)</li> </ul>	<p>Details on multivariate analysis lacking; no control for PPE and limited control for exposures</p>
<p>Hunter et al, 2020 (89)</p> <p>Cross-sectional</p> <p>United States (Indiana); 18 locations within one health care system; dates not reported</p>	<p>734 HCWs without active symptoms or previously confirmed COVID-19 who volunteered and completed study</p> <ul style="list-style-type: none"> <li>• Mean age: 42.8 y</li> <li>• 70.1% female</li> </ul> <p>38.0% physicians, 43.2% nurses, 12.8% RTs, 6.0% Admin</p>	<p>Prevalence of SARS-CoV-2 IgG antibodies:</p> <ul style="list-style-type: none"> <li>• Physician/APP: 1.1% (3/279)</li> <li>• Nurses: 2.2% (7/317)               <ul style="list-style-type: none"> <li>○ Nurse vs. physician: OR 2.08 (0.53-8.11)*</li> </ul> </li> <li>• RTs: 0% (0/94)</li> <li>• Administrative : 4.5% (2/44)</li> <li>• High risk: 1.3% (5/385)</li> <li>• Low risk: 2.0% (7/349)</li> </ul>	<p>Number of tests allocated according to assessed risk; testing protocol varied according to hospital risk (only offered to ED and COVID units in high risk hospitals); no control for confounders</p>
<p>Jacob et al 2021 (16)</p> <p>Cross-sectional</p> <p>United States (Atlanta GA, Baltimore MD and Chicago IL); 4 health care systems; 19 April to 30 August 2020</p>	<p>24749 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age not reported; 18% &lt;30 y, 30% 30-39 y, 21% 40-49 y, 18% 50-59 y, 12% ≥60 y</li> <li>• 78% female</li> <li>• 61% white, 21% Black, 10% Asian, 4% unknown race, 3% other race, 1% multiracial, 0.4% American Indian or</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 4.3% (840/19361); adjusted OR 0.8 (0.7-1.0)</li> <li>• Male: 4.5% (240/5378); reference</li> </ul> <p>Age</p> <ul style="list-style-type: none"> <li>• &lt;30 y: 5.3% (239/4545); <b>adjusted OR 1.3 (1.0-1.7)</b></li> <li>• 30-39 y: 4.4% (328/7454); adjusted OR 1.1 (0.9-1.4)</li> <li>• 40-49 y: 4.4% (228/5234); adjusted OR 1.0 (0.8-1.3)</li> <li>• 50-59 y: 3.9% (178/4578); adjusted OR 0.9 (0.7-1.2)</li> <li>• ≥60 y: 3.6% (107/2938); reference</li> </ul> <p>Race</p> <ul style="list-style-type: none"> <li>• White: 3.3% (499/15157); reference</li> <li>• Black: 7.3% (376/5117); <b>adjusted OR 2.1 (1.8-2.4)</b></li> </ul>	<p>Participation rate not reported; potential recall bias</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p><b>Added for Update Alert #9</b></p>	<p>Alaska Native; 4% Hispanic</p> <ul style="list-style-type: none"> <li>32% nurse, 18% physician, 21% nonclinical, 8% other direct care personnel, 6% nurse practitioner or physician's assistant, 5% nurse assistant or patient care technician, 2% radiology, 2% respiratory therapist, 2% physical, occupational or speech therapist, 2% other professional, 1% pharmacy, &lt;1% environmental service, &lt;1% unknown role</li> <li>4.4% SARS-CoV-2 seropositive</li> </ul>	<ul style="list-style-type: none"> <li>Asian: 4.5% (107/2369); adjusted OR 1.2 (1.0-1.5)</li> <li>Unknown: 5.2% (53/1012); <b>adjusted OR 1.8 (1.2-2.7)</b></li> <li>Other race: 3.6% (25/702); adjusted OR 1.3 (0.8-2.0)</li> <li>Multiracial: 5.5% (14/253); adjusted OR 1.3 (0.8-2.3)</li> <li>American Indian or Alaska Native: 4.8% (5/105); adjusted OR 1.4 (0.6-3.5)</li> <li>Native Hawaiian or other Pacific Islander: 2.9% (1/34); adjusted OR 0.8 (0.1-6.2)</li> </ul> <p>Ethnicity</p> <ul style="list-style-type: none"> <li>Hispanic: 5.2% (59/1126); adjusted OR 1.1 (0.8-1.5)</li> <li>Non-Hispanic/Latino: 4.4% (975/22403); reference</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nonclinical: 3.9% (205/5289); reference</li> <li>Nurse: 4.8% (374/7830); adjusted OR 1.1 (0.9-1.3)</li> <li>Physician: 3.7% (166/4499); adjusted OR 0.9 (0.7-1.1) <ul style="list-style-type: none"> <li>Nurse vs. physician: <b>OR 1.13 (1.09-1.58)*</b></li> </ul> </li> <li>Nurse practitioner or physician's assistant: 3.5% (53/1535); adjusted OR 0.9 (0.6-1.2)</li> <li>Environmental services: 7.4% (9/122); adjusted OR 1.5 (0.8-3.1)</li> <li>Pharmacy: 3.1% (10/325); adjusted OR 0.8 (0.4-1.6)</li> <li>Physical, occupational, or speech therapist: 3.5% (17/483); adjusted OR 1.3 (0.7-2.1)</li> <li>Radiology technician: 4.8% (23/476); adjusted OR 1.0 (0.6-1.6)</li> <li>Respiratory therapist: 4.5% (18/399); adjusted OR 0.9 (0.5-1.6)</li> <li>Other direct care personnel: 5.5% (105/1914); adjusted OR 1.1 (0.9-1.4)</li> <li>Other health care professional: 2.7% (10/367); adjusted OR 0.7 (0.4-1.3)</li> <li>Unknown: 6.8% (11/162); adjusted OR 0.9 (0.4-1.8)</li> </ul> <p>Exposure - workplace</p> <ul style="list-style-type: none"> <li>Inpatient unit (with or without COVID-19): 4.8% (425/8893); reference</li> <li>ED: 5.3% (127/2409); adjusted OR 1.0 (0.8-1.3)</li> <li>Other: 3.7% (413/11257); adjusted OR 0.9 (0.7-1.0)</li> <li>Unknown: 5.5% (115/2108); adjusted OR 0.9 (0.7-1.2)</li> </ul> <p>Exposure - patients</p> <ul style="list-style-type: none"> <li>Any contact with COVID-19 patients: 4.7% (584/12413); adjusted OR 1.1 (0.9-1.3)</li> <li>No contact with COVID-19 patients: 3.9% (448/11435); reference</li> <li>Unknown contact: 5.3% (48/901); adjusted OR 1.3 (0.9-1.9)</li> </ul>	
<p>Jeremias et al, 2020 (90)</p> <p>Cross-sectional</p>	<p>3,046 HCWs (asymptomatic or symptom-free for at</p>	<p>Prevalence of SARS-CoV-2 seropositivity</p> <ul style="list-style-type: none"> <li>Female: 9.4% (118/1259)</li> <li>Male: 11.1% (49/440) <ul style="list-style-type: none"> <li>Female vs. male: OR 0.83 (0.58-1.17)*</li> </ul> </li> </ul>	<p>64% participation rate; demographic characteristics reported for the entire</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
United States (New York); 1 hospital; 1 March to 30 April 2020	least 14 days), of whom 1958 underwent testing <ul style="list-style-type: none"> <li>• Mean age 43 y</li> <li>• 70% female</li> <li>• 6.4% physician, 55.6% nurse, 10.0% technologist, 6.2% environmental worker, 21.7% ancillary worker</li> </ul>	<ul style="list-style-type: none"> <li>• Physician: 11.4% (9/79)</li> <li>• Nurse: 9.5% (99/1043)               <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: OR 0.82 (0.40-1.68)*</li> </ul> </li> <li>• Technologist: 5.8% (9/155)</li> <li>• Environmental worker: 12.0% (12/100)</li> <li>• Ancillary worker: 12.1% (39/322)</li> <li>• ER: 10.2% (9/88)</li> <li>• Floor: 12.3% (60/489)</li> <li>• ICU: 6.9% (22/321)</li> <li>• Operational: 10.5% (42/400)</li> <li>• Procedural: 9.1% (22/243)</li> <li>• Other: 7.6% (12/158)</li> </ul>	cohort rather than those who underwent testing
Jespersen et al, 2020 (91)  Cross-sectional  Denmark (central region); all hospitals, prehospital and specialist practitioners; 18 May to 19 June 2020	17,971 (17,280 with reported data) HCWs <ul style="list-style-type: none"> <li>• Mean age not reported, 11% age &lt;29 y, 22% age 30-39 y, 26% age 40-49 y, 26% age 50-59, 15% age ≥60 y</li> <li>• 86% female</li> <li>• 85% hospital worker (n=15,261)               <ul style="list-style-type: none"> <li>◦ 13% physician, 46% nurse, 7% laboratory scientist, 9% medical secretary, 25% other role</li> </ul> </li> </ul>	SARS-CoV-2 seropositivity <ul style="list-style-type: none"> <li>• Age &lt;29 y: 6.0% (116/1,916)</li> <li>• Age 30-39 y: 3.8% (144/3,794)</li> <li>• Age 40-49 y: 3.8% (175/4,560)</li> <li>• Age 50-59 y: 3.6% (161/4,505)</li> <li>• Age ≥60 y: 2.9% (72/2,505)</li> <li>• Male: 3.9% (94/2,430)</li> <li>• Female: 3.9% (574/14,850)               <ul style="list-style-type: none"> <li>◦ Female vs. male: OR 1.00 (0.80-1.25)*</li> </ul> </li> </ul>	69% overall response rate; discrepant results reported
Jones et al 2020 (92)  Cross-sectional  UK (Bristol); health service	6858 HCWs (all invited for testing) <ul style="list-style-type: none"> <li>• Mean age not reported</li> <li>• 78% female</li> <li>• 29% nurse/midwife, 12%</li> </ul>	Age <ul style="list-style-type: none"> <li>• ≤20 y: 12.3% (14/114); adjusted OR 1.47 (0.96-2.20)</li> <li>• 21-30 y: 10.9% (192/1757); <b>adjusted OR 1.64 (1.36-1.99)</b></li> <li>• 31-40 y: 7.3% (118/1624); reference</li> <li>• 41-50 y: 10.3% (158/1536); <b>adjusted OR 1.36 (1.11-1.67)</b></li> <li>• 51-60 y: 8.5% (120/1408); <b>adjusted OR 1.45 (1.17-1.80)</b></li> <li>• 61-70 y: 8.7% (35/402); adjusted OR 1.28 (0.94 to 1.73)</li> </ul>	No control for exposures or PPE; 56% participation rate

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>• medical/dental, 9%</li> <li>• allied health, 18%</li> <li>• administrative/clerical, 21%</li> <li>• other clinical services</li> <li>• 9.3% SARS-CoV-2 seroprevalence</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 9.3% (498/5338)</li> <li>• Male: 9.2% (140/1520) <ul style="list-style-type: none"> <li>○ Female vs. male: adjusted OR 1.04 (0.88-1.23)</li> </ul> </li> </ul> <p>Race/Ethnicity</p> <ul style="list-style-type: none"> <li>• Black, Asian, and minority ethnic: 14.6% (160/1095)</li> <li>• White: 8.2% (456/5578) <ul style="list-style-type: none"> <li>○ BAME vs white: <b>adjusted OR 1.99 (1.69-2.34)</b></li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse/midwife: 10.2% (201/1962)</li> <li>• Medical/dental: 8.6% (74/856) <ul style="list-style-type: none"> <li>○ Nurse/midwife vs. medical/dental: OR 1.21 (0.91-1.60)*</li> </ul> </li> <li>• Allied health 7.5% (31/413)</li> <li>• Administrative/clerical: 5.9% (73/1233)</li> <li>• Other clinical services: 12.7% (180/1420)</li> </ul>	
<p>Korth et al, 2020 (93)</p> <p>Cross-sectional</p> <p>German (Essen); 1 hospital; 25 March to April 21 2020</p>	<p>317 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age, 37 y in high-risk group, 42.3 y in low-risk group</li> <li>• 100% female</li> <li>• 25% physician, 66% nurse, 6% lab assistant, 3% other</li> <li>• 1.6% (5/316) diagnosed with SARS-CoV-2 IgG positivity</li> </ul>	<p>Prevalence of SARS-CoV-2 IgG positivity</p> <ul style="list-style-type: none"> <li>• High-risk (daily contact with COVID-19 patients on designated wards and intensive care units): 1.2% (3/244)</li> <li>• Intermediate-risk (daily non-COVID-19 patient contact): 5.4% (2/36)</li> <li>• Low-risk (no daily patient contact): 0% (0/35)</li> </ul>	<p>No control for confounders</p>
<p>Krastinova et al 2020 (94)</p> <p>Cross-sectional</p> <p>France (Creteil); 1 hospital; 17 March to 20 April 2020</p>	<p>314 symptomatic HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 40 y</li> <li>• 81% female</li> <li>• HCW role not reported</li> <li>• 5.0% SARS-CoV-2 infection (PCR)</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>• &gt;50 y vs. ≤50 y: adjusted OR 0.69 (0.36-1.32)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 34.5% (88/255)</li> <li>• Male: 37.2% (22/59) <ul style="list-style-type: none"> <li>○ Female vs. male: adjusted OR 1.20 (0.60-2.38)</li> </ul> </li> </ul> <p>Comorbidities</p> <ul style="list-style-type: none"> <li>• BMI ≥30 vs. &lt;30 kg/m<sup>2</sup>: adjusted OR 0.92 (0.62-1.63)</li> <li>• Former vs. never smoker: adjusted OR 0.83 (0.40-1.74)</li> <li>• Current vs. never smoker: <b>adjusted OR 0.30 (0.15-0.62)</b></li> </ul>	<p>No control for PPE and limited control for exposures</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		Exposure <ul style="list-style-type: none"> <li>• Non-patient facing vs. non-clinical: adjusted OR 1.57 (0.5-5.31)</li> <li>• Direct patient facing vs. non-clinical: adjusted OR 3.08 (1.09-8.78)</li> </ul>	
Lackermair et al, 2020 (95)  Cross-sectional  Germany (Dachau); 8 primary care clinics; 2 to 6 April	151 HCWs <ul style="list-style-type: none"> <li>• Mean age 38 years</li> <li>• 83% female</li> <li>• 36% physician, 64% other HCW</li> <li>• 28% known unprotected COVID-19 contact</li> <li>• 72% symptomatic</li> </ul>	Prevalence of SARS-CoV-2 seropositivity <ul style="list-style-type: none"> <li>• Female: 1.6% (2/126)</li> <li>• Male: 8.0% (2/25)               <ul style="list-style-type: none"> <li>◦ Female vs. male: OR 0.19 (0.02-1.38)*</li> </ul> </li> <li>• Physician: 5.6% (3/54)</li> <li>• Other HCW role: 1.0% (1/97)</li> <li>• Direct contact with COVID-19 patient: 4.8% (2/42)</li> <li>• No direct contact with COVID-19 patient: 1.8% (2/109)               <ul style="list-style-type: none"> <li>◦ Direct contact with COVID-19 patient vs. no direct contact: 2.68 (0.36-19.64)*</li> </ul> </li> </ul>	Potential recall bias
Lahner et al, 2020 (96)  Cross-sectional  Italy (Rome); 1 hospital; 18 March to 27 April 2020	2,115 HCWs in a COVID-19 regional hub <ul style="list-style-type: none"> <li>• Median age 46 y</li> <li>• 60.2% female</li> <li>• 30% physician, 33% nurse, 37% other HCW role</li> </ul>	Incidence of SARS-CoV-2 infection (PCR) <ul style="list-style-type: none"> <li>• Physician: 4.1% (26/632)</li> <li>• Nurse: 3.8% (27/705)</li> <li>• Other HCW role: 0.6% (5/778)</li> </ul>	No non-HCW controls
Lombardi et al, 2020 (97)  Cross-sectional  Italy (Milan); 1 hospital; 24 February to 31 March 31 2020	1,573 HCWs <ul style="list-style-type: none"> <li>• Mean age, 44 y</li> <li>• 64% female</li> <li>• 37% physician, 33% nurse/midwife, 10% health care assistant, 11% health technician, 9% clerical workers/technician</li> <li>• 30% at least 1 symptom</li> <li>• 8.8% (138/1573) diagnosed with</li> </ul>	Odds ratio (95% CI) for SARS-CoV-2 infection (PCR) <ul style="list-style-type: none"> <li>• Female vs. male: 0.83 (0.58-1.18)</li> <li>• Nurse vs. physician: 0.75 (0.50-1.13)</li> </ul> Prevalence of SARS-CoV-2 infection (PCR) <ul style="list-style-type: none"> <li>• &lt;30 y: 11.7% (29/248)</li> <li>• 30-39 y: 8.8% (34/387)</li> <li>• 40-49 y: 8.0% (26/326)</li> <li>• 50-59 y: 7.9% (35/444)</li> <li>• ≥60 y: 8.3% (14/168)</li> <li>• Physician (including resident): 10.6% (62/582)</li> <li>• Nurses/midwife: 8.2% (43/522)</li> <li>• Health care assistant: 8.0% (13/162)</li> <li>• Health technician: 9.4% (16/170)</li> </ul>	No control for confounders

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	SARS-CoV-2 infection (PCR)	<ul style="list-style-type: none"> <li>Clerical worker/technician: 2.9% (4/137)</li> </ul>	
Martin et al, 2020 (98) Cross-sectional  Belgium (Brussels); 1 tertiary hospital specializing in infectious disease; 15 April to 18 May 2020	326 HCWs <ul style="list-style-type: none"> <li>Mean age 37 y</li> <li>73% female</li> <li>29% physician, 51% nurse, 9% care assistant, 11% paramedical staff, 8% administrative staff, 2% cleaning staff</li> <li>82% asymptomatic</li> <li>11% COVID-19 diagnosis prior to study</li> </ul>	SARS-CoV-2 infection (PCR or seropositivity) <ul style="list-style-type: none"> <li>Male: 11.5% (10/87)               <ul style="list-style-type: none"> <li>Female: 13.0% (31/239)</li> </ul> </li> <li>Female vs. male: OR 1.15 (0.54-2.45)*</li> <li>Physician: 11.8% (10/85)               <ul style="list-style-type: none"> <li>Nurse: 12.7% (19/150)</li> </ul> </li> <li>Nurse vs. physician: 1.09 (0.48-2.46)*</li> <li>Care assistant: 14.8% (4/27)</li> <li>Paramedical staff: 15.1% (5/33)</li> <li>Administrative staff: 0.4% (1/25)</li> <li>Cleaning staff: 33.3% (2/6)</li> <li>COVID-19 unit: 14.4% (31/215)</li> <li>COVID-19 ICU: 5.7% (3/53)</li> <li>ED: 12.1% (7/58)</li> </ul>	No control for confounders
Moncunill et al 2021 (99)  Cross-sectional  Spain (Barcelona); 1 hospital; 27 April to 6 May 2020	501 asymptomatic HCWs <ul style="list-style-type: none"> <li>Mean age 42 y</li> <li>72% female</li> <li>50% nurse/auxiliary services, 26% physician, 8% technician, 17% other role; 75% direct clinical care; 50% COVID-19 unit</li> <li>14.9% incident (4 weeks) SARS-CoV-2 seropositivity or infection (PCR)</li> </ul>	Age <ul style="list-style-type: none"> <li>Per year: OR 0.98 (0.95-1.02)</li> </ul> Sex <ul style="list-style-type: none"> <li>Female vs. male: OR 1.27 (0.50-3.24)</li> </ul> HCW role (vs. other role) <ul style="list-style-type: none"> <li>Nurse/auxiliary services: OR 5.54 (0.72-42.55)</li> <li>Physician: OR 2.77 (0.30-25.25)</li> <li>Technician: <b>OR 13.03 (1.47-116)</b></li> </ul> Comorbidities (yes vs. no) <ul style="list-style-type: none"> <li>Heart and liver disease, diabetes, chronic respiratory and renal disease, cancer and autoimmune disease, or other immunological disorders: OR 0.70 (0.23-2.08)</li> <li>Smoker: OR 1.58 (0.67-3.77)</li> </ul> Exposure (vs. no) <ul style="list-style-type: none"> <li>Work in clinical care: 1.06 (0.41-2.70)</li> <li>Involved with direct patient contact: OR 0.97 (0.38-2.50)</li> <li>Work in COVID-19 unit: OR 1.07 (0.48-2.40)</li> </ul>	No control for confounders; some estimates very imprecise
Mukhtar et al 2021 (17)  Cross-sectional	455 asymptomatic HCWs <ul style="list-style-type: none"> <li>Mean age 33 y</li> <li>48% female</li> </ul>	Age (years): mean 33.4 (cases) vs. 32.8 (non-cases), p=0.71 Sex <ul style="list-style-type: none"> <li>Female: 9.2% (20/216); OR 1.42 (0.72-2.82)*</li> <li>Male: 6.7% (16/239); reference</li> </ul>	75% participation rate; HCW role not reported; no control for confounders; some

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
Egypt (Cairo); university hospital; 20 May to 11 June 2020  <b>Added for Update Alert #9</b>	<ul style="list-style-type: none"> <li>• HCW role not reported</li> <li>• 7.9% SARS-CoV-2 seropositivity</li> </ul>	Exposure <ul style="list-style-type: none"> <li>• Participation in an aerosol-generating procedure: 0.7% (1/143); <b>OR 0.06 (0.01-0.41)*</b></li> <li>• No participation in an aerosol-generating procedure: 11.2% (35/312); reference</li> <li>• Hypertension (yes vs. no): 8.0% (2/25) vs. 8.6% (34/396); OR 1.01 (0.23-4.48)*</li> <li>• Diabetes (yes vs. no): 0% (0/9) vs. 8.8% (36/410); OR 0.59 (0.03-10.38)*</li> <li>• Asthma (yes vs. no): 5.3% (1/19) vs. 8.7% (35/401); OR 0.64 (0.08-4.91)*</li> <li>• Current smoker vs. non-smoker: 8.3% (2/24) vs. 7.6% (28/369); OR 1.11 (0.25-4.95)*</li> <li>• Ex-smoker vs. non-smoker: 9.7% (6/62) vs. 7.6% (28/369); OR 1.30 (0.52-2.39)*</li> </ul>	estimates very imprecise
Newberry et al 2021 (18)  Cross-sectional  United States (California); 10 county fire departments; June to August 2020  <b>Added for Update Alert #9</b>	983 firefighters cross-trained as paramedics or EMTs <ul style="list-style-type: none"> <li>• Mean age not reported; 21% 18-34 y, 57% 35-49 y, 22% ≥50 y</li> <li>• 4% female</li> <li>• 60% white non-Hispanic, 20% Hispanic, 8% Asian/Pacific Islander, 3% Black non-Hispanic, 10% other</li> <li>• 2.5% SARS-CoV-2 seropositivity; 0.9% SARS-CoV-2 infection (PCR)</li> </ul>	<i>SARS-CoV-2 seropositivity</i> Age <ul style="list-style-type: none"> <li>• 18-34 y: 1.0% (2/206); reference</li> <li>• 35-49 y: 3.1% (17/556); OR 3.22 (0.74-14.05)*</li> <li>• ≥50 y: 2.7% (6/221); OR 2.85 (0.57-14.27)*</li> </ul> Race/ethnicity <ul style="list-style-type: none"> <li>• White, non-Hispanic: 1.3% (8/594); reference</li> <li>• Hispanic: 4.7% (9/192); <b>OR 3.60 (1.37-9.47)*</b></li> <li>• Asian or Pacific Islander: 3.8% (3/78); OR 2.93 (0.76-11.29)*</li> <li>• Black, non-Hispanic: 3.8% (1/26); OR 2.93 (0.35-24.34)*</li> <li>• Other: 4.3% (4/93); OR 3.29 (0.97-11.16)*</li> </ul> Exposure <ul style="list-style-type: none"> <li>• Exposed to confirmed SARS-CoV-2 patient respiratory secretions (yes vs. no): 4.8% (13/271) vs. 1.7% (12/712); <b>OR 2.94 (1.32-6.53)*</b></li> <li>• Exposed to confirmed SARS-CoV-2 positive patient or colleague (yes vs. no): 3.0% (10/335) vs. 2.3% (15/648); OR 1.30 (0.58-2.92)*</li> </ul> PPE <ul style="list-style-type: none"> <li>• Full use of PPE during exposure (yes vs. no): 1.3% (3/227) vs. 5.6% (5/90); <b>OR 0.23 (0.05-0.97)*</b></li> <li>• PPE breach or failure (yes vs. no): 2.7% (1/38) vs. 2.3% (19/837); OR 1.20 (0.16-9.18)</li> </ul> <i>SARS-CoV-2 infection (PCR)</i> Age <ul style="list-style-type: none"> <li>• 18-34 y: 1.0% (2/206); reference</li> <li>• 35-49 y: 0.5% (3/556); OR 0.55 (0.09-3.34)</li> <li>• ≥50 y: 1.8% (4/221); OR 1.88 (0.34-10.38)</li> </ul> Race/ethnicity	73% participation rate; potential recall bias; imprecise estimates; no control for confounders



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• White, non-Hispanic: 1.0% (6/594); reference</li> <li>• Hispanic: 1.6% (3/192); OR 1.56 (0.39-6.28)</li> <li>• Asian or Pacific Islander: 0% (0/78); OR 0.58 (0.03-10.34)</li> <li>• Black, non-Hispanic: 0% (0/26); OR 1.71 (0.09-31.13)</li> <li>• Other: 0% (0/93); OR 0.48 (0.03-8.67)</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• Exposed to confirmed SARS-CoV-2 patient respiratory secretions (yes vs. no): 0.7% (2/271) vs. 1.0% (7/712); OR 0.75 (0.15-3.63)*</li> <li>• Exposed to confirmed SARS-CoV-2 positive patient or colleague (yes vs. no): 1.5% (5/335) vs. 0.6% (4/648); OR 2.44 (0.65-9.15)*</li> </ul> <p>PPE</p> <ul style="list-style-type: none"> <li>• Full use of PPE during exposure (yes vs. no): 1.3% (3/227) vs. 2.2% (2/90); OR 0.59 (0.10-3.59)</li> <li>• PPE breach or failure (yes vs. no): 2.7% (0/37) vs. 1.1% (9/837); OR 1.16 (0.07-20.36)</li> </ul>	
<p>Nopsopon et al 2021 (19)</p> <p>Cross-sectional</p> <p>Thailand (Ranong province); public hospital; 17 April to 17 May 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>844 HCWs in a low-risk hospital setting</p> <ul style="list-style-type: none"> <li>• Median age 42 y</li> <li>• 72% female</li> <li>• HCW role not reported</li> <li>• 0.8% SARS-CoV-2 seropositivity</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 1.0% (6/605); OR 2.10 (0.25-17.57)*</li> <li>• Male: 0.5% (1/211); reference</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>• Close contact with a confirmed COVID-19 case: 0% (0/17); OR 3.13 (0.17-56.90)*</li> <li>• No close contact with a confirmed COVID-19 case: 0.8% (7/827); reference</li> </ul>	<p>No control for confounders; imprecise estimates</p>
<p>Nygren et al 2021 (20)</p> <p>Cross-sectional</p> <p>Sweden (Lund); university hospital; 8 September to 10 November 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>271 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 37 y</li> <li>• 81% female</li> <li>• 40% nurse, 33% assistant nurse, 12% physician, 2% other HCW with patient contact, 12% other HCW without patient contact</li> </ul>	<p>Exposure</p> <ul style="list-style-type: none"> <li>• Working in COVID-19 unit: 21.6% (11/51); <b>adjusted OR 5.6 (1.3-23.0)</b></li> <li>• Not working in a COVID-19 unit: 4.5% (10/220); reference</li> <li>• Increased risk (involvement in an aerosol-generating procedure or bedside surveillance for &gt;3 hours/shift with a COVID-19 patient: 16.1% (9/56); <b>OR 3.2 (1.1-8.7)^</b></li> <li>• No increased risk: 5.7% (12/211); reference</li> <li>• Caring for COVID-19 patient most days: 19.7% (12/61); <b>adjusted OR 5.1 (1.3-19.0)</b></li> <li>• No caring for COVID-19 patient most days: 4.3% (9/210); reference</li> <li>• Worked shift with COVID-19-positive colleague; 11.3% (7/62); adjusted OR 1.4 (0.45-4.0)</li> </ul>	<p>Participation rate not reported; potential recall bias; limited adjustment for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>7.7% SARS-CoV-2 seropositive or infection (PCR)</li> </ul>	<ul style="list-style-type: none"> <li>Did not work shift with COVID-19-positive colleague: 6.7% (14/208); reference</li> </ul>	
<p>Olalla et al, 2020 (100)</p> <p>Cross-sectional</p> <p>Spain (Andalusia); 1 hospital; 15 to 24 April 2020</p>	<p>498 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 42 y</li> <li>80% female</li> <li>20% physician, 39% nurse, 26% nursing assistant, 7% security, 2% administrative, 5% housekeeping</li> <li>26% ED, 13% ICU, 44% COVID-19 unit, 9% non-COVID-19 unit, 8% pediatric unit</li> </ul>	<p>Prevalence of SARS-CoV-2 IgG seropositivity, negative IgM and negative PCR</p> <ul style="list-style-type: none"> <li>Physician: 1.9% (2/101)</li> <li>Nurse: 0.5% (1/195) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.26 (0.03-2.85)*</li> </ul> </li> <li>Nursing assistant: 2.3% (3/129)</li> <li>Security: 2.9% (1/35)</li> <li>ER: 1.6% (2/129)</li> <li>ICU: 1.6% (1/63)</li> <li>COVID-19 unit: 0.9% (2/219)</li> <li>Non-COVID-19 unit: 4.5% (2/44) <ul style="list-style-type: none"> <li>COVID-19 vs. non-COVID-19 unit: OR 0.19 (0.03-1.41)*</li> </ul> </li> </ul>	<p>Uncertain criteria for testing eligibility; no control for confounders</p>
<p>Pereckaite et al 2021 (101)</p> <p>Cross-sectional</p> <p>Lithuania (Kaunas); hospital system; 15 June to 21 September 2020</p>	<p>432 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 43 y</li> <li>85% female</li> <li>41% nurse, 39% physician, 12% assistant, 7% other role</li> <li>1.2% SARS-CoV-2 seropositive</li> </ul>	<p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse: 1.1% (2/179)</li> <li>Physician: 1.2% (2/169) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 0.94 (0.13-6.77)*</li> </ul> </li> </ul>	<p>Participation rate unclear; no control for confounders; imprecise estimate</p>
<p>Rodriguez et al 2021 (21)</p> <p>Cross-sectional</p> <p>Spain (Mallorca); university hospital; 28 April to 11 June 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>2210 HCWs</p> <ul style="list-style-type: none"> <li>Mean age 44 y</li> <li>74% female</li> <li>56% nurse or nursing assistant, 17% physician, 5% other HCW, 10% other non HCW, 3% registrar, 0.8% warden</li> <li>2.8% SARS-CoV-2 seropositive</li> </ul>	<p>Age (mean, years), cases vs. non-cases: 42 vs. 44, <math>p &gt; 0.05</math></p> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 2.6% (42/1637)</li> <li>Male: 1.6% (19/1168) <ul style="list-style-type: none"> <li>Female vs. male: OR 1.59 (0.92-2.75)*</li> </ul> </li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse or nursing assistant: 3.0% (37/1240)</li> <li>Physician: 2.6% (10/380) <ul style="list-style-type: none"> <li>Nurse or nursing assistant vs. physician: OR 1.14 (0.56-2.31)*</li> </ul> </li> <li>Registrar: 3.9% (3/77)</li> <li>Warden: 3.4% (6/176)</li> <li>Other HCW: 0% (0/108)</li> </ul>	<p>79% participation rate; no adjustment for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Schmitz et al 2020 (102)</p> <p>Cross-sectional</p> <p>The Netherlands (countrywide); 43 hospitals; 1 March to 1 May 2020</p>	<p>3,064 ED HCWs</p> <ul style="list-style-type: none"> <li>• Mean age, % female not reported</li> <li>• 14% resident physician, 70% nurse, 16% consultant</li> <li>• 5.4% SARS-CoV-2 infection (PCR)</li> </ul>	<ul style="list-style-type: none"> <li>• Other non-HCW: 2.2% (5/229)</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse: 5.6% (121/2153)</li> <li>• Resident physician: 6.3% (27/431)</li> <li>• Consultant: 3.5% (16/459) <ul style="list-style-type: none"> <li>◦ Nurse vs. physician: OR 1.17 (0.82-1.68)*</li> </ul> </li> </ul> <p>PPE use</p> <ul style="list-style-type: none"> <li>• High-level PPE hospital (FFP2 mask and eye protection for all patient contact) hospital: (73/944)</li> <li>• Other hospital: (91/2099) <ul style="list-style-type: none"> <li>◦ High-level PPE hospital vs. other hospital: <b>OR 1.85 (1.35-2.54)*^</b></li> </ul> </li> </ul>	<p>SARS-CoV-2 infection status based on self-report; potential recall bias; no control for confounders; participation rate 70%; PPE used based on hospital policy, not individual HW use</p>
<p>Shields et al, 2020a (103)</p> <p>Cross-sectional</p> <p>United Kingdom (Birmingham, England); four urban hospitals; 25 April 2020</p>	<p>554 asymptomatic HCWs</p> <ul style="list-style-type: none"> <li>• Age, sex, HCW role/position not reported</li> </ul>	<p>Prevalence of SARS-CoV-2 (PCR): 2.4% (13/554) Prevalence of SARS-CoV-2 seroconversion (IgG, IgM, IgA): 24.4% (126/516)</p> <ul style="list-style-type: none"> <li>• Housekeeping: 34.5% (10/29)</li> <li>• Acute medicine: 33.3% (10/30)</li> <li>• General internal medicine: 30.3% (30/99)</li> <li>• Intensive care: 14.8% (9/61)</li> <li>• Emergency medicine: 13.3% (2/15)</li> <li>• General surgery: 13.0% (3/23)</li> <li>• Female: 26.3% (102/388)</li> <li>• Male: 18.8% (24/128)</li> </ul> <p>OR (95% CI) for SARS-CoV-2 seroconversion</p> <ul style="list-style-type: none"> <li>• Female vs. male: 1.55 (0.94-2.54)*</li> </ul>	<p><b>Not peer reviewed</b></p> <p>No information on clinical characteristics of HCWs; no information on clinical outcomes of SARS-CoV-2 infection; participation rate not reported; 7% of patients who underwent PCR testing did not undergo antibody testing</p>
<p>Shields et al 2020b (104)</p> <p>Cross-sectional</p> <p>UK (Birmingham); NHS hospital trust; 24 to 25 April 2020</p>	<p>516 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 42 y</li> <li>• 75% female</li> <li>• HCW role not reported</li> <li>• 24.4% SARS-CoV-2 seropositivity</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>• Per additional year: adjusted OR 0.98 (0.96-1.00)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>• Female: (102/388)</li> <li>• Male: (24/128) <ul style="list-style-type: none"> <li>◦ Female vs. male: adjusted OR 1.49 (0.81-2.83)</li> </ul> </li> </ul> <p>Race/ethnicity</p> <ul style="list-style-type: none"> <li>• BAME vs. white: <b>adjusted OR 1.92 (1.14-3.23)</b></li> </ul> <p>Department (working in the department vs. not working in the department)</p> <ul style="list-style-type: none"> <li>• Acute medicine: adjusted OR 0.99 (0.34-2.86)</li> <li>• ED: adjusted OR 0.36 (0.05-1.69)</li> <li>• Estates: adjusted OR 0.57 (0.11-2.29)</li> <li>• Internal medicine: adjusted OR 0.93 (0.42-2.12)</li> </ul>	<p>No control for HCW role, exposures, or PPE; participation rate unclear</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Surgery: adjusted OR 0.24 (0.03-1.05)</li> <li>• Facilities: adjusted OR 0.52 (0.15-1.60)</li> <li>• Housekeeping: adjusted OR 1.01 (0.31-3.09)</li> <li>• ICU: adjusted OR 0.28 (0.09-0.78)</li> <li>• Ob/gyn: adjusted OR 0.85 (0.30-2.39)</li> <li>• Research: adjusted OR 0.44 (0.15-1.22)</li> </ul>	
<p>Stubblefield et al, 2020 (105)</p> <p>Cross-sectional</p> <p>United States (Tennessee); 1 academic medical center; 3 to 13 April 2020</p>	<p>249 frontline HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 34 y</li> <li>• 57% female</li> <li>• 37% nurse, 36% physician/provider, 8% radiology technician, 19% other health care role</li> <li>• 59% ED, 22% medical ICU, 19% other setting</li> </ul>	<p>Prevalence of SARS-CoV-2 seropositivity</p> <ul style="list-style-type: none"> <li>• Female: 6.7% (11/163)</li> <li>• Male: 6.6% (8/122)</li> <li>• Nurse: 4.8% (5/105)</li> <li>• Physician/provider: 9.3% (8/86)</li> <li>• Radiology technician: 29.4% (5/17)</li> <li>• Other HCW role: 2.4% (1/41)</li> <li>• ED: 8.2% (12/147)</li> <li>• Medical ICU: 5.5% (3/55)</li> <li>• Other setting: 8.5% (4/47)</li> <li>• Did not use surgical or N95 mask or PAPR during all clinical encounters: 23.1% (3/13)</li> </ul> <p>OR (95% CI) for SARS-CoV-2 seropositivity</p> <ul style="list-style-type: none"> <li>• Female vs. male: 1.03 (0.40-2.65)*</li> <li>• Nurse vs. physician/provider: 0.49 (0.15-1.55)*</li> </ul>	<p>No control for confounders</p>
<p>Talbot et al 2021 (23)</p> <p>Cross-sectional</p> <p>United States (Suffolk County, NY); university hospital; 2 to 18 April 2020</p> <p><b>Added for Update Alert #9</b></p>	<p>474 HCWs</p> <ul style="list-style-type: none"> <li>• Mean age 42 y</li> <li>• 62% female</li> <li>• 72% non-Hispanic white, 7% Hispanic or Latino, 3% African American/Black, 18% Asian, 0.5% other/unknown race/ethnicity</li> <li>• 28% nurse (RN), 21% frontline physician, 19% other physician, 28% other clinical</li> </ul>	<p>Sex</p> <ul style="list-style-type: none"> <li>• Female: 18.5% (54/292)</li> <li>• Male: 14.3% (26/182)</li> <li>◦ Female vs. male: OR 1.36 (0.82-2.27)*</li> </ul> <p>Race/Ethnicity</p> <ul style="list-style-type: none"> <li>• Non-Hispanic white: 15.6% (53/339); reference</li> <li>• Hispanic or Latino: 22.6% (7/31); OR 1.57 (0.65-3.84)*</li> <li>• African American/Black: 7.1% (1/14); OR 0.42 (0.05-3.24)*</li> <li>• Asian: 21.8% (19/87); OR 1.51 (0.84-2.71)*</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>• Nurse (RN): 15.6% (21/135)</li> <li>• Frontline physician: 12.7% (13/102)</li> <li>• Other physician: 16.5% (15/91)</li> <li>◦ Nurse vs. (any) physician: OR 1.09 (0.59-2.01)*</li> <li>• Other clinical staff: 21.6% (29/134)</li> <li>• Administrative/other role: 16.7% (2/12)</li> </ul>	<p>Participation rate not reported; potential recall bias; no adjustment for confounders; imprecise estimates</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>staff, 2% administrative/other role</li> <li>16.9% SARS-CoV-2 seropositive</li> </ul>	Exposure <ul style="list-style-type: none"> <li>High exposure (time exposed to COVID-19 patients at work): 14.2% (19/134); OR 0.71 (0.38-1.33)*</li> <li>Moderate exposure: 17.0% (16/94); OR 0.88 (0.43-1.72)*</li> <li>Some exposure: 17.1% (14/82); OR 0.89 (0.44-1.78)</li> <li>Minimal to no exposure: 18.9% (30/159); reference</li> </ul>	
Varona et al 2021 (106)  Cross-sectional  Spain (Madrid, Coruna, Barcelona, Other); hospital employees of the HM Group (GHM); 15 April to 30 June 2020	6038 HCWs (1253 symptomatic in previous 2 mo) <ul style="list-style-type: none"> <li>Mean age 44 y</li> <li>71% female</li> <li>62.7 % high-risk (clinical environment; prolonged/ direct contact with patients); 16.8% moderate risk (clinical environment with non-intense/no patient contact); 20.5% low-risk (non-clinical environment)</li> <li>11.0% SARS-CoV-2 seroprevalence</li> </ul>	Age <ul style="list-style-type: none"> <li>&lt;30: 12.3% (112/909); reference</li> <li>30-45: 10.2% (273/2679); adjusted OR 0.84 (0.67 to 1.06)</li> <li>46-60: 11.1% (209/1881); adjusted OR 0.96 (0.76 to 1.23)</li> <li>&gt;60: 11.9% (68/569); adjusted OR 1.07 (0.77 to 1.48)</li> </ul> Sex <ul style="list-style-type: none"> <li>Male: 11.2% (195/1744)</li> <li>Female: 10.9% (467/4294)               <ul style="list-style-type: none"> <li>Female vs. male: adjusted OR 0.98 (0.83 to 1.18)</li> </ul> </li> <li>Exposure risk category High (prolonged direct contact): 12.1% (457/3786)</li> <li>Moderate (clinical or non-clinical with non-intense patient contact): 11.4% (116/1014)</li> <li>Low (non-clinical and minimal/no patient contact): 7.2% (89/1238)               <ul style="list-style-type: none"> <li>High vs. low risk: <b>adjusted OR 2.06 (1.63 to 2.62)</b></li> <li>Moderate vs. low risk: <b>adjusted OR 1.77 (1.32 to 2.37)</b></li> </ul> </li> </ul>	Potential recall bias; limited control for potential exposures and no control for PPE
Venugopal et al 2021 (107)  Cross-sectional  USA (South Bronx, NY); Level 1 trauma center; 1 March to 1 May 2020	500 HCWs <ul style="list-style-type: none"> <li>Mean age not reported; 48% 20-39 y; 41% 40-59 y; 11% &gt;60 y</li> <li>69% female</li> <li>28% Hispanic; 24% White; 24% Asian; 18% Black; 6% Other race/ethnicity</li> <li>33% physician; 30% nurse; 15% ancillary</li> </ul>	Age^ <ul style="list-style-type: none"> <li>20-39 y: 25% (58/230); reference</li> <li>40-59 y: 30% (60/196); OR 1.31 (0.86-2.00)*</li> <li>≥60 y: 23% (12/52); OR 0.89 (0.44-1.81)*</li> </ul> Sex^ <ul style="list-style-type: none"> <li>Female: 26% (87/329)</li> <li>Male: 29% (43/149)               <ul style="list-style-type: none"> <li>Female vs. male: OR 0.89 (0.58-1.36)* 0.90 (0.67-1.24)</li> </ul> </li> </ul> Race/ethnicity: <ul style="list-style-type: none"> <li>Caucasian: 15% (18/115); reference</li> <li>Hispanic: 31% (41/132); adjusted OR 1.32 (0.60-2.89)</li> </ul>	Potential recall bias; limited control for exposures; potential data discrepancies between reported OR and data (unadjusted OR re-calculated using data provided in Table 1)

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>service; 22% other role</li> <li>14% high and moderate risk of health care exposure; 86% low risk of health care exposure 25% community exposure</li> <li>27.4% SARS-CoV-2 seropositivity</li> </ul>	<ul style="list-style-type: none"> <li>Black: 32% (28/87); adjusted OR 1.50 (0.62-3.58)</li> <li>Asian: 26% (30/114); adjusted OR 0.90 (0.39-2.07)</li> <li>Other race/ethnicity: 43% (13/30); adjusted OR 2.59 (0.86-7.73)</li> </ul> <p>HCW role<sup>^</sup></p> <ul style="list-style-type: none"> <li>Nurse: 28% (40/142)</li> <li>Physician: 25% (39/157) <ul style="list-style-type: none"> <li>Nurse vs. physician: OR 1.19 (0.71-1.98)*</li> </ul> </li> <li>Ancillary service: 28% (20/72)</li> <li>Other role: 29% (31/107)</li> </ul> <p>PPE<sup>^</sup></p> <ul style="list-style-type: none"> <li>N95 only (yes vs. no): 25% (19/76); OR 0.87 (0.50-1.54)</li> <li>Surgical mask only (yes vs. no): 36% (39/109); OR 1.70 (1.08-2.69)</li> <li>N95 and surgical mask (yes vs. no): 25% (90/361); OR 0.64 (0.41-1.00)</li> <li>Face shield and goggles (yes vs. no): 23% (77/329); OR 0.55 (0.36-0.84)</li> <li>No PPE: 50% (1/2)</li> <li>N95 only vs. surgical mask only: OR 0.60 (0.31-1.15)*</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>High/moderate risk (prolonged close contact with patient with COVID-19 with HCW or patient not wearing face mask or aerosol-generating procedure without eye, nose or mouth protection): 38% (25/65)</li> <li>Low risk: 25% (105/413) <ul style="list-style-type: none"> <li>High/moderate vs. low risk: adjusted OR 2.00 (0.99 to 4.25)</li> </ul> </li> </ul>	
<p>von Freyburg et al, 2020 (108)</p> <p>Cross-sectional</p> <p>Germany (Dachau); single hospital; 3-5 and April 2020</p>	<p>1170 HCWs</p> <ul style="list-style-type: none"> <li>Age, sex not reported</li> <li>17.8% physician, 35.3% nurse, 43.1% nonmedical staff; 3.8% other</li> </ul>	<p>Incidence of SARS-CoV-2 seropositivity:</p> <ul style="list-style-type: none"> <li>Physician: 3.8% (8/208)</li> <li>Nurse: 9.7% (40/413)</li> <li>Nonmedical: 1.6% (8/505)</li> <li>Other: 4.5% (2/44)</li> </ul> <p>OR for SARS-CoV-2 seropositivity Nurse vs. physician: 2.68 (1.23-5.84)*</p>	<p>No information on clinical outcomes of infection; limited information on demographic and no information on clinical characteristics of HCWs</p>
<p>Wan et al 2021 (24)</p>	<p>1174 HCWs with work-related COVID-19 exposure</p>	<p>Age</p> <ul style="list-style-type: none"> <li>≤24 y: 0.6% (1/157); reference</li> <li>25-34 y: 1.1% (8/759); OR 1.66 (0.21-13.38)*</li> </ul>	<p>No control for confounders; imprecise estimates</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<p>Cross-sectional</p> <p>Malaysia; university medical center; 6 March to 20 August 2020</p> <p><b>Added for Update Alert #9</b></p>	<ul style="list-style-type: none"> <li>Median age 30 y</li> <li>72% female</li> <li>47% nurse, 28% physician, 22% allied health, 3% ancillary personnel</li> <li>1.0% SARS-CoV-2 infection (PCR)</li> </ul>	<ul style="list-style-type: none"> <li>35-44 y: 1.5% (3/204); OR 2.33 (0.24-22.60)*</li> <li>45-54 y: 0% (0/48); OR 1.08 (0.04-26.84)*</li> <li>≥55 y: 0% (0/6); OR 8.03 (0.30-216.60)*</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>Female: 1.0% (8/841); OR 0.79 (0.24-2.64)*</li> <li>Male: 1.2% (4/333); reference</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse: 1.1% (6/551); OR 1.78 (0.36-8.86)*</li> <li>Physician: 0.6% (2/325); reference</li> <li>Allied health: 1.2% (3/259); OR 1.89 (0.31-11.41)*</li> <li>Ancillary personnel: 2.6% (1/39); OR 4.25 (0.38-47.98)*</li> </ul> <p>Exposure</p> <ul style="list-style-type: none"> <li>High or moderate risk (exposed to respiratory secretions without PPE or prolonged contact with COVID-19 patient without proper PPE): 3.5% (12/342); <b>OR 62.97 (3.72-1066.70)*</b></li> <li>Low risk (close contact with COVID-19 patient while using PPE): 0% (0/832); reference</li> </ul>	
<p>Yogo et al 2020 (109)</p> <p>Cross-sectional</p> <p>USA (San Diego); 4 acute care hospitals, 1 inpatient behavioral health hospital, 3 skilled nursing facilities; 20 May to 8 June 2020</p>	<p>1770 HCWs in high-risk settings</p> <ul style="list-style-type: none"> <li>Mean age not reported; 45% 18-35 y, 26% 36-45 y, 18% 46-55 y, 8% 56-65 y, 2% &gt;65 y</li> <li>75% female</li> <li>64% nurse, 9% nursing assistant, &lt;1% nurse practitioner, 6% physician, 6% phlebotomist, 7% respiratory therapist, 2% social worker, 4% technician, 1% therapist, 1% other role</li> <li>2.3% SARS-CoV-2 seropositivity or infection (PCR)</li> </ul>	<p>Age</p> <ul style="list-style-type: none"> <li>18-35 y: reference</li> <li>36-45 y: adjusted OR 0.47 (0.17-1.33)</li> <li>46-55 y: adjusted OR 0.50 (0.16-1.59)</li> <li>56-65 y: adjusted OR 0.32 (0.04-2.50)</li> <li>&gt;65 y: adjusted OR 1.93 (0.25-14.80)</li> </ul> <p>Sex</p> <ul style="list-style-type: none"> <li>Female vs. male: adjusted OR 1.00 (0.40-2.51)</li> </ul> <p>Race/ethnicity</p> <ul style="list-style-type: none"> <li>Caucasian: reference</li> <li>African American/Black: adjusted OR 1.32 (0.15-11.47)</li> <li>Asian: adjusted OR 1.16 (0.41-3.31)</li> <li>Hispanic/Latino: <b>adjusted OR 2.79 (1.02-7.65)</b></li> <li>Other: adjusted OR 2.85 (0.62-13.15)</li> </ul> <p>HCW role</p> <ul style="list-style-type: none"> <li>Nurse: reference</li> <li>Nursing assistant: adjusted OR 0.65 (0.17-2.45)</li> <li>Physician: adjusted OR 1.19 (0.19-7.38)</li> <li>Technician: adjusted OR 1.65 (0.38-7.15)</li> <li>Therapist: adjusted OR 0.78 (0.01-70.94)</li> </ul> <p>PPE (exposure without PPE)</p>	<p>Potential recall bias; participation rate 45%</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>No: reference</li> <li>Yes: adjusted OR 1.17 (0.42-3.26)</li> </ul>	
Zhang G et al, 2020 (75)  Cross-sectional  China (Wuhan); 1 university hospital; 25 December 2019 to 31 January 2020	237 HCWs with confirmed contact with a COVID-19 infected patient <ul style="list-style-type: none"> <li>Age, sex not reported</li> <li>28% physician, 72% nurse</li> <li>31% respiratory department, 31% hepatobiliary surgery, 38% neurology</li> </ul>	Incidence of SARS-CoV-2 infection (PCR) <ul style="list-style-type: none"> <li>Physician: 14.9% (10/67)</li> <li>Nurse: 1.2% (2/170)</li> <li>Respiratory department: 0% (0/73)</li> <li>Hepatobiliary surgery: 14.9% (10/74)</li> <li>Neurology: 2.2% (2/90)</li> </ul>	Limited information on demographic characteristics; no control for confounders
Zheng et al, 2020 (110)  Cross-sectional  China (Wuhan); throughout Wuhan area; from March 26, 2020	117,100 HCWs <ul style="list-style-type: none"> <li>Age not reported</li> <li>72% female</li> <li>37% physician, 49% nurse, 14% medical staff</li> <li>2.1% (2,457/117,100) diagnosed with COVID-19</li> </ul>	OR (95% CI) for COVID-19 <ul style="list-style-type: none"> <li>Female vs. male: 1.02 (0.94-1.12)</li> <li>Nurse vs. physician: 1.16 (1.07-1.27)</li> <li>Nurse vs. medical staff: 1.03 (0.91-1.16)</li> </ul> Prevalence of COVID-19 <ul style="list-style-type: none"> <li>General hospital: 2.9% (2,193/74,944)</li> <li>Specialized hospital: 0.80% (140/17,565)</li> <li>Community hospital: 0.50% (124/24,591)</li> </ul>	COVID-19 cases based on requests for financial assistance; denominators based on epidemiological data; limited information on clinical outcomes of COVID-19 infections
Zhou F et al, 2020 (111)  Cross-sectional  China (Wuhan); single hospital; 16 to 25 March 2020	3674 HCWs <ul style="list-style-type: none"> <li>Mean age not reported; 38% age 18-30 y, 45% age 31-50 y; 17% age &gt;50 y</li> <li>68% female</li> <li>65% health care role, 14% administrative staff, 21% clinical support staff</li> </ul>	Incidence of SARS-CoV-2 infection (PCR, seropositivity, or CT scan suggesting infection) <ul style="list-style-type: none"> <li>Female: 3.3% (81/2486)</li> <li>Male: 3.8% (45/1188)               <ul style="list-style-type: none"> <li>Female vs. male: OR 0.86 (0.59-1.24)</li> </ul> </li> <li>Age 18-30: 2.5% (35/1378)</li> <li>Age 31-50: 3.3% (55/1656)</li> <li>Age &gt;50: (36/640)</li> <li>Health care role: 3.0% (73/2406)</li> <li>Administrative staff: 2.4% (12/505)</li> <li>Clinical staff: 5.4% (41/763)</li> <li>High risk vs. low-risk setting: <math>p=0.39</math></li> <li>Attended vs. did not attend training early in the COVID-19 outbreak: <b><math>p&lt;0.01</math></b></li> </ul>	No control for confounders



Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
<b>Case-control studies</b>			
Celebi et al, 2020 (112)  Case-control  Population subset of Celebi 2020 prospective cohort, see above	47 HCWs and 134 controls <ul style="list-style-type: none"> <li>• Mean age 35 y (cases)</li> <li>• 68% female (cases)</li> <li>• 15% physician, 60% nurse, 25% cleaning personnel</li> </ul>	Unadjusted OR (95% CI) for SARS-CoV-2 infection* <ul style="list-style-type: none"> <li>• Female vs. male: 1.27 (0.63-2.57)</li> <li>• Nurse vs. physician: 2.45 (0.98-6.11)</li> <li>• Entered room with suspected or confirmed COVID-19 patient (yes vs. no): 0.58 (0.28-1.20)</li> <li>• Examined (touched) suspected or confirmed COVID-19 patient (yes vs. no): <b>0.42 (0.21-0.85)</b></li> <li>• Obtained a respiratory sample from a suspected or confirmed COVID-19 patient (yes vs. no): 0.50 (0.22-1.13)</li> <li>• Intubated a suspected or confirmed COVID-19 patient or present in the room during intubation (yes vs. no): 0.79 (0.30-2.09)</li> <li>• Resuscitated a suspected or confirmed COVID-19 patient or present in the room during resuscitation (yes vs. no): 1.25 (0.45-3.48)</li> <li>• Entered the ICU room of a suspected or confirmed patient with mechanical ventilation (yes vs. no): 0.72 (0.32-1.66)</li> <li>• Present in the operation room during a surgical procedure on suspected or confirmed COVID-19 patient (yes vs. no): 0.56 (0.03-11.83)</li> <li>• Improper use of PPE while caring for suspected or confirmed COVID-19 patient (yes vs. no): <b>5.29 (1.64-17.11)</b></li> <li>• Made mistake while implementing infection control precautions (yes vs. no): 2.98 (0.58-15.29)</li> <li>• Stayed in personnel break room with an HCW without wearing medical mask for more than 15 minutes (yes vs. no): <b>6.18 (2.98-12.83)</b></li> <li>• Consumed food within one meter of an HCW (yes vs. no): <b>2.91 (1.43-5.92)</b></li> <li>• Failed to keep a safe social distance from an HCW (yes vs. no): <b>2.54 (1.28-5.03)</b></li> </ul> Adjusted OR (95% CI) for SARS-CoV-2 infection <ul style="list-style-type: none"> <li>• Improper use of PPE while caring for suspected or confirmed COVID-19 patient (yes vs. no): <b>11.30 (2.18-59)</b></li> <li>• Stayed in same personnel break room as an HCW without wearing medical mask for more than 15 minutes (yes vs. no): <b>7.42 (1.90-29)</b></li> </ul>	Potential recall bias; imprecision in adjusted risk estimates
Chatterjee et al, 2020 (113)  Case-control  India (throughout); 8 to 23 May 2020	378 HCW cases and 373 HCW controls <ul style="list-style-type: none"> <li>• Mean age 35 y (cases)</li> <li>• 42% female (cases)</li> </ul>	Unadjusted OR (95%) for SARS-CoV-2 infection, <ul style="list-style-type: none"> <li>• ICU with suspected or confirmed COVID-19 case on ventilator, yes vs. no: 1.36 (0.88-2.1)</li> <li>• Performing endotracheal intubation vs. not performing: <b>2.5 (1.13-5.5)</b></li> <li>• Respiratory tract suctioning (yes vs. no): 0.73 (0.37-1.45)</li> </ul>	Potential recall bias; 60% of eligible cases included

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
	<ul style="list-style-type: none"> <li>29% physician, 44% nurse/nurse midwife, 4% housekeeping, 11% lab or operating room technician, 3% security guard, 9% other</li> </ul>	<ul style="list-style-type: none"> <li>Handling clinical specimen (stool, blood, bronchoalveolar lavage) (yes vs. no): 0.89 (0.57-1.39)</li> <li>Doctor vs. laboratory technician/operation theatre technician: 0.94 (0.57-1.57)</li> <li>Nurse vs. laboratory technician/operation theatre technician: 1.2 (0.74-1.96)</li> <li>No PPE use vs. PPE use all/most cases: <b>3.72 (2.12-6.52)</b> <ul style="list-style-type: none"> <li>Any mask vs. no mask: <b>0.35 (0.22-0.57)</b></li> <li>Cap vs. no cap: <b>0.70 (0.52-0.94)</b></li> <li>Gown vs. no gown: <b>0.62 (0.46-0.83)</b></li> <li>Shoe cover vs. no shoe cover: 1.05 (0.78-1.42)</li> <li>Face shield or goggles vs. none: 0.81 (0.61-1.08)</li> <li>Gloves vs. no gloves: <b>0.38 (0.26-0.55)</b></li> </ul> </li> </ul> <p>Adjusted OR (95% CI) for SARS-CoV-2 infection</p> <ul style="list-style-type: none"> <li>Male vs. female: <b>1.93 (1.21-3.07)</b></li> <li>Never used PPE vs used PPE: <b>5.33 (2.27-12.48)</b></li> <li>Performing endotracheal intubation vs. not performing: <b>4.33 (1.16-16.07)</b></li> </ul>	
<p>Khalil et al, 2020 (114)</p> <p>Case-control</p> <p>Bangladesh; multiple hospitals (number not reported); May to June 2020</p>	<p>98 COVID-19 positive HCWs and 92 COVID-19 negative controls</p> <ul style="list-style-type: none"> <li>Mean age 33 y (cases)</li> <li>22% female (cases)</li> <li>100% physicians</li> </ul>	<p>Risk of COVID-19 (defined as positive PCR), unadjusted OR (95% CI):</p> <ul style="list-style-type: none"> <li>Age ≥35 years vs. &lt;35 years: 0.67 (0.35-1.28)</li> <li>Female vs. male: 0.66 (0.44-1.69)</li> <li>Workplace setting (reference inpatient) <ul style="list-style-type: none"> <li>Outpatient: 0.64 (0.31-1.29)</li> <li>ED: 0.94 (0.41-2.15)</li> <li>ICU: 1.24 (0.40-3.85)</li> <li>Tertiary care: 0.95 (0.31-2.88)</li> </ul> </li> <li>Received formal training on PPE (yes vs. no): 1.67 (0.89-3.12)</li> <li>Place of contact with COVID-19 (reference hospital environment) <ul style="list-style-type: none"> <li>Suspected contact with COVID-19 patient or health worker: 1.51 (0.67-3.42)</li> <li>Confirmed contact with COVID-19 patient or health worker: 0.82 (0.39-1.69)</li> <li>Community contact: 1.14 (0.24-5.43)</li> <li>Unknown contact: 0.35 (0.13-0.94)</li> </ul> </li> <li>Participated in direct COVID-19 patient care (yes vs. no): 0.94 (0.50-1.77)</li> <li>Performed aerosol-generating procedure on COVID-19 patient (yes vs. no): 1.30 (0.64-2.37)</li> <li>Direct contact with contaminated fomite (yes vs. no): 1.74 (0.90-3.35)</li> <li>Wore PPE (yes vs. no): 0.15 (0.02-1.21)</li> <li>Single-use gloves (yes vs. no): 1.01 (0.38-2.68)</li> <li>Medical/surgical mask (yes vs. no): 1.40 (0.30-6.42)</li> <li>Face shield/goggles (yes vs. no): <b>0.44 (0.23-0.84)</b></li> <li>Disposable gown (yes vs. no): 1.08 (0.53-2.20)</li> </ul>	<p>Proportion of eligible HCW cases included not reported; method of identifying controls unclear; imprecise estimates; potential recall bias; no control for confounders</p>

Study, Year (Reference) Study Design Setting and Study Dates	Population Characteristics	Outcomes	Limitations
		<ul style="list-style-type: none"> <li>• Proper donning and doffing of PPE (yes vs. no): 0.57 (0.29-1.14)</li> <li>• Followed hand hygiene –               <ul style="list-style-type: none"> <li>○ During patient care (yes vs. no): 0.78 (0.23-2.67)</li> <li>○ During procedure (yes vs. no): 3.28 (0.66-12.30)</li> <li>○ After body fluid exposure (yes vs. no): 0.28 (0.06-1.45)</li> <li>○ After touching fomites (yes vs. no): 1.58 (0.49-5.04)</li> </ul> </li> <li>• Decontaminated surroundings (yes vs. no): <b>0.39 (0.18-0.87)</b></li> </ul>	

Abbreviations: BAME = Black, Asian and minority ethnic; BCG = bacille Calmette-Guerin; CPR = cardiopulmonary resuscitation ; ED = emergency department; HCW = health care worker; HR = hazard ratio; ICU = intensive care unit; IRR = incidence rate ratio; MMR = measles, mumps and rubella; NICU = neonatal intensive care unit; ob/gyn = obstetrics and gynecology; OR = odds ratio; PAPR = powered air purifying respirator; PCR = polymerase chain reaction; PICU = pediatric intensive care unit; PPE = personal protective equipment; RR = relative risk; VHA = Veterans Health Administration; y=years

\*Unadjusted OR calculated based on available data.

^Variable was not retained in the multivariate model

**Supplement Table 2. Demographic characteristics and HCW role or position and risk for infection with SARS-CoV-2 in HCWs**

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
Abbas et al 2021 (4)  <b>Added for Update Alert #9</b>	Age (per year): adjusted OR 1.00 (0.99-1.01)	Female vs. male: <b>adjusted OR 0.60 (0.49-0.73)</b>	--	--	--	--	Clinical vs. nonclinical: <b>adjusted OR 1.27 (1.06-1.53)</b>
Abdelmoniem et al 2020 (30)	Mean 31.7 (cases) vs. 31.9 years (non-cases), p=0.86	Female vs. male: OR 1.35 (0.61-2.97)	--		9.4% (7/74)	16.8% (15/89) Nurse vs. physician: OR 1.95 (0.75-5.05)	Cleaner/transportation: 20.8% (5/24)  Radiology/lab: 0% (0/2)  Administration: 14.3% (2/14)
Akinbami et al 2020 (55)	18-24 y: 7.9% (54/686)  25-34 y: 6.9% (337/4,885)  35-44 y: 7.0% (278/3,977)  45-59 y: 6.9% (360/5,222)  60-64 y: 7.5% (83/1,106)  ≥65 y: 3.5% (18/521); vs. 18-24 y, <b>adjusted OR 0.41 (0.23-0.72)</b>	Female vs. male: <b>adjusted OR 0.79 (0.65-0.95)</b>	Non-Hispanic black vs. white: 16.3% (196/1200); <b>adjusted OR 1.92 (1.52-2.43)</b>  Non-Hispanic Asian vs. white: 7.3% (80/1097); adjusted OR 0.97 (0.74-1.26)  Hispanic vs. white: 6.8% (30/440); adjusted OR 1.06 (0.76-1.48)  Other race/ethnicity vs. white: 7.2% (29/404); adjusted OR 0.95 (0.67-1.35)		6.1% (140/2,297)	Nurse: 7.7% (495/6,426) Nurse vs. physician; <b>adjusted OR 1.52 (1.18-1.95)</b>  Nurse assistant: 12.8% (82/641) Nurse assistant vs. physician: <b>adjusted OR 1.88 (1.24-2.83)</b>	Pharmacist: 4.4% (14/321)  Physical therapist: 10.6% (25/235)  Respiratory therapist: 8.3% (34/409)  Administration/clerk: 8.0% (77/964)  Clinical technician: 5.5% (20/365)  Imaging technician: 4.2% (30/719)  Laboratory technician: 3.4% (10/293)  Midlevel clinician: 4.6% (26/566)  Other HCW role: 7.0% (62/888)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
Akinbami et al 2021(5)  <i>Hospital HCWs</i>  <b>Added for Update Alert #9</b>	18-24 y: reference  25-34 y: <b>adjusted OR 0.53 (0.31-0.92)</b>  35-44 y: adjusted OR 0.46 (0.20-1.04)  45-59 y: <b>adjusted OR 0.50 (0.26-0.96)</b>  60-64 y: <b>adjusted OR 0.48 (0.23-0.97)</b>  ≥65 y: <b>adjusted OR 0.26 (0.11-0.63)</b>	Female: 3.1% (212/6788); adjusted OR 0.85 (0.59-1.21)  Male: 2.8% (44/1582); reference	White: 2.7% (182/6829); reference  Black: 7.0% (20/284); <b>adjusted OR 2.83 (1.77-4.51)</b>  Asian: 3.2% (10/316); adjusted OR 1.16 (0.58-2.29)  Hispanic: 5.6% (31/554); <b>adjusted OR 1.70 (1.35-2.13)</b>  Other race/ethnicity: 5.8% (11/191); adjusted OR 1.94 (0.89-4.22)	--	2.2% (22/1001)	Nurse: 4.2% (114/2733) Nurse vs. physician: <b>adjusted OR 1.66 (1.07-2.57)</b>  Nurse assistant: 5.9% (23/392) Nurse assistant vs. physician: adjusted OR 1.44 (0.85-2.43)	Physician assistant: 1.0% (1/100) vs. physician; adjusted OR 0.68 (0.22-2.12)  Reception/medical assistant: 4.1% (12/296) vs. physician; adjusted OR 2.04 (1.18-3.52)
Akinbami et al 2021 (5)  <i>Nursing home HCWs</i>  <b>Added for Update Alert #9</b>	18-24 y: reference  25-34 y: adjusted OR 1.27 (0.59-2.73)  35-44 y: adjusted OR 1.21 (0.44-3.37)  45-59 y: adjusted OR	Female: 12.4% (157/1267); <b>adjusted OR 0.66 (0.46-0.94)</b>  Male: 17.2% (39/227); reference	White: 10.2% (119/1165); reference  Black: 27.6% (24/87); adjusted OR 1.60 (0.84-3.05)  Asian: 21.4% (6/28); adjusted OR 1.90 (0.99-3.66)	--	--	Nurse: 15.3% (63/413); adjusted OR 1.78 (0.93-3.42)  Nurse assistant: 19.9% (59/296); adjusted OR 2.06 (1.06-4.00)	Occupational/physical/speech therapist: 9.8% (16/163); reference

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	1.61 (0.68-3.78)  60-64 y: adjusted OR 1.94 (0.89-4.21)  ≥65 y: adjusted OR 1.75 (0.59-5.20)		Hispanic: 21.5% (28/130); adjusted OR 1.90 (0.99-3.66)  Other race/ethnicity: 20.0% (8/40); <b>adjusted OR 2.57 (1.25-5.28)</b>				
Al Maskari et al, 2020 (76)	--	Female vs. male: <b>OR 4.45 (3.32-5.96)</b>	--		4.7% (26556)	4.1% (77/1870) Nurse vs. physician: OR 0.88 (0.56-1.38)	Paramedic: 2.8% (27/969)  Administrative/support staff: 5.6% (74/1308)
Algado-Selles et al 2020 (56)	<60 y vs ≥60 y: OR 1.2 (0.7-2.0)	Female vs. male: OR 1.2 (0.8-1.8)	--		28.2% (60/213)	18.1% (49/270) Nurse vs. physician: <b>OR 0.57 (0.37-0.87)</b>	Nurse assistant/technician: 14.6% (27/185)  Other role: 17.2% (20/116)
Alkurt et al 2021 (6)  <b>Added for Update Alert #9</b>	--	OR 1.16 (0.77-1.74)	--	--	10.8% (30/279)	16.8% (45/268) Nurse vs. physician: <b>OR 1.67 (1.02-2.75)</b>	Ward clerk and security: 11.6% (15/129) Lab and radiology technician: 6.5% (7/107) Cleaning staff: 12.5% (12/96) Administrative staff: 18.9% (10/53)
Amendola et al, 2020 (77)	--	Female vs. male: OR <b>0.44 (0.21-0.96)</b>	--		4.7% (10/214)	6.0% (13/216) Nurse vs. physician: OR 1.31 (0.56-3.05)	Other health technicians: 4.2% (5/117)  Non-clinical HCW: 5.2% (6/116)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
Bahrs et al., 2021 (31)	--	Female vs. male: OR 0.93 (0.33-2.64)	--	--	4.8% (5/103)	Nurse or care worker: 2.3% (5/215) Nurse or care worker vs. physician: adjusted OR 0.38 (0.10-1.34)	Cleaner: 16.7% (1/6)  Reception staff: 5.3% (1/19)  Administrative staff: 3.3% (6/180)  Other role: 0% (0/130)
Bai et al, 2020 (57)	Mean age: 36.6 y in cases vs. 30.5 in non-cases, <b>P=0.006</b>	Female vs. male: OR 0.78 (0.23-2.64)	--	--	--	Nurse vs. physician: OR 0.65 (0.18-2.34)	--
Baker et al 2021 (79)	≥60: reference  50-59: adjusted OR 0.8 (0.6-1.2)  40-49: adjusted OR 0.9 (0.7-1.4)  30-39: adjusted OR 1.0 (0.7-1.4)  <30: adjusted OR 1.2 (0.8-1.7)	Female vs. male: adjusted OR 0.77 (0.59-1.00)	White: 4.3% (226/5263); reference  Black: 8.3% (238/2860); <b>adjusted OR 2.1 (1.7-2.6)</b>  Asian: 5.3% (60/1133); adjusted OR 1.3 (0.9-1.7)  Multiracial: 7.6% (10/132); adjusted OR 1.8 (0.8-3.5)	--	5.0% (87/1753)	5.9% (177/2976) Nurse vs. physician: OR 1.21 (0.93-1.58)	Other HCW role with no patient contact: 5.5% (100/1812)  Other direct care: 6.2% (88/1423)  Advanced practice provider: 5.2% (36/698)  Nurse tech: 8.1% (28/346) Radiology tech: 7.0% (21/302)
Banjeree et al 2020 (58)	--	Female vs. male: OR 0.85 (0.49-1.45)	--	--	--	--	--
Barallat et al 2020 (78)	35-54 vs. 18-34 y: OR 0.86 (0.72-1.03)	Female vs. male: OR 0.90 (0.75-1.08)	--	--	27.0% (192/1821)	Nurse: 9.6% (216/2243) Nursing assistant: 11.9% (85/832)	Health care support services: 4.6% (33/429)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	≥55 vs. 18-34 y: OR 0.98 (0.79-1.21)					Nurse vs. physician: OR 0.90 (0.74-1.11) Nurse or nursing assistant vs. physician: OR 0.92 (0.76-1.11)	Administration: 10.5% (75/1181)  Other role: 7.2% (51/616)
Barrett et al 2020 (32)	--	--	--		2.4% (5/210)	11.1% (25/225) Nurse vs. physician: <b>OR 5.12 (1.92-13.65)</b>	Other HCW role: 9% (10/111)
Bayle et al 2021 (7)  <b>Added for Update Alert #9</b>	--	Female vs. male: OR 1.05 (0.38-2.92)	--	--	--	Nurse and nursing assistant: 15.2% (23/151) Nurse and nursing assistant vs. medical staff: OR 2.38 (0.13-43.64)*	Medical staff: 0% (0/6)  Clerical staff: 0% (0/20)  Allied health: 13.3% (2/15) Environmental staff: 12.1% (4/33)  Food service: 25.0% (3/12)
Blairon et al, 2020 (33)	--	--	--		11.8% (38/323)	19.2% (113/588) Nurse vs. physician: OR <b>1.78 (1.20-2.65)</b>	Pharmacist or administrative staff: 9.1% (29/320)  Maintenance or technical worker: 16.4% (22/134)  Imaging or lab worker: 6.6% (2/31)
Buchtele et al, 2020 (59)	--	--	--		0% (0/5)	27.8% (5/18) Nurse vs. physician: OR 4.48 (0.21-65.60)	Cleaning staff: 0% (0/3)
Calcagno et al 2020 (34)	--	--	--		7.8% (55/700)	Nurse: 8.2% (150/1833) Nurse vs. physician: OR 1.05 (0.76-1.44)	Health care personnel: 6.7% (23/343)  Pharmacist: 3.4% (1/29)



Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
						Nurse assistant: 9.2% (44/476) Nurse or nurse assistant vs. physician: OR 1.08 (0.79-1.47)	Administrative employee: 3.3% (18/539)  Technical personnel: 6.9% (15/216)  Laboratory personnel: 11.5% (18/157)
Celebi et al, 2020 (112)	--	Female vs. male: OR 1.27 (0.63-2.57)	--		--	Nurse vs. physician: OR 2.45 (0.98-6.11)	--
Chatterjee et al, 2020 (113)	Mean age: 34.7 y in cases vs. 33.5 y in non-cases	Male vs. female: adjusted OR <b>1.93 (1.21-3.07)</b>	--		--	--	--
Clifton et al 2021 (8)  <b>Added for Update Alert #9</b>	--	Female vs. male: OR 0.74 (0.13-4.10)	--	--	Physician or physician assistant: 0% (0/25)	Nurse: 1.0% (1/100) Nurse vs. physician or physician assistant: OR 0.77 (0.03-19.44)	Medical support: 1.1% (1/94)  Other role: 3.4% (4/117)
Colaneri et al 2020 (60)	Mean age: 46.3 y in cases vs. 44.9 in non-cases, p=0.43	Female vs. male: OR 0.73 (0.52-1.02)	--		12.1% (54/446)	11.1% (63/568) Nurse vs. physician: OR 0.91 (0.62-1.33); adjusted IRR 1.49 (0.97-2.30)	Health care assistant: 13.3% (34/255)  Administrative staff: 7.3% (13/178)
Comelli et al 2021 (9)  <b>Added for Update Alert #9</b>	Mean age: 45 y in cases vs. 44 y in non-cases, p=0.01	Female vs. male: 0.94 (0.73-1.21)	--	--	--	--	--
Dacosta-Urbieta et al, 2020 (80)	--	--	--		Physician/resident: 3.8% (3/80)	Nurse/nurse's aide: 4.8% (4/83)	--

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
						Nurse/nurse's aide vs. physician/resident: OR 1.30 (0.28-6.00)	
Dalla Volta et al, 2020 (81)	--	--	--		Physician/resident: 20.7% (6/29)	5.4% (2/37) Nurse vs. physician/resident: OR 0.22 (0.04-1.18)	Administrative: 50% (2/4)
Davido et al 2021 (10)  <b>Added for Update Alert #9</b>	>44 vs. <44: <b>adjusted OR 6.7 (1.7-37.7)</b>	Female vs. male: adjusted OR 1.25 (0.42-5.00)	--	--	Physician: 22.2% (4/18)	Nurse or nursing assistant: 36.2% (17/47); vs. physician: OR 1.98 (0.56-7.00)	Support staff: 28.6% (6/21)
Dillner et al 2021 (11)  <b>Added for Update Alert #9</b>	< 29 y: 16.4% (249/1522); reference  30-39 y: 12.1% (383/3172); <b>OR 0.70 (0.59-0.83)*</b>  40-49 y: 11.4% (370/3238); <b>OR 0.66 (0.55-0.78)*</b>  50-59 y: 10.2% (313/3066); <b>OR 0.58 (0.49-0.70)*</b>  ≥60 y: 8.6% (166/1930);	--	--	--	--	--	--

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	<b>OR 0.48 (0.39-0.59)*</b>						
el-Abdellati et al, 2021 (35)	Mean 46.8 (cases) vs. 43.7 (non-cases) years	Female vs. male: OR 0.52 (0.16-1.71)	--	--	--	--	--
el-Boghdadly et al, 2020 (36)	Age (y): HR, 0.99 (0.98-1.01)	Female vs. male: adjusted HR <b>1.36 (1.01-1.82)</b>	--	--	10.6% (166/1558) Physician vs. non-physician: OR 0.94 (0.56-1.58)	--	Non-physician: 11.2% (18/160)
el-Boghdadly et al, 2020 (36)	Age (y): HR, 0.99 (0.98-1.01)	Female vs. male: adjusted HR <b>1.36 (1.01-1.82)</b>	--	--	10.6% (166/1558) Physician vs. non-physician: OR 0.94 (0.56-1.58)	--	Non-physician: 11.2% (18/160)
Eyre et al 2020 (83)  <i>Seropositive or PCR</i>	Per 10 years: OR 0.95 (0.90-1.00)	Female vs. male: OR 0.88 (0.76-1.01)	White: 9.5% (686/7237); reference  Asian: 16.8% (281/1673); <b>adjusted OR 1.51 (1.28-1.77)</b>  Black: 18.0% (71/394); <b>adjusted OR 1.66 (1.25-2.21)</b>  Chinese: 7.5% (7/93); adjusted OR 0.75 (0.34-1.67)  Mixed race/ethnicity: 11.6% (28/242); adjusted OR .23 (0.82-1.87)	--	10.9% (170/1557)	Nurse/health care assistant: 14.2% (562/3971) Nurse/health care assistant vs. physician: <b>OR 1.35 (1.12-1.61)*</b>	Administration: 7.2% (88/1218)  Laboratory staff: 8.2% (29/354)  Cleaning staff: 18.6% (60/323)  Therapist: 14.9% (47/316)  Security or catering: 11.8% (26/221)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
Eyre et al 2020 (83)  <i>Seropositive</i>	--	Male vs. female: <b>adjusted OR 1.19 (1.01-1.40)</b>	vs. <i>White</i> Asian: <b>adjusted OR 1.52 (1.29-1.80)</b>  Black: <b>adjusted OR 1.71 (1.28-2.28)</b>  Chinese: adjusted OR 0.67 (0.29-1.59)  Mixed race/ethnicity: adjusted OR 1.30 (0.86-1.97)	--	vs. <i>administration</i> Senior physician: adjusted OR 0.84 (0.54-1.31)  Junior physician: adjusted OR 1.05 (0.70-1.58)	vs. <i>administration</i> Nurse/health care assistant: adjusted OR 1.33 (0.94-1.87)	vs. <i>administration</i> Laboratory staff: adjusted OR 0.96 (0.60-1.54)  Cleaning staff: <b>adjusted OR 1.96 (1.26-3.04)</b>
Faico-Filho et al, 2020 (84)	--	--	--	--	24.2% (26/107)	Nurse or nurse technician: 40.1% (73/182)  Nurse or nurse technician vs. physician: <b>OR 2.09 (1.23-3.55)</b>	Laboratory personnel: 28.6% (4/14)  Administrative staff: 31.1% (28/90)  Logistic worker: 63.0% (17/27)
Ferreira et al 2021 (37)	--	--	--	--	<i>PCR</i> 0% (0/152)  <i>Seropositive</i> 1.0% (1/101)	<i>PCR</i> 1.2% (8/655) Nurse vs. physician: OR 4.00 (0.23-69.75)  <i>Seropositive</i> 1.9% (7/361) Nurse vs. physician: OR 1.98 (0.24-16.26)	<i>PCR</i> Allied health: 2.2% (1/446)  <i>Seropositive</i> Allied health: 1.9% (5/261)
Fletcher et al 2021 (12)  <i>Study Period 1</i>	Study 1: Mean 36 (cases) vs. 40 (non-	Female vs. male: OR 0.56 (0.24-1.30)	White: 1.6% (20/1274); reference	--	--	--	Clinical provider: 2.4% (17/708); reference

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
<p><b>Added for Update Alert #9</b></p>	cases) years, p=0.08		<p>Hispanic/Latino: 2.9% (1/34); OR 1.90 (0.25-14.58)</p> <p>Black: 4.8% (1/21); OR 3.13 (0.40-24.51)</p> <p>Asian/Pacific Islander: 0% (0/22); OR 1.36 (0.08-23.19)</p> <p>Arabic: 10.0% (1/10); OR 6.97 (0.84-57.62)</p> <p>Other race/ethnicity: 12.5% (3/24); <b>OR 8.96 (2.47-32.47)</b></p>				<p>Interprofessional: 0.8% (1/132); OR 0.31 (0.04-2.35)</p> <p>Ancillary: 1.0% (1/105); OR 0.39 (0.05-2.97)</p> <p>Nonclinical role: 1.6% (7/440); OR 0.66 (0.27-1.60)</p>
<p>Fletcher et al 2021 (12)</p> <p><i>Study Period 2</i></p> <p><b>Added for Update Alert #9</b></p>	Study 2: Mean 38.9 (cases) vs. 40.3 years, p=0.13	Female vs. male: OR 1.05 (0.72-1.53)	<p>White: 13.5% (176/1303); reference</p> <p>Hispanic/Latino: 20.5% (8/39); OR 1.65 (0.75-3.65)</p> <p>Black: 26.1% (6/23); OR 2.26 (0.88-5.81)</p> <p>Asian/Pacific Islander: 0% (4/33); OR 0.88 (0.31-2.54)</p>	--	--	--	<p>Clinical provider: 13.4% (107/800); reference</p> <p>Interprofessional: 17.5% (33/189); OR 1.37 (0.89-2.10)</p> <p>Ancillary: 10.6% (10/94); OR 0.77 (0.39-1.53)</p> <p>Nonclinical role: 14.6% (48/329); OR 1.11 (0.77-1.60)</p>

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
			Arabic: 12.5% (1/8); OR 0.91 (0.11-7.48)  Other race/ethnicity: 7.7% (3/39); OR 0.53 (0.16-1.75)				
Fusco et al, 2020 (115)	--	Female vs. male: OR 0.35 (0.03-3.43)	--		3.8% (1/26)	3.5% (2/57) Nurse vs. physician: OR 1.10 (0.10-12.70)	Other HCW role: 3.1% (1/32)
Fukuda et al 2021 (13)  <b>Added for Update Alert #9</b>	≥40 vs. <40 y: OR 1.04 (0.35-3.12)	Female vs. male: OR 1.42 (0.44-4.52)			0.4% (5/1111)	0.2% (3/1308) Nurse vs. physician: OR 1.42 (0.44-4.52)	<i>Physician reference</i> Laboratory personnel: 0% (0/236); OR 0.43 (0.02-7.72)  Paramedic: 0.6% (2/314); OR 1.42 (0.27-7.34)  Administrative staff: 0.6% (3/510); OR 1.31 (0.31-5.50)  Researcher: 0.2% (1/632); OR 0.35 (0.04-3.01)  Other role: 0% (0/36); OR 2.76 (0.15-50.78)*
Garcia et al, 2020 (62)	--	--	--		13.0% (64/491)	Nurse: 10.2% (126/1231)  Nurse supervisor: 37.5% (9/24)  Any nursing role: 10.7% (135/1255)  Nurse vs. physician, COVID-	Department head: 23.1% (9/39)  Other role: 4.4% (5/113)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
						19: OR 0.76 (0.55-1.05)*	
Garralda Fernandez et al 2021 (86)	--	Female vs. male: <b>OR 0.68 (0.54-0.85)</b>	--	--	25.4% (n/N not reported)  Physician vs. administrator: OR 2.13 (1.53-2.96)	Nurse: 19.4% (n/N not reported) Nursing assistant: 22.0% (n/N not reported)  Nurse vs. administrator: OR 1.51 (1.09-2.09)	Security: 21.1% (n/N not reported)  Technician: 18.1% (n/N not reported)  Cleaning staff: 16.9% (n/N not reported)
Goenka et al 2020 (87)	--	--	--		3.9% (10/255)	9.4% (21/224) Nurse vs. physician: adjusted OR 1.61 (0.62-4.35)	Housekeeping: 26.1% (59/226)  Technician: 12.1% (12/99)  Administration: 8.0% (6/75)  Lab assistant/pharmacist: 15.3% (11/72)  Dietician: 18.4% (9/49)  Ward executive: 7.0% (5/71)  Other role: 2.0% (1/51)
Gras-Valenti et al 2020 (63)	Age ≤24 y: 6.9% (5/72)  25-29 y: 9.4% (36/383)  30-34 y: 7.7% (29/375)	Female vs. male: OR 0.93 (0.70-1.22)	--		8.7% (85/974)	6.6% (78/1,186) Nurse vs. physician: OR 0.74 (0.53-1.01)	--

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	35-39 y: 6.4% (26/408)  40-44 y: 7.4% (36/487)  45-49 y: 5.8% (29/503)  50-54 y: 6.2% (34/553)  55-59 y: 5.6% (36/645) 60-64 y: 5.2% (36/688)  ≥65 y: 10.8% (7/65)						
Gupta et al 2021 (14)  <b>Added for Update Alert #9</b>	18-35 vs. >35: OR 1.01 (0.86-1.18)	Female vs. male: OR 0.82 (0.67-1.00)	--	--	5.4% (36/661)	9.8% (117/1198) Nurse vs. physician: OR 1.88 (1.28-2.77)	Administration: 19.6% (105/537)  Technical staff: 17.9% (71/397)  Paramedical: 17.2% (128/743)  Research staff: 14.8% (30/203)
Hall et al 2021 (15)	--	Female vs. male: <b>OR 0.84 (0.78-0.90)</b>	White: 31.1% (6969/22404); reference	Incidence of infection within 14 days (reinfection or	35.9% (999/2783)	34.4% (3751/10891) Nurse or health care assistant vs.	<i>Physician reference</i> Administration: 27.9% (1090/3903)



Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
<b>Added for Update Alert #9</b>			Mixed race: 40.8% (724/1773); <b>OR 1.53 (1.38-1.69)</b>  Asian: 45.0% (236/525); <b>OR 1.81 (1.52-2.15)</b>  Black: 32.5% (134/412); OR 1.07 (0.87-1.31)  Chinese: 42.5% (147/346); <b>OR 1.64 (1.32-2.03)</b>	new infection) per 1000 participants 18.7 vs. 98.0		physician: OR 0.94 (0.86-1.02)	Specialist: 31.6% (489/1548)  Scientist: 25.2% (225/894)  Midwife: 29.1% (189/649)  Pharmacist: 28.7% (112/390)  Estates, porters or security: 37.1% (95/256)  Other role: 30.5% (1328/4347)
Herzberg et al 2021 (88)	Per 10 years: adjusted OR 1.50 (1.19 to 1.90)	Female vs. male: adjusted OR 0.91 (0.42-2.00)	--	--	--	--	--
Houlihan et al, 2020 (39)	<30 y: 54% (31/57)  30-39 y: 49% (34/70)  40-49 y: 30% (12/30)  ≥50 y: 33% (10/30)	Female vs. male: OR 0.67 (0.38-1.20)	--		44% (32/72)	Nurse or other frontline clinical staff: 43% (46/106)  Nurse or other frontline worker vs. physician: OR 0.96 (0.52-1.75)	Other health care role: 41% (9/22)
Hunter et al, 2020 (89)	--	--	--		1.1% (3/279)	2.2% (7/317) Nurse vs. physician: OR 2.08 (0.53-8.11)	Administrative staff vs. all other employees: RR 3.1 (0.71-13.9)
Jacob et al 2021 (16)	<30 y: 5.3% (239/4545);	Female vs. male:	Race	--	3.7% (166/4499)	Nurse: 4.8% (374/7830)	Nonclinical: 3.9% (205/5289); reference

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
<b>Added for Update Alert #9</b>	<p>adjusted OR 1.3 (1.0-1.7)</p> <p>30-39 y: 4.4% (328/7454); adjusted OR 1.1 (0.9-1.4)</p> <p>40-49 y: 4.4% (228/5234); adjusted OR 1.0 (0.8-1.3)</p> <p>50-59 y: 3.9% (178/4578); adjusted OR 0.9 (0.7-1.2)</p> <p>≥60 y: 3.6% (107/2938); reference</p>	adjusted OR 0.8 (0.7-1.0)	<p>White: 3.3% (499/15157); reference</p> <p>Black: 7.3% (376/5117); adjusted OR 2.1 (1.8-2.4)</p> <p>Asian: 4.5% (107/2369); adjusted OR 1.2 (1.0-1.5)</p> <p>Unknown: 5.2% (53/1012); adjusted OR 1.8 (1.2-2.7)</p> <p>Other race: 3.6% (25/702); adjusted OR 1.3 (0.8-2.0)</p> <p>Multiracial: 5.5% (14/253); adjusted OR 1.3 (0.8-2.3)</p> <p>American Indian or Alaska Native: 4.8% (5/105); adjusted OR 1.4 (0.6-3.5)</p> <p>Native Hawaiian or other Pacific Islander: 2.9% (1/34); adjusted OR 0.8 (0.1-6.2)</p> <p>Ethnicity</p>			Nurse vs. physician: OR 1.13 (1.09-1.58)	<p>Nurse practitioner or physician's assistant: 3.5% (53/1535); adjusted OR 0.9 (0.6-1.2)</p> <p>Environmental services: 7.4% (9/122); adjusted OR 1.5 (0.8-3.1)</p> <p>Pharmacy: 3.1% (10/325); adjusted OR 0.8 (0.4-1.6)</p> <p>Physical, occupational, or speech therapist: 3.5% (17/483); adjusted OR 1.3 (0.7-2.1)</p> <p>Radiology technician: 4.8% (23/476); adjusted OR 1.0 (0.6-1.6)</p> <p>Respiratory therapist: 4.5% (18/399); adjusted OR 0.9 (0.5-1.6)</p> <p>Other direct care personnel: 5.5% (105/1914); adjusted OR 1.1 (0.9-1.4)</p> <p>Other health care professional: 2.7% (10/367); adjusted OR 0.7 (0.4-1.3)</p> <p>Unknown: 6.8% (11/162); adjusted OR 0.9 (0.4-1.8)</p>

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
			Hispanic: 5.2% (59/1126); adjusted OR 1.1 (0.8-1.5)  Non-Hispanic/Latino: 4.4% (975/22403); reference				
Jeremias et al, 2020 (90)	--	Female vs. male: OR 0.83 (0.58-117)	--		11.4% (9/79)	9.5% (99/1043) Nurse vs. physician: OR 0.82 (0.40-1.68)	Technologist: 5.8% (9/155)  Environmental worker: 12.0% (12/100)  Ancillary worker: 12.1% (39/322)
Jespersen et al, 2020 (91)	<29 y: 6.0% (116/1,916)  30-39 y: 3.8% (144/3,794)  40-49 y: 3.8% (175/4,560)  50-59 y: 3.6% (161/4,505)  ≥60 y: 2.9% (72/2,505)	Female vs. male: OR 1.00 (0.80-1.25)	--		Range (according to study site): 1.9%-12.8%	Range (according to study site): 1.24%-18.2%	Range (according to study site):  Laboratory scientist: 1.43%-12.9%  Medical secretary: 1.09%-2.52%  Other role: 0.80%-5.77%
Jones et al 2020 (92)	≤20 y: adjusted OR 1.47 (0.96-2.20)	Female vs. male: adjusted OR 1.04 (0.88-1.23)	BAME vs white: <b>adjusted OR 1.99 (1.69-2.34)</b>		Medical/dental: 8.6% (74/856)	Nurse/midwife: 10.2% (201/1962)  Nurse/midwife vs. medical/dental:	Allied health 7.5% (31/413)  Administrative/clerical: 5.9% (73/1233)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	21-30 y: <b>adjusted OR 1.64 (1.36-1.99)</b>  31-40 y: reference  41-50 y: <b>adjusted OR 1.36 (1.11-1.67)</b>  51-60 y: <b>adjusted OR 1.45 (1.17-1.80)</b>  61-70 y: adjusted OR 1.28 (0.94 to 1.73)					OR 1.21 (0.91-1.60)	Other clinical services: 12.7% (180/1420)
Kassem et al, 2020 (40)	--	Female vs. male OR 0.61 (0.20-1.86)	--		13.3% (4/30)	21.4% (6/28) Nurse vs. physician: OR 0.56 (0.14-2.25)	Patient transporters/cleaners: 33.3% (3/9)  Administrative: 42.9% (3/7)
Khalil et al, 2020 (114)	≥35 years vs. <35 years: OR 0.67 (0.35-1.28)	Female vs. male: OR 0.66 (0.44-1.69)	--		--	--	--
Krastinova et al 2020 (94)  <b>Added for 1 January 2020 update</b>	>50 y vs. ≤50 y: adjusted OR 0.69 (0.36-1.32)	Female vs. male: adjusted OR 1.20 (0.60-2.38)	--		--	--	--
Lackermair et al, 2020 (95)	--	Female vs. male: OR	--		5.6% (3/54)	--	1.0% (1/97)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
		0.19 (0.02-1.38)					
Lahner et al, 2020 (96)	--	--			4.1% (26/632)	3.8% (27/705) Nurse vs. physician: OR 0.93 (0.54-1.61)*	Other HCW role: 0.6% (5/778)
Lai et al, 2020 (65)	<45 y vs. ≥45 y: <b>OR 0.32 (0.21-0.48)</b>	Female vs. male: OR 0.91 (0.60-1.39)	--		--	Nurse vs. physician: OR 1.16 (0.73-1.84)	Health care assistant vs. physician: OR 0.59 (0.33-1.04)
Leeds et al, 2020 (41)	Age: adjusted 1.01 (0.99-1.03)	Female vs. male: adjusted 0.97 (0.56-1.69)	BAME vs. white: 1.08 (0.56-2.04)		--	--	Frontline worker vs. other worker: adjusted 0.79 (0.53-1.17)
Lombardi et al, 2020 (97)	<30 y: 11.7% (29/248)  30-39 y: 8.8% (34/387)  40-49 y: 8.0% (26/326)  50-59 y: 7.9% (35/444)  ≥60 y: 8.3% (14/168)	Female vs. male: OR 0.83 (0.58-1.18)	--		Physician (including residents): 10.6% (62/582)	Nurse/midwife: 8.2% (43/522)  Nurse vs. physician: OR 0.75 (0.50-1.13)	Health care assistant: 8.0% (13/162)  Health technician: 9.4% (16/170)  Clerical worker, technician: 2.9% (4/137)
Lumley et al, 2020 et al (42)	Median 38 vs. 38-41 y (positive at baseline vs. not positive at baseline)	Female vs. male: <b>OR 0.85 (0.75-0.97)</b>	Asian vs. white: <b>OR 1.97 (1.70-2.28)</b>  Black vs. white: <b>OR 2.25 (1.75-2.89)</b>	vs. <i>negative</i> Anti-spike IgG positive: <b>adjusted IRR 0.3 (0.03-0.44)</b>  Anti-nucleocapsid IgG positive:	9.9% (184/1860)	Nurse or health care assistant: 12.3% (555/4528)  Nurse or health care assistant vs. physician: <b>OR 1.27 (1.07-1.52)</b>	Administrative staff: 6.1% (95/1557)  Medical or nursing student: 5.8% (36/620)  Laboratory staff: 8.0% (36/452)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
			Chinese vs. white: <b>OR 0.89 (0.45-1.75)</b>	<b>adjusted IRR 0.11 (0.03-0.45)</b>  Both anti-spike and anti-nucleocapsid IgG positive: <b>adjusted IRR 0.06 (0.01-0.46)</b> Either anti-spike or anti-nucleocapsid positive: adjusted IRR 0.42 (0.10-1.69)			Physical, occupational or speech therapist: 9.6% (37/386)  Porter or domestic worker: 15.4% (58/377)  Security, estates, or catering staff: 8.5% (23/271)
Maltezou et al, 2020 (43)	--	Female vs. male: <b>adjusted OR 0.55 (0.31-0.96)</b>	--		--	--	Administrative role vs other role: <b>adjusted OR 3.06 (1.43-6.55)</b>
Martin et al, 2020 (98)	--	Female: 13.0% (31/239) Male: 11.5% (10/87) Female vs. male: OR 1.15 (0.54-2.45)	--		11.8% (10/85)	12.7% (19/150) Nurse vs. physician: OR 1.09 (0.48-2.46)	Care assistant: 14.8% (4/27)  Paramedical staff: 15.1% (5/33)  Administrative staff: 0.4% (1/25)  Cleaning staff: 33.3% (2/6)  COVID-19 unit: 14.4% (31/215)  COVID-19 ICU: 5.7% (3/53)  ED: 12.1% (7/58)
Milazzo et al 2021 (44)	Per 1 year or more of increase:	Female vs. male: adjusted OR	--	--	4.1% (8/194)	2.8% (6/214) Nurse vs. physician:	Health care service worker: 1.6% (1/63)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	adjusted OR 0.99 (0.95-1.03)	1.26 (0.41-3.85)				adjusted OR 0.71 (0.22-2.27)	Health service assistant: 5.3% (4/76)  Socio-administrative staff: 6.9% (4/58)
Moncunill et al 2021 (99)	Per year: OR 0.98 (0.95-1.02)	Female vs. male: OR 1.27 (0.50-3.24)	--	--	Physician vs. other HCW role: OR 2.77 (0.30-25.25)	Nurse/auxiliary services vs. other HCW role: OR 5.54 (0.72-42.55)	Technician vs. other HCW role: <b>OR 13.03 (1.47-116)</b>
Moscola et al, 2020 (66)	Adjusted RR (95% CI) vs. age 18-39 years: 40-49: 1.0 (0.97-1.02)  50-59: 0.99 (0.97-1.02)  60-69: 1.00 (0.98-1.03)  ≥70: 1.00 (0.94-1.07)	Female vs. male: adjusted RR, 1.05 (1.01-1.09)	American Indian: 17.0% (32/188)  Asian: 11.9% (722/6082)  Black: 23.5% (1513/6444)  Hispanic: 19.6% (1108/5653)  Pacific Islander: 17.2% (35/203)  White: 9.6% (2057/21 428)  Other/multiracial: 16.9% (56/331)		Physician vs. allied health: adjusted RR, 0.98 (0.95-1.00)	Nurse vs. allied health: adjusted RR, 1.00 (0.98-1.01)  Nurse vs. physician: OR 1.58 (1.38-1.79)	Adjusted RR (95% CI) vs. allied health:  Administrative and clerical: 1.01 (0.99-1.02)  Service/ maintenance: 1.03 (1.00-1.05)
Mukhtar et al 2021 (17)  <b>Added for Update Alert #9</b>	Mean 33.4 (cases) vs. 32.8 (non-cases) years, p=0.71	Female vs. male: OR 1.42 (0.72-2.82)	--	--	--	--	--
Mutambudzi et al, 2020 (45)	--	--	--		--	--	Health care professionals: 0.7% (12/1,779)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
							Medical support staff: 0.8% (10/1,286)  Health associate professionals: 0.7% (54/7,653)
Newberry et al 2021 (18)  <i>SARS-CoV-2 seropositivity</i>  <b>Added for Update Alert #9</b>	18-34 y: 1.0% (2/206); reference  35-49 y: 3.1% (17/556); OR 3.22 (0.74-14.05)  ≥50 y: 2.7% (6/221); OR 2.85 (0.57-14.27)	--	White, non-Hispanic: 1.3% (8/594); reference  Hispanic: 4.7% (9/192); <b>OR 3.60 (1.37-9.47)</b>  Asian or Pacific Islander: 3.8% (3/78); OR 2.93 (0.76-11.29)  Black, non-Hispanic: 3.8% (1/26); OR 2.93 (0.35-24.34)  Other: 4.3% (4/93); OR 3.29 (0.97-11.16)	--	--	--	--
Newberry et al 2021 (18)  <i>SARS-CoV-2 infection (PCR)</i>  <b>Added for Update Alert #9</b>	18-34 y: 1.0% (2/206); reference  35-49 y: 0.5% (3/556); OR 0.55 (0.09-3.34)  ≥50 y: 1.8% (4/221); OR	--	White, non-Hispanic: 1.0% (6/594); reference  Hispanic: 1.6% (3/192); OR 1.56 (0.39-6.28)  Asian or Pacific Islander: 0% (0/78); OR 0.58 (0.03-10.34)	--	--	--	--



Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	1.88 (0.34-10.38)		Black, non-Hispanic: 0% (0/26); OR 1.71 (0.09-31.13)  Other: 0% (0/93); OR 0.48 (0.03-8.67)				
Nopsopon et al 2021 (19)  <b>Added for Update Alert #9</b>	--	Female vs. male: OR 2.10 (0.25-17.57)	--	--	--	--	--
Olalla et al, 2020 (100)	--	--	--	--	1.9% (2/101)	0.5% (1/195) Nurse vs. physician: OR 0.26 (0.03-2.85)	Nursing assistant: 2.3% (3/129)  Security: 2.9% (1/35)
Pereckaite et al 2021 (101)	--	--	--	--	1.2% (2/169)	1.1% (2/179) OR 0.94 (0.13-6.77)	--
Perez-Garcia et al 2020 (68)	--	--	--	--	33.1% (90/272)	39.6% (340/859) Nurse vs. physician: OR 1.32 (0.99-1.77)	Medical staff: 34.7% (154/444)  Technical specialist: 29.1% (41/141)  Hospital porter: 44.9% (83/185)  Other HCW: 26.4% (19/72)  Non-health care hospital personnel: 29.8% (104/349)
Piapan et al, 2020 (69)	--	Female vs. male: adjusted OR	--	--	12.7 (32/252)	Nurse vs. physician:	Nurse's aide vs. physician: adjusted OR 1.4 (0.7-2.6)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
		0.67 (0.45-1.02)				adjusted OR 0.9 (0.5-1.4)	Resident vs. physician: adjusted OR 1.3 (0.5-2.7)  Other role vs. physician: adjusted OR 0.9 (0.4-2.0)
Rashid-Abdi et al 2020 (47)	Mean 38 (cases) vs. 44 (non-cases) years, p not reported	Female vs. male: OR 12.82 (0.75-219.19)	--		8.0% (2/25)	Nurse vs. physician: OR 3.11 (0.62-15.47)  Nurse or nurse assistant vs. physician: OR 3.44 (0.75-15.68)	Other HCW role: 0% (0/6)
Rasmussen et al 2021 (48)	--	--	--	--	<i>Infection (PCR)</i> 5% (4/80)  <i>Seropositive</i> 4% (3/80)	<i>Infection (PCR)</i> 1% (1/104) Nurse vs. physician: OR 0.18 (0.02-1.68)  <i>Seropositive</i> 2% (2/104) Nurse vs. physician: OR 0.50 (0.08-3.09)	<i>Infection (PCR)</i> Secretary: 0% (0/18)  Theatre personnel: 0% (0/81)  Cleaner: 0% (0/8)  Porter: 7% (2/31)  Other role: 0% (0/25)  <i>Seropositive</i> Secretary: 6% (1/18)  Theatre personnel: 5% (4/81)  Cleaner: 0% (0/8)  Porter: 13% (4/31)  Other role: 4% (1/25)
Rodriguez et al 2021 (21)	Mean 42 y (cases) vs. 44 y (non-	Female vs. male: OR 1.59 (0.92-2.75)	--	--	2.6% (10/380)	Nurse or nursing assistant: 3.0% (37/1240)	Registrar: 3.9% (3/77)  Warden: 3.4% (6/176)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
<b>Added for Update Alert #9</b>	cases), p>0.05					Nurse or nursing assistant vs. physician: OR 1.14 (0.56-2.31)*	Other HCW: 0% (0/108)  Other non-HCW: 2.2% (5/229)
Schmidt et al, 2020 (49)	18-29 y: 1.9% (1/55)  30-49 y: 4.8% (7/154)  50-64 y: 1.8% (3/170)  ≥65 y: 0% (0/6)	Female vs. male: OR 0.42 (0.12-1.49)	--		8.8% (3/34)	0% (0/154) Nurse vs. physician: <b>OR 0.03 (0.002-0.58)</b>	Therapist: 3.8% (3/80)  Other role: 4.3% (5/117)
Schmitz et al 2020(102)	--	--	--		4.8% (43/890)	5.6% (121/2153) Nurse vs. physician: OR 1.17 (0.82-1.68)	--
Shields et al, 2020a (104)	--	Female vs. male: OR 1.55 (0.94-2.54)	BAME vs. white: <b>adjusted OR 1.92 (1.14-3.23)</b>		--	--	--
Shields et al 2020b (104)	Per additional year: adjusted OR 0.98 (0.96-1.00)	Female vs. male: adjusted OR 1.49 (0.81-2.83)	--		--	--	--
Shorten et al 2021 (22)  <b>Added for Update Alert #9</b>	Age, per 1 year change: adjusted OR 0.99 (0.98-0.994)	Female vs. male: adjusted OR 1.06 (0.87-1.29)	White (UK or Republic of Ireland); reference  Asian/Asian British: adjusted OR 1.61 (1.27-2.04)	--	--	--	--

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
			Other white: adjusted OR 1.28 (0.79-2.05)  Black/Black British: adjusted OR 2.08 (1.25- 3.45)  Mixed race/ethnicity: adjusted OR 0.72 (0.35-1.49)  Chinese: adjusted OR 0.62 (0.18-2.14)  Unknown ethnicity: adjusted OR 1.44 (1.14-1.82)				
Sims et al 2020 (50)	Mean 41.3 y (cases) vs. 43.3 y (non-cases), p>0.05	Female vs. male: OR 0.97 (0.87-1.09)	Black vs. white: <b>OR 2.95 (2.54-3.44)*</b>  Hispanic vs. white: <b>OR 1.66 (1.22-2.27)*</b>		7.0% (277/3,957)	Nurse/nursing support: 10.8% (902/8,352)  Nurse/nursing support vs. physician: <b>OR 1.62 (1.41-1.86)*</b>	Respiratory therapy: 12.1% (37/306)  Phlebotomy: 14.6% (41/281)  Clinical support with patient contact: 8.0% (173/2162)  Facilities: 8.2% (41/500)  Administration: 6.8% (194/2,853)  Laboratory: 5.5% (44/800)  Security/safety: 6.6% (7/106)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
							Clinical support with no patient contact: 7.7% (102/1,325)
Sotgiu et al. 2020 (71)	IgG 20-29 y:14.8% (4/27)  30-39 y: 2.3% (1/44)  40-49 y: 7.0% (4/57)  50-59 y: 9.8% (5/51)  60-69 y: 4.4% (1/23)	Female vs. male (IgG): OR 0.58 (0.20-1.67)	--		IgG: 14.8% (7/115)	IgG: 7.8% (5/64) Nurse vs. physician (IgG): OR 0.76 (0.23-2.52)	Other role: IgG 13.0% (3/23)
Stubblefield et al, 2020 (105)	--	Female vs. male: OR 1.03 (0.40-2.65)	--		9.3% (8/86)	4.8% (5/105) Nurse vs. physician: OR 0.49 (0.15-1.55)	Radiology technician: 29.4% (5/17)  Other HCW role: 2.4% (1/41)
Talbot et al 2021 (23)  <b>Added for Update Alert #9</b>	Mean age 42.4 y (cases) vs. 41.9 y (non-cases)	Female vs. male: OR 1.36 (0.82-2.27)	Non-Hispanic white: 15.6% (53/339); reference  Hispanic or Latino: 22.6% (7/31); OR 1.57 (0.65-3.84)  African American/Black: 7.1% (1/14); OR 0.42 (0.05-3.24)		Frontline physician: 12.7% (13/102)  Other physician: 16.5% (15/91)	15.6% (21/135) Nurse vs. physician: OR 1.09 (0.59-2.01)	Other clinical staff: 21.6% (29/134)  Administrative/other role: 16.7% (2/12)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
			Asian: 21.8% (19/87); OR 1.51 (0.84-2.71)				
Trieu et al, 2020 (51)	20-35 vs. 36-78 y: OR 1.2 (0.6-2.2)	Female vs. male: OR 1.2 (0.6-2.2)	--	--	Physician vs. other HCW role: OR 0.9 (0.4-2.0)	Nurse vs. other HCW role: OR 1.3 (0.7-2.7)	--
Varona et al 2021 (106)	30-45 vs. <30 y: adjusted OR 0.84 (0.67 to 1.06)  46-60 vs. <30 y: adjusted OR 0.96 (0.76 to 1.23)  >60 vs. <30 y: adjusted OR 1.07 (0.77 to 1.48)	Female vs. male: adjusted OR 0.98 (0.83 to 1.18)	--	--	--	--	--
Venugopal et al 2021 (107)	40-59 vs. 20-39 y: OR 1.31 (0.86-2.00)*  ≥60 vs. 20-39 y: OR 0.89 (0.44-1.81)*	Female vs. male: OR 0.89 (0.58 to 1.36)*	Hispanic vs. white: adjusted OR 1.32 (0.60 to 2.89)*  Black vs. white: adjusted OR 1.50 (0.62 to 3.58)*  Asian vs. white: adjusted OR 0.90 (0.39 to 2.07)*	--	25% (39/157)	28% (40/142) Nurse vs. physician: OR 1.19 (0.71-1.98)*	Ancillary service: 28% (20/72)  Other role: 29% (31/107)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
			Other race/ethnicity vs. white: adjusted OR 2.59 (0.86 to 7.73)*				
Villaneuva et al, 2020 (52)	20-29 y: 2.3% (2/88) 30-39 y: 2.9% (4/140) 40-49 y: 2.9% (2/68) 50-59 y: 0% (0/24) 60-69 y: 0% (0/4)	Female vs. male: OR 1.51 (0.30-7.63)	--		2.7% (1/37)	2.0% (4/203) Nurse vs. physician: OR 0.72 (0.07-6.66)	Lab personnel: 25% (3/12)  Radiology tech, clerk, other: 0%
Vimercati et al 2021 (53)	<i>Infection</i> Mean age, positive vs. negative: 43.2 y vs. 45.7 y; OR 0.98 (0.95-1.02)  <i>Seropositive, IgM</i> Mean age, positive vs. negative: 43.3 y vs. 46.0 y; <b>OR 0.98 (0.97-0.99)</b>  <i>Seropositive, IgG</i>	<i>Infection (PCR)</i> Female vs. male: OR 1.54 (0.58-4.13)  <i>Seropositive, IgM</i> Female vs. male: adjusted OR 0.97 (0.75-1.27)  <i>Seropositive, IgG</i> Female vs. male: adjusted OR 0.73 (0.41-1.29)	--	--	<i>Infection (PCR)</i> 1.6% (13/831)  <i>Seropositive, IgM</i> 13.6% (113/831)  <i>Seropositive, IgG</i> 2.2% (18/831)	<i>Infection (PCR)</i> 0.5% (4/809) Nurse vs. physician: <b>OR 0.31 (0.10-0.96)</b>  <i>Seropositive, IgM</i> 12.1% (98/809) Nurse vs. physician: OR 0.88 (0.66-1.17)  <i>Seropositive, IgG</i> 2.1% (17/809) Nurse vs. physician: OR 0.97 (0.50-1.89)	<i>Infection (PCR)</i> Support operator: 0.3% (1/347)  Health care professions: 0% (0/53)  Other role: 0% (0/367)  <i>Seropositive, IgM</i> Support operator: 10.1% (35/347)  Health care professions: 0.9% (5/53)  Other: 7.1% (26/367)  <i>Seropositive, IgG</i> Support operator: 4.0% (14/347)

Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
	Mean age, positive vs. negative: 48.9 vs. 45.6; <b>OR 1.03 (1.00-1.06)</b>						Health care professions: 1.9% (1/53)  Other: 1.9% (7/367)
von Freyburg et al, 2020 (108)	--	--	--		3.8% (8/208)	9.7% (40/413) Nurse vs. physician: OR 2.68 (1.23-5.84)	4.5% (2/44)
Wan et al 2021 (24)  <b>Added for Update Alert #9</b>	≤24 y: reference  25-34 y: OR 1.66 (0.21-13.38)  35-44 y: 1.5% (3/204); OR 2.33 (0.24-22.60)  45-54 y: OR 1.08 (0.04-26.84)  ≥55 y: OR 8.03 (0.30-216.60)	Female vs. male: OR 0.79 (0.24-2.64)	--	--	0.6% (2/325)	1.1% (6/551) Nurse vs. physician: OR 1.78 (0.36-8.86)	<i>Physician reference</i> Allied health: 1.2% (3/259); OR 1.89 (0.31-11.41)  Ancillary personnel: 2.6% (1/39); OR 4.25 (0.38-47.98)
Wang X. et al 2020b (74)	Mean 36.6 y (cases) vs. 30.5 y (non-cases), p=0.006	Female vs. male: OR 0.78 (0.23-2.64)	--		13.3% (4/30)	9.1% (8/88) Nurse vs. physician: OR 0.65 (0.18-2.34)	--
Wang X. et al, 2020a (73)	--	--	--		--	Nurse vs. physician: OR 0.04 (0.005-0.31)	--



Author, Year (Reference)	Age	Sex	Race/Ethnicity	Antibody status	Physician	Nurse	Other HCW Role
Yogo et al 2020 (109)	18-35 y: reference  36-45 y: adjusted OR 0.47 (0.17-1.33)  46-55 y: adjusted OR 0.50 (0.16-1.59)  56-65 y: adjusted OR 0.32 (0.04-2.50)  >65 y: adjusted OR 1.93 (0.25-14.80)	Female vs. male: adjusted OR 1.00 (0.40-2.51)	African American/Black vs. Caucasian: adjusted OR 1.32 (0.15-11.47)  Asian vs. Caucasian: adjusted OR 1.16 (0.41-3.31)  Hispanic/Latino vs. Caucasian: <b>adjusted OR 2.79 (1.02-7.65)</b>  Other vs. Caucasian: adjusted OR 2.85 (0.62-13.15)		--	Nurse vs. physician: adjusted OR 1.19 (0.19-7.38)	Nursing assistant: adjusted OR 0.65 (0.17-2.45)  Technician: adjusted OR 1.65 (0.38-7.15)  Therapist: adjusted OR 0.78 (0.01-70.94)
Zhang G, et al 2020 (75)	--	--	--		14.9% (10/67)	1.2% (2/170) Nurse vs. physician: OR <b>0.07 (0.01-0.32)</b>	--
Zhou et al, 2020 (111)	Age 18-30: 2.5% (35/1378)  Age 31-50: 3.3% (55/1656)  Age >50: (36/640)	Female vs. male: OR 0.86 (0.59-1.24)	--		--	--	Health care role: 3.0% (73/2406)  Administrative staff: 2.4% (12/505)  Clinical staff: 5.4% (41/763)

Abbreviations: BAME = Black, Asian and minority ethnic; EMT = emergency medical technician; HCW = health care worker; OR = odds ratio; RR = relative risk.

**Supplement Table 3. Exposure history and risk for infection with SARS-CoV-2 in HCWs**

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
Abdelmoniem et al 2020 (30)	--	Contact with patient with known or suspected SARS-CoV-2 infection (yes vs. no): OR 0.41 (0.15-1.08)	--	--	--
Akinbami et al 2020 (55)	--	Exposure to patient with COVID-19 (yes vs. no): adjusted OR 1.03 (0.87-1.22)	--	--	Aerosol generating procedure frequency <ul style="list-style-type: none"> <li>• 0 times: reference</li> <li>• 1-5 times: adjusted OR 1.04 (0.85-1.28)</li> <li>• 6-10 times: adjusted OR 0.83 (0.66-1.04)</li> <li>• 11-25 times: adjusted OR 0.78 (0.69-1.16)</li> <li>• &gt;25 times: adjusted OR 1.09 (0.89-1.34)</li> </ul>
Akinbami et al 2021 (5) <i>Hospital HCWs</i>  <b>Added for Update Alert #9</b>	--	No/unknown exposure to COVID-19-positive coworker: 2.1% (134/6299); reference  Exposure to COVID-19-positive coworker: 5.9% (122/2070); <b>adjusted OR 1.87 (1.36-2.58)</b>	--	--	Frequency of aerosol-generating procedure (times/shift/week) <ul style="list-style-type: none"> <li>• 0: 2.6% (108/4121); reference</li> <li>• 1-5: 3.7% (62/1679); adjusted OR 1.12 (0.76-1.62)</li> <li>• 6-10: 5.8% (22/380); adjusted OR 1.60 (0.87-2.92)</li> <li>• 11-25: 4.0% (11/277); adjusted OR 0.71 (0.36-1.40)</li> <li>• &gt;25 times: 5.2% (19/366); adjusted OR 1.24 (0.70-2.20)</li> </ul>
Akinbami et al 2021 (5) <i>Nursing home HCWs</i>	--	No/unknown exposure to COVID-19-positive	--	--	Frequency of aerosol-generating procedure (times/shift/week)

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
<b>Added for Update Alert #9</b>		coworker: 8.8% (83/944); reference Exposure to COVID-19-positive coworker: 20.6% (113/550); adjusted OR 1.10 (0.71-1.72)			<ul style="list-style-type: none"> <li>• 0: 10.8% (93/858); reference</li> <li>• 1-5: 21.9% (25/114); adjusted OR 1.59 (0.87-2.92)</li> <li>• 6-10: 19.4% (7/36); adjusted OR 1.46 (0.66-3.24)</li> <li>• 11-25: 17.4% (4/23); adjusted OR 0.96 (0.25-3.71)</li> <li>• &gt;25 times: 29.3% (12/41); adjusted OR 1.31 (0.63-2.74)</li> </ul>
Algado-Selles et al 2020 (56)	--	Close vs. occasional contact: OR 1.69 (1.07-2.67)	--	--	--
Alkurt et al 2021 (6) <b>Added for Update Alert #9</b>	--	COVID-19 vs. non-COVID-19 clinic: <b>OR 0.46 (0.28-0.78)</b>	--	--	--
Amendola et al, 2020 (77)	--	Direct contact with COVID-19 patient vs. no known direct contact: OR 2.07 (0.89-4.78)	--	--	--
Bahrs et al., 2021 (31)	--	Work COVID-19 risk category <ul style="list-style-type: none"> <li>• High-risk (patient contact with confirmed COVID-19 patients or high number of suspected cases): 1.5% (2/137); reference</li> </ul>	--	--	--

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
		<ul style="list-style-type: none"> <li>Intermediate-risk (patient contact, no routine contact with confirmed or suspected COVID-19 patients): 2.9% (10/343); adjusted OR 1.97 (0.42-9.22)</li> <li>Low-risk (no patient contact): 3.3% (6/180); adjusted OR 2.10 (0.40-11.06)</li> </ul>			
Bai et al, 2020 (57)	--	<p>Contact with index case (yes or no): <b>OR 0.27 (0.08-0.94)</b></p> <ul style="list-style-type: none"> <li>Air contact vs. no contact: OR 0.32 (0.07-1.50)</li> <li>Direct contact vs. no contact: OR 0.22 (0.05-1.03)</li> <li>Air or direct contact vs. no contacts: OR 0.31 (0.03-3.01)</li> </ul>	--	<p>Contact frequency (median, contacts/day): 3.0 in cases vs. 5.0 in non-cases, P=0.95</p> <p>Contact duration (median, minutes/contact): 4.0 in cases vs. 4.0 in non-cases, P=0.54</p> <p>In same department as index case: OR 62.70 (3.60-1092.46)</p>	--
Baker et al 2021 (79)	--	COVID-19 unit vs. no patient contact: adjusted OR 1.5 (1.0-2.4)	--	--	--
Barrett et al 2020 (32)	--	--	--	Average number of patients with suspected or confirmed COVID-19 per shift, 0 vs. ≥5 patients: <b>OR 0.36 (0.14-0.89)*</b>	--

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
				Estimated percentage of work-time spent in patients' rooms, <25% vs. ≥75%: OR 0.42 (0.18-1.01)	
Calcagno et al 2020 (34)	--	Direct patient contact vs. indirect/no patient contact: <b>OR 1.51 (1.11-2.05)*</b>	--	--	--
Celebi et al, 2020 (112)	Intubating a suspected or confirmed COVID-19 patient or being present in the room during intubation, yes vs. no: OR 0.79 (0.30-2.09)	--	Obtaining a respiratory sample from a suspected or confirmed COVID-19 patient: OR 0.59 (0.22-1.13)	--	<p>Resuscitating a suspected or confirmed COVID-19 patient or being present in the room during resuscitation: OR 1.25 (0.45-3.48)</p> <p>Entering a room in which a suspected or confirmed COVID-19 patient was hospitalized: OR 0.58 (0.28-1.20)</p> <p>Examining (touching) a suspected or confirmed COVID-19 patient: <b>OR 0.42 (0.21-0.85)</b></p> <p>Entering the ICU room of a suspected or confirmed patient with mechanical ventilation: OR 0.72 (0.32-1.66)</p> <p>Being present in the operation room during a surgical procedure on a suspected or confirmed COVID-19 patient: OR 0.56 (0.03-11.83)</p>

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
Chatterjee et al, 2020 (113)	Performing endotracheal intubation vs. not performing: <b>adjusted OR 4.33 (1.16-16.07)</b>	--	--	--	In ICU with suspected or confirmed COVID-19 case on ventilator (yes vs. no): OR 1.36 (0.88-2.1)*  Respiratory tract suctioning (yes vs. no): OR 0.73 (0.37-1.45)*  Handling clinical specimen (yes vs. no): OR 0.78 (0.57-1.39)*
Clifton et al 2021 (8)  <b>Added for Update Alert #9</b>	--	Direct contact vs. no direct contact with COVID-19 patients: OR 0.25 (0.04-1.37)	--	--	Performed vs. did not perform aerosol-generating procedures: OR 0.88 (0.05-16.12)
Colaneri et al 2020 (60)	--	--	Contact with CPAP helmets (yes vs. no): <b>OR 4.22 (3.00-5.94)</b>	--	--
Comelli et al 2021 (9)  <b>Added for Update Alert #9</b>	--	Direct vs. no direct contact with confirmed COVID-19 case: <b>OR 1.51 (1.21-1.89)</b>  Work vs. did not work in COVID-19 unit or ED: OR 1.04 (0.84-1.29)	--	--	--
Davido et al 2021 (10)	--	COVID-19 unit vs. non-COVID-19 unit:	--	--	Participated in procedure involving patient airway, yes vs.

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
Added for Update Alert #9		adjusted OR 0.7 (0.2-3.2)  Exposure to COVID-19 infected coworker vs. no/unknown exposure: OR 1.66 (0.64-4.32)			no: adjusted OR 2.6 (0.6-12.5)
Ebinger et al 2021 (82)	--	Regular contact with patients with COVID-19: 6.0% (86/1444)*  Work in unit housing/caring for patients with COVID-19 (yes vs. no): <b>adjusted OR 1.61 (1.18 to 2.18)</b>	--	--	--
el-Boghdadly et al, 2020 (36)	Tracheal intubation: 8.97% (462/5148)	--	Apnoeic oxygenation: HR 0.84 (0.63-1.14)  Bag-mask ventilation (yes vs. no): HR 0.81 (0.54-1.23)  Supraglottic airway: device (yes vs. no): HR 1.40 (0.66-2.97)	--	--
Eyre et al 2020 (83)  <i>Seroprevalence or PCR</i>	--	Do not work in COVID-19 unit: 8.6% (631/7369); reference  Work in COVID-19 unit: 22.6% (358/1586); <b>adjusted OR 2.47 (1.99-3.08)</b>	--	--	--

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
		Work in any unit: 12.9% (139/1079); <b>adjusted OR 1.39 (1.04-1.85)</b>			
Eyre et al 2020 (83) <i>Seroprevalence only</i>	--	vs. no work in a COVID-19 patient area Work in COVID-19 patient area: <b>adjusted OR 2.39 (1.91-3.00)</b>  Work in any area: <b>adjusted OR 1.38 (1.03-1.84)</b>	--	--	--
Faico-Filho et al, 2020 (84)	--	Direct patient contact vs. no direct patient contact: OR 0.72 (0.48-1.07)	--	--	--
Ferreira et al 2021 (37)	--	<i>PCR</i> Direct care of COVID patient vs. no direct care: OR 1.15 (0.29 to 4.61)  <i>Seropositive</i> Direct care of COVID patient vs. no direct care: OR 0.20 (0.03-1.53)	--	--	--
Fletcher et al 2021 (12)  <b>Added for Update Alert #9</b>	--	--	--	--	<u>Study Period 1</u> Exposed to COVID-19 outside of work but not in household vs. exposed to COVID-19 in household: OR 0.54 (0.16-1.78)  <u>Study Period 2</u> Exposed to COVID-19 outside of work but not in household vs. exposed to COVID-19



Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
					in household: <b>OR 0.56 (0.34-0.90)</b>
Fukuda et al 2021 (13)  <b>Added for Update Alert #9</b>	--	--	---	-	High-risk exposure: 0.3% (8/2419); reference  Medium-risk exposure: 0.4% (2/550); OR 1.10 (0.23-5.19)*  Low-risk exposure: 0.3% (4/1178); OR 1.03 (0.31-3.42)*
Fusco et al, 2020 (85)	--	Direct patient care vs. no direct patient care: OR 0.74 (0.04-14.91)	--	>30 days vs. <30 days exposure to patients with suspected or confirmed COVID-19: OR 1.52 (0.21-11.21)	--
Goenka et al 2020 (87)	--	High-risk (work in COVID-19 unit or ICU or regularly involved in testing or investigating of COVID-19 patients) vs. low-risk (no direct contact with patients or their belongings): adjusted OR 0.93 (0.13-6.79)	--	--	Time spent in hospital in a week <48 vs. 48 hours or more: <b>OR 1.92 (1.25-2.97)</b>
Gupta et al 2021 (14)  <b>Added for Update Alert #9</b>	--	Contact vs. no contact with COVID-19 positive individual: <b>OR 1.38 (1.14-1.68)</b>  Active vs. not active COVID duty: OR 0.84 (0.67-1.05)	--	--	--
Hall et al 2021 (15)	--	--	--	--	Direct patient contact vs. no direct patient

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
<b>Added for Update Alert #9</b>					contact: <b>OR 1.25 (1.15-1.35)</b>
Heinzerling et al, 2020 (64)	--	Direct skin-to-skin contact with index patient: OR 0.45 (0.02-9.52)	--	<p>Estimated time in patient room (median, minutes): 120 vs. 25, P=0.06</p> <p>Estimated time in patient room during aerosol generating procedures (median, minutes): 95 vs. 0, P=0.13</p> <p>Longest single duration of time in room (reference &lt;2 minutes):  2 to 30 minutes: OR <b>32.00 (1.96-522.78)</b></p> <ul style="list-style-type: none"> <li>• 31 to 60 minutes: OR 1.86 (0.07-46.97)</li> <li>• &gt;60 minutes: OR 8.00 (0.59-130.70)</li> </ul> <p>Within 6 feet of index patient: OR 1.03 (0.05-23.49)</p>	<p>Taking vital sign (yes vs. no): OR 7.71 (0.61-97.85)</p> <p>Taking medical history (yes vs. no): OR 1.93 (0.15-24.46)</p> <p>Performing physical examination: <b>OR 21.82 (1.02-466.52)</b></p> <p>Taking vital sign, taking medical history, providing medication, bathing or cleaning patient, lifting or positioning patient, emptying bedpan, changing linens, cleaning patient room, peripheral line insertion, central line insertion, drawing arterial blood bas, drawing blood: No statistically significant associations</p>
Herzberg et al 2021 (88)	--	Direct patient care, yes vs. no: OR 0.85 (0.41 to 1.7)	--	--	--
Jacob et al 2021 (16) <b>Added for Update Alert #9</b>	--	Any contact with COVID-19 patients: 4.7% (584/12413): adjusted OR 1.1 (0.9-1.3)	--	--	--

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
		No contact with COVID-19 patients: 3.9% (448/11435); reference  Unknown contact: 5.3% (48/901); adjusted OR 1.3 (0.9-1.9)			
Kassem et al, 2020 (40)	-	Exposure to suspected or confirmed COVID-19 during work in last 2 weeks vs. not: OR 0.95 (0.27-3.44)	-	-	-
Khalil et al, 2020 (114)	--	Participated in direct COVID-19 patient care vs. no participation (yes vs. no): 0.94 (0.50-1.77)	--	--	Performed aerosol-generating procedure on COVID-19 patient (yes vs. no): OR 1.30 (0.64-2.37)
Krastinova et al, 2020 (94)	--	Non-patient facing vs. non-clinical: adjusted OR 1.57 (0.5-5.31)  Direct patient facing vs. non-clinical: adjusted OR 3.08 (1.09-8.78)	--	--	--
Milazzo et al 2021 (44)	--	Contact vs. no contact with infected patient: adjusted OR 1.19 (0.37-3.79)	--	--	--
Moncunill et al 2021 (99)	--	Direct patient contact (yes vs. no): OR 0.97 (0.38-2.50)  Work in COVID-19 unit (yes vs. no): OR 1.07 (0.48-2.40)	--	--	--
Moscola et al, 2020 (66)	--	--	--	Work in COVID-19 positive unit, yes vs. no: adjusted RR 1.00 (0.98-1.03)	Work location, ED ref RR multivariable ICU: 0.98 (0.93-1.02) Non ICU hospital units: 1.00 (0.96-1.04)

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
Mukhtar et al 2021 (17)  <b>Added for Update Alert #9</b>	--	--	--	--	Other: 0.99 (0.95-1.03) Participated vs. did not participate in an aerosol-generating procedure: <b>OR 0.06 (0.01-0.41)</b>
Newberry et al 2021 (18) 6 <b>Added for Update Alert #9</b>	--	--	--	--	<i>Seropositivity</i> Exposed to confirmed SARS-CoV-2 patient respiratory secretions vs. no exposure: <b>OR 2.94 (1.32-6.53)</b>  Exposed to confirmed SARS-CoV-2 positive patient or colleague vs. not exposed: OR 1.30 (0.58-2.92)  <i>Infection (PCR)</i> Exposed to confirmed SARS-CoV-2 patient respiratory secretions vs. no exposure: OR 0.75 (0.15-3.63)  Exposed to confirmed SARS-CoV-2 positive patient or colleague vs. not exposed: OR 2.44 (0.65-9.15)
Nopsopon et al 2021 (19)  <b>Added for Update Alert #9</b>	--	--	--	--	Close contact with a confirmed COVID-19 case vs. no close contact: OR 3.13 (0.17-56.90)
Nygren et al 2021 (20)		Caring for COVID-19 patient most days: 19.7% (12/61);			Working in COVID-19 unit: 21.6% (11/51);

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
Added for Update Alert #9		<p><b>adjusted OR 5.1 (1.3-19.0)</b></p> <p>No caring for COVID-19 patient most days: 4.3% (9/210); reference</p>			<p><b>adjusted OR 5.6 (1.3-23.0)</b></p> <p>Not working in a COVID-19 unit: 4.5% (10/220); reference</p> <p>Increased risk (involvement in an aerosol-generating procedure or bedside surveillance for &gt;3 hours/shift with a COVID-19 patient: 16.1% (9/56); <b>OR 3.2 (1.1-8.7)^</b></p> <p>No increased risk: 5.7% (12/211); reference</p>
Olalla et al, 2020 (100)	--	--	--	COVID-19 vs. non-COVID-19 unit: OR 0.19 (0.03-1.41)	--
Perez-Garcia et al 2020 (68)	--	<p>Direct patient contact vs. no direct patient contact: <b>OR 1.40 (1.10-1.79)</b></p> <p>Contact with COVID-19 patients (yes vs. no): <b>adjusted OR 1.69 (1.28-2.24)</b></p>	--	Close contact with COVID-19 infected person vs. casual contact: adjusted OR 1.32 (0.97-1.80)	<p>Participation in aerosol-generating procedure vs. no participation: <b>OR 2.54 (1.71-3.77)</b></p> <p>Contact with co-worker (yes vs. no): <b>OR 3.18 (2.64-3.82)*</b></p>
Ran et al, 2020 (70)	Endotracheal tube removal: RR, 0.63 (0.06-7.08)	--	--	--	<p>CPR: RR, 0.63 (0.06-7.08)</p> <p>Fiberoptic bronchoscopy: RR, 0.63 (0.06-7.08)</p> <p>Sputum suction: RR, 0.43 (0.12-1.55)</p>

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
Rashid-Abdi et al, 2020 (47)	--	--	--	--	Exposure at work vs. outside of work: OR 16.88 (3.79-75.19)
Sims et al 2020 (50)	--	Direct vs. no direct patient contact: <b>OR 1.41 (1.25-1.58)</b>	--	--	--
Talbot et al 2021 (23)  <b>Added for Update Alert #9</b>	--	--	---	High exposure (time exposed to COVID-19 patients at work): 14.2% (19/134); OR 0.71 (0.38-1.33)  Moderate exposure: 17.0% (16/94); OR 0.88 (0.43-1.72)  Some exposure: 17.1% (14/82); OR 0.89 (0.44-1.78)  Minimal to no exposure: 18.9% (30/159); reference	--
Trieu et al, 2020 (51)	--	Patient contact vs. no patient contact: OR 1.7 (0.7-4.3)	--	--	--
Varona et al 2021 (106)	--	Prolonged direct contact vs. non-clinical and minimal/no patient contact: <b>adjusted OR 2.06 (1.63-2.62)</b>  Clinical or non-clinical with non-intense patient contact vs. non-clinical and minimal/no patient	--	--	--

Author, Year (Reference)	Intubation	Directness of Contact	Oxygen Administration and Related Exposures	Number or Duration of Contacts and Proximity to Patient	Other Exposures
		contact: <i>adjusted OR 1.77 (1.32-2.37)</i>			
Venugopal et al 2021 (107)	--	--	--	--	High/moderate (prolonged close contact with patient with COVID-19 with HCW or patient not wearing face mask or aerosol-generating procedure without eye, nose, or mouth protection) vs. low risk: adjusted OR 2.00 (0.99 to 4.25)
Wan et al 2021 (24)  <b>Added for Update Alert #9</b>	--	--	--	--	High/moderate risk (prolonged contact with COVID-19 patient without proper PPE use or exposed to respiratory secretions without PPE) vs. low risk (close contact with COVID-19 patient while using PPE): <b>OR 62.97 (3.72-1066.70)</b>
Wang X. et al 2020b (74)	--	Contact vs. no contact with index case: <b>OR 0.27 (0.08-0.94)</b>  Contact vs. no contact with infected co-worker: <b>OR 62.70 (3.60-1092.46)</b>	--	--	--

Abbreviations: BiPAP = bilevel positive airway pressure; CPR = cardiopulmonary resuscitation; ECG = electrocardiography; HCW = health care worker; OR = odds ratio; RR = relative risk; SARS = severe acute respiratory syndrome.

\*Variable not included in a multivariate model.

**Supplement Table 4. Education or training, environmental and physical factors, and infection control policies and risk for infection with SARS-CoV-2**

Author, Year (Reference)	Education or Training on Infection Control	Ventilation or Negative Pressure Isolation Room	Environment and Physical Layout	Infection Control Policies
Akinbami et al 2021 (5) <i>Hospital HCWs</i> <b>Added for Update Alert #9</b>	No PPE donning/doffing training: 2.5% (5/199); reference  PPE donning/doffing training: 3.6% (184/5140); OR 1.45 (0.59-3.55)	--	--	Use of PPE shortage protocol (reference: never used PPE) <ul style="list-style-type: none"> <li>No shortage: 4.9% (25/511); 1.23 (0.67-2.25)</li> <li>Reuse: 2.3% (21/934); adjusted OR 0.55 (0.28-1.05)</li> <li>Extended use: 3.1% (42/1341); adjusted OR 0.66 (0.42-1.04)</li> <li>Reuse and extended use: 3.9% (104/2644); adjusted OR 0.84 (0.56-1.26)</li> </ul>
Akinbami et al 2021 (5) <i>Nursing home HCWs</i> <b>Added for Update Alert #9</b>	No PPE donning/doffing training: 20.0% (3/15); reference  PPE donning/doffing training: 15.0% (170/1135); OR 0.70 (0.20-2.52)	--	--	Use of PPE shortage protocol (reference: never used PPE) <ul style="list-style-type: none"> <li>No shortage: 11.8% (28/238); adjusted OR 0.94 (0.46-1.94)</li> <li>Reuse: 11.3% (21/186); adjusted OR 0.89 (0.42-1.87)</li> <li>Extended use: 17.8% (45/253); adjusted OR 1.49 (0.77-2.87)</li> <li>Reuse and extended use: 16.8% (83/495); adjusted OR 1.30 (0.66-2.58)</li> </ul>
Fusco et al, 2020 (115)	Participation in a PPE training even vs. no participation: OR 2.86 (0.14-56.58)	--	--	--
Milazzo et al 2021 (44)	Trained vs. not trained in PPE use: adjusted OR 0.71 (0.25-2.13)	--	--	--
Zhou F et al, 2020 (111)	Attended vs. did not attend training early in the COVID-19 outbreak: <b><i>p</i>&lt;0.01</b>	--	--	--

Abbreviations: PPE = personal protective equipment; SARS = severe acute respiratory syndrome



**Supplement Table 5. Mask use and risk for infection with SARS-CoV-2 in HCWs**

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
Akinbami et al 2020 (55)	--	--	Always use N95 vs. less than always: <b>adjusted OR 0.83 (0.72-0.95)</b>  Always use surgical mask vs. less than always: <b>adjusted OR 0.86 (0.75-0.98)</b>	--
Chatterjee et al, 2020 (113)	Any mask vs. no mask: <b>OR 0.35 (0.22-0.57)*</b>	--	--	--
Davido et al 2021 (10)  <b>Added for Update Alert #9</b>	--	--	Systematic use of facemask vs. no systematic use: <b>adjusted OR 0.07 (0.003-0.56)</b>	--
Fletcher et al 2021 (12)  <b>Added for Update Alert #9</b>	--	<u>Study Period 1</u> N95 vs. surgical mask: OR 1.25 (0.55-2.85)  <u>Study Period 2</u> N95 vs. surgical mask: OR 1.18 (0.86-1.62)	--	--
Heinzerling et al, 2020 (64)	--	--	Always facemask (non-N95) during aerosol generating procedures: OR 0.77 (0.03-20.02)  Always facemask (non-N95) during non-aerosol generating procedures: OR 1.29 (0.05-30.38)	--
Khalil et al, 2020 (114)	Medical/surgical mask (yes vs. no): 1.40 (0.30-6.42)	--	--	--
Piapan et al, 2020 (69)	Mask (FFP2-3 or surgical) vs. no mask: adjusted OR 1.6 (0.9-2.9)	FFP2 mask vs. surgical mask: <b>adjusted OR 7.1 (3.6-13.9)</b>	--	--

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
Sims et al 2020 (50)	<p>Any mask vs. no mask: <b>OR 0.58 (0.50-0.66)</b></p> <p>N95 or surgical mask vs. no mask: <b>OR 0.57 (0.50-0.66)</b></p> <p>N95 vs. no mask: <b>OR 0.54 (0.47-0.62)</b></p> <p>Surgical mask vs. no mask: <b>OR 0.71 (0.58-0.86)</b></p>	N95 vs. surgical mask: <b>OR 0.76 (0.63-0.92)</b>	--	--
Venugopal et al 2021 (107)	<p>N95 only (yes vs. no): OR 0.87 (0.50-1.54)*</p> <p>Surgical mask only (yes vs. no): OR 1.70 (1.08-2.69)*</p> <p>N95 and surgical mask (yes vs. no): OR 0.64 (0.41-1.00)*</p>	N95 only vs. surgical mask only: OR 0.60 (0.31-1.15)	--	--
Wang X. et al, 2020a (73)	In department with mask use (no vs. yes): <b>adjusted OR 464.82 (97.73- ∞)</b>	--	--	--

Abbreviations: HCW = health care worker; OR = odds ratio; SARS = severe acute respiratory syndrome

\*Variable not included in a multivariate model.

**Supplement Table 6. Infection prevention and control factors (other than masks) and risk for infection with SARS-CoV-2 in HCWs**

Author, Year (Reference)	Gown	Glove	Handwashing	Eye Protection	PPE
Abdelmoniem et al 2020 (30)	--	--	Proper hand hygiene (yes vs. no): OR 0.74 (0.15-3.59)	--	PPE use as recommended (yes vs. no): OR 1.00 (0.21-4.72)
Akinbami et al 2020 (55)	Use all the time vs less than all the time: 6.9% (643/9,316); adjusted OR 1.14 (0.97-1.34)	Use all the time vs less than all the time: adjusted OR 1.09 (0.90-1.30)	--	Face shield or goggles, use all the time vs less than all the time: adjusted OR 1.09 (0.90-1.30)	PAPR, use all the time vs. less than all the time: adjusted OR 1.10 (0.80-1.52)
Akinbami et al 2021 (5) <i>Hospital HCWs</i>  <b>Added for Update Alert #9</b>	--	--	--	--	No/unknown exposure to COVID-19-positive patient: 2.0% (88/4422); reference  Exposed while not wearing PPE: 4.6% (60/1317); adjusted OR 1.28 (0.89-1.85)  Exposed while wearing PPE: 4.1% (108/2630); <b>adjusted OR 1.41 (0.99-2.00)</b>
Akinbami et al 2021 (5) <i>Nursing home HCWs</i>  <b>Added for Update Alert #9</b>	--	--	--	--	No/unknown exposure to COVID-19-positive patient: 6.0% (49/823); reference  Exposed while not wearing PPE: 16.2% (28/173); adjusted OR 1.10 (0.54-2.07)  Exposed while wearing PPE: 23.9% (119/498); <b>adjusted OR 2.18 (1.26-3.80)</b>
Algado-Selles et al 2020 (56)	--	--	--	--	PPE use (surgical mask or N95 [or equivalent] and eye protection for aerosol generating procedures; yes vs. no): <b>adjusted OR 0.45 (0.26-0.83)</b>
Baker et al 2021 (79)	--	--	--	--	PPE use as recommended vs. not as recommended: adjusted OR 0.8 (0.4-1.4)

Author, Year (Reference)	Gown	Glove	Handwashing	Eye Protection	PPE
					PPE use as recommended vs. unsure use: <b>adjusted OR 0.6 (0.4-0.9)</b>
Barrett et al 2020 (32)	--	--	--	--	Estimated proportion of patients for which PPE (gloves, gown and surgical or N95 mask) was used, <25% vs. 100%: OR 0.41 (0.14-1.22)*
Celebi et al, 2020 (112)	--	--	--	--	Making a mistake while implementing infection control precautions, yes vs. no: OR 2.98 (0.58-15.29)  Improper use of PPE while caring for a suspected or confirmed COVID-19 patient, yes vs. no: <b>adjusted OR 11.30 (2.18-59)</b>  Stayed in personnel break room with other HCW without wearing a medical mask for >15 minutes, yes vs. no: <b>adjusted OR 7.42 (1.90-29.02)</b>
Chatterjee et al, 2020 (113)	Gown vs. no gown: <b>OR 0.62 (0.46-0.83)*</b>	Gloves vs. no gloves: <b>OR 0.38 (0.26-0.55)*</b>	--	Face shield or goggles vs. none: OR 0.81 (0.61-1.08)*	No PPE vs PPE all/most of the time: <b>adjusted OR 5.33 (2.27-12.48)</b>  Shoe cover vs. no shoe cover: OR 1.05 (0.78-1.42)*  Cap vs. no cap: <b>OR 0.70 (0.52-0.94)*</b>
Clifton et al 2021 (8)  <b>Added for Update Alert #9</b>	--	--	--	--	Reported vs. did not report break in PPE: OR 1.69 (0.19-14.84)
el-Boghdady et al, 2020 (36)	--	--	--	--	PPE meeting WHO standard (yes vs. no): HR, 0.97 (0.63-1.51)*
Eyre et al 2020 (83)  <i>Seroprevalence</i>	--	--	--	--	Exposure to known or suspected COVID-19 patient without PPE, yes vs. no: <b>adjusted OR 1.47 (1.26-1.70)</b>
Fletcher et al 2021 (12)	--	--	--	--	<u>Study Period 1</u>

Author, Year (Reference)	Gown	Glove	Handwashing	Eye Protection	PPE
<b>Added for Update Alert #9</b>					PPE use at work (yes vs. no): OR 0.98 (0.06-16.48) PPE use at work (sometimes vs. no): 0% (0/58) vs. 0% (0/23)  <u>Study Period 2</u> PPE use at work (yes vs. no): OR 2.81 (0.86-9.20) PPE use at work (sometimes vs. no): 10% (5/50); OR 0.70 (0.27-1.79)
Gupta et al 2021 (14)  <b>Added for Update Alert #9</b>	--	--	--	--	PPE breach vs. no breach: OR 0.96 (0.66-1.40)
Heinzerling et al, 2020 (64)	--	Always gloves during aerosol generating procedures: 3.10 (0.13-75.19)  Always gloves during non-aerosol generating procedures: 4.40 (0.21-91.92)	--	--	--
Kassem et al, 2020 (40)	-	-	Proper hand hygiene: OR 0.26 (0.02-4.46)	-	PPE when indicated, always vs. occasionally OR 0.54 (0.05-6.32)
Khalil et al, 2020 (114)	Disposable gown (yes vs. no): OR 1.08 (0.53-2.20)	Single-use gloves (yes vs. no): OR 1.01 (0.38-2.68)	Followed hand hygiene <ul style="list-style-type: none"> <li>• During patient care (yes vs. no): OR 0.78 (0.23-2.67)</li> <li>• During procedure (yes vs. no): OR 3.28 (0.66-12.30)</li> <li>• After body fluid exposure (yes vs. no): OR 0.28 (0.06-1.45)</li> <li>• After touching fomites (yes vs.</li> </ul>	Face shield/goggles (yes vs. no): <b>0.44 (0.23-0.84)</b>	Wore PPE (yes vs. no): OR 0.15 (0.02-1.21)  Proper donning and doffing of PPE (yes vs. no): OR 0.57 (0.29-1.14)

Author, Year (Reference)	Gown	Glove	Handwashing	Eye Protection	PPE
			no): OR 1.58 (0.49-5.04)		
Maltezou et al, 2020 (43)	--	--	--	--	High- vs. low- or moderate-risk exposure (based on mask use by patient and PPE use by HCW): <b>adjusted OR 3.06 (1.43-6.55)</b>
Newberry et al 2021 (18)  <b>Added for Update Alert #9</b>	--	--	--	--	<i>Seropositivity</i> Full use of PPE during exposure (yes vs. no): <b>OR 0.23 (0.05-0.97)</b>  PPE breach or failure (yes vs. no): OR 1.20 (0.16-9.18)  <i>Infection (PCR)</i> Full use of PPE during exposure (yes vs. no ): OR 0.59 (0.10-3.59)  PPE breach or failure (yes vs. no): OR 1.16 (0.07-20.36)
Perez-Garcia et al 2020 (68)	--	--	--	--	Use of PPE (included cap, FFP2 mask [or FFP3 mask for aerosol generating procedures], disposable medical protective clothing, gloves, goggles/screens) vs. no use: <b>adjusted OR 0.56 (0.44-0.72)</b>
Ran L et al, 2020 (70)	--	--	Unqualified hand washing: RR 2.64 (1.04-6.71)  Suboptimal hand-washing before patient contact: RR 3.10 (1.43-6.73)  Suboptimal hand-washing after patient contact: RR 2.43 (1.34-4.39)	--	Improper PPE: RR 2.82 (1.11-7.18)
Schmitz et al 2020 (102)	--	--	--	--	High-level PPE (FFP2 mask and eye protection for all patient contact) hospital vs. other hospital: <b>OR 1.85 (1.35-2.54)*</b>

Author, Year (Reference)	Gown	Glove	Handwashing	Eye Protection	PPE
Trieu et al 2020	--	--	--	--	Patient contact with full PPE vs. no patient contact: OR 1.1 (0.5-2.7)  Patient contact with partial PPE vs. no patient contact: OR 2.5 (0.5-12.2)
Venugopal et al 2021 (107)	--	--	--	Face shield and goggles (yes vs. no): OR 0.55 (0.36-0.84)*	--
Wang Q. et al, 2020 (116)	--	--	--	--	Level 2 protection (cap, N95 or higher, goggles/eye protection, gown, gloves, shoe covers) (yes vs. no): <b>OR 0.03 (0.003-0.19)†</b>
Yogo et al 2020 (109)	--	--	--	--	Exposure to SARS-CoV-2 infected patient without PPE, yes vs. no: adjusted OR 1.17 (0.42-3.26)

Abbreviations: HCW = health care worker; OR = odds ratio; PPE = personal protective equipment; RR = relative risk; SARS = severe acute respiratory syndrome.

\*Variable not included in a multivariate model

**Supplement Table 7. Risk factors for SARS-CoV-2 infection in HCWs evidence map**

Risk factor	Size of evidence	Effect
Age (older vs. young age)	++++	●
Sex (female vs. male)	++++	●
Race/ethnicity (Black or Hispanic vs. White)	+++	●
SARS-CoV-19 antibody status (positive vs. negative)	+	◆
HCW role (nurse vs. physician)	++++	●
Directness or intensity of contact (more direct or intense vs. less direct or intense exposure)	+++	◆
Participation in high-risk (e.g., aerosol-generating) procedure (yes vs. no)	+++	◆
Education/training in infection control measures (yes vs. no)	+	◆
Mask use (yes vs. no)	++	◆
PPE use (yes or full/always vs. no or incomplete/inconsistent)	+++	●

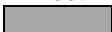


**Size of evidence**

- ++++ >50 studies; >200,000 HCWs
- +++ 20-50 studies; >100,000 HCWs
- ++ 10-20 studies; >50,000 HCWs
- + <10 studies; <20,000 HCWs

**Strength of evidence**

- Moderate
- ◆ Low
- Insufficient
- No evidence

**Effect**

-  Positive association
-  Negative association
-  No association



## References

1. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Epidemiology of and risk factors for coronavirus infection in health care workers: a living rapid review. *Ann Intern Med.* 2020;173(2):120-36. Epub 2020/05/06. doi: 10.7326/m20-1632. PubMed PMID: 32369541; PubMed Central PMCID: PMC7240841.
2. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert 7: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med.* 2021. Epub 2021/02/09. doi: 10.7326/121-0034. PubMed PMID: 33556273.
3. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert 2: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med.* 2020;173(4):W77. doi: 10.7326/M20-4806.
4. Abbas S, Raza A, Iftikhar A, Khan A, Khan S, Yusuf MA. Seroprevalence of SARS-CoV-2 antibodies among health care personnel at a health care system in Pakistan. *Asia Pac J Public Health.* 2021:10105395211011010. Epub 2021/04/22. doi: 10.1177/10105395211011010. PubMed PMID: 33880961.
5. Akinbami LJ, Chan PA, Vuong N, Sami S, Lewis D, Sheridan PE, et al. Severe Acute Respiratory Syndrome Coronavirus 2 seropositivity among healthcare personnel in hospitals and nursing homes, Rhode Island, USA, July-August 2020. *Emerg Infect Dis.* 2021;27(3):823-34. Epub 2021/02/25. doi: 10.3201/eid2703.204508. PubMed PMID: 33622481; PubMed Central PMCID: PMC7920685.
6. Alkurt G, Murt A, Aydin Z, Tatli O, Agaoglu NB, Irvem A, et al. Seroprevalence of coronavirus disease 2019 (COVID-19) among health care workers from three pandemic hospitals of Turkey. *PloS One.* 2021;16(3):e0247865. Epub 2021/03/04. doi: 10.1371/journal.pone.0247865. PubMed PMID: 33657142; PubMed Central PMCID: PMC7928442.
7. Bayle C, Cantin D, Vidal JS, Sourdeau E, Slama L, Dumesges N, et al. Asymptomatic SARS COV-2 carriers among nursing home staff: A source of contamination for residents? *Infect Dis Now.* 2021;51(2):197-200. Epub 2021/02/02. doi: 10.1016/j.idnow.2020.11.008. PubMed PMID: 33521774; PubMed Central PMCID: PMC7834689.
8. Clifton GT, Pati R, Krammer F, Laing ED, Broder CC, Mendu DR, et al. SARS-CoV-2 infection risk among active duty military members deployed to a field hospital - New York City, April 2020. *MMWR Morb Mortal Wkly Rep.* 2021;70(9):308-11. Epub 2021/03/05. doi: 10.15585/mmwr.mm7009a3. PubMed PMID: 33661864; PubMed Central PMCID: PMC7948931
9. Comelli A, Focà E, Sansone E, Tomasi C, Albini E, Quiros-Roldan E, et al. Serological response to SARS-CoV-2 in health care workers employed in a large tertiary hospital in Lombardy, Northern Italy. *Microorganisms.* 2021;9(3). Epub 2021/03/07. doi: 10.3390/microorganisms9030488. PubMed PMID: 33669151.
10. Davido B, Gautier S, Riom I, Landowski S, Lawrence C, Thiebaut A, et al. First wave of COVID-19 in hospital staff members of a tertiary care hospital in the greater Paris area: surveillance and risk factors study. *Int J Infect Dis.* 2021. Epub 2021/02/20. doi: 10.1016/j.ijid.2021.02.055. PubMed PMID: 33607301.
11. Dillner J, Elfström KM, Blomqvist J, Eklund C, Lagheden C, Nordqvist-Kleppe S, et al. Antibodies to SARS-CoV-2 and risk of past or future sick leave. *Sci Rep.* 2021;11(1):5160. Epub 2021/03/06. doi: 10.1038/s41598-021-84356-w. PubMed PMID: 33664279; PubMed Central PMCID: PMC7933367.

12. Fletcher JJ, Feucht EC, Hahn PY, McGoff TN, Dehart DJ, El Mortada ME, et al. Health Care Acquired COVID-19 is Less Symptomatic than Community Acquired Disease Among Healthcare Workers. *Infect Control Hosp Epidemiol*. 2021:1-28. Epub 2021/04/16. doi: 10.1017/ice.2021.167. PubMed PMID: 33853694.
13. Fukuda H, Seyama K, Ito K, Ai T, Nojiri S, Hori S, et al. SARS-CoV-2 seroprevalence in healthcare workers at a frontline hospital in Tokyo. *Sci Rep*. 2021;11(1):8380. Epub 2021/04/18. doi: 10.1038/s41598-021-87688-9. PubMed PMID: 33863960.
14. Gupta R, Dwivedi T, Gajendra S, Sahoo B, Gupta SK, Vikas H, et al. Seroprevalence of antibodies to SARS-CoV-2 in healthcare workers & implications of infection control practice in India. *Indian J Med Res*. 2021. Epub 2021/03/02. doi: 10.4103/ijmr.IJMR\_3911\_20. PubMed PMID: 33642348.
15. Hall VJ, Foulkes S, Charlett A, Atti A, Monk EJM, Simmons R, et al. SARS-CoV-2 infection rates of antibody-positive compared with antibody-negative health-care workers in England: a large, multicentre, prospective cohort study (SIREN). *Lancet*. 2021;397(10283):1459-69. Epub 2021/04/13. doi: 10.1016/s0140-6736(21)00675-9. PubMed PMID: 33844963; PubMed Central PMCID: PMC8040523.
16. Jacob JT, Baker JM, Fridkin SK, Lopman BA, Steinberg JP, Christenson RH, et al. Risk factors associated with SARS-CoV-2 seropositivity among us health care personnel. *JAMA Netw Open*. 2021;4(3):e211283. Epub 2021/03/11. doi: 10.1001/jamanetworkopen.2021.1283. PubMed PMID: 33688967.
17. Mukhtar A, Afishawy M, Alkhatib E, Hosny M, Yousef M, Amal Elsayed A, et al. Asymptomatic SARS-CoV-2 infection among healthcare workers in a non-COVID-19 Teaching University Hospital. *J Public Health Res*. 2021. Epub 2021/04/03. doi: 10.4081/jphr.2021.2102. PubMed PMID: 33794599.
18. Newberry JA, Gautreau M, Staats K, Carrillo E, Mulkerin W, Yang S, et al. SARS-CoV-2 IgG seropositivity and acute asymptomatic infection rate among firefighter first responders in an early outbreak county in California. *Prehosp Emerg Care*. 2021:1-10. Epub 2021/04/06. doi: 10.1080/10903127.2021.1912227. PubMed PMID: 33819128.
19. Nopsopon T, Pongpirul K, Chotirosniramit K, Jakaew W, Kaewwijit C, Kanchana S, et al. Seroprevalence of hospital staff in a province with zero COVID-19 cases. *PloS One*. 2021;16(4):e0238088. Epub 2021/04/02. doi: 10.1371/journal.pone.0238088. PubMed PMID: 33793556; PubMed Central PMCID: PMC8016267.
20. Nygren D, Norén J, De Marinis Y, Holmberg A, Fraenkel CJ, Rasmussen M. Association between SARS-CoV-2 and exposure risks in health care workers and university employees - a cross-sectional study. *Infect Dis (Lond)*. 2021:1-9. Epub 2021/03/11. doi: 10.1080/23744235.2021.1892819. PubMed PMID: 33689558.
21. Rodriguez A, Arrizabalaga M, Fernandez-Baca V, Lainez MP, Al Nakeeb Z, Garcia JD, et al. Seroprevalence of SARS-CoV-2 antibody among healthcare workers in a university hospital in Mallorca, Spain, during the first wave of COVID-19 pandemic. *Int J Infect Dis*. 2021. Epub 2021/03/02. doi: 10.1016/j.ijid.2021.02.104. PubMed PMID: 33647507; PubMed Central PMCID: PMC7910131.
22. Shorten RJ, Haslam S, Hurley MA, Rowbottom A, Myers M, Wilkinson P, et al. Seroprevalence of SARS-CoV-2 infection in healthcare workers in a large teaching hospital in the North West of England: a period prevalence survey. *BMJ Open*. 2021;11(3):e045384. Epub 2021/03/18. doi: 10.1136/bmjopen-2020-045384. PubMed PMID: 33727275; PubMed Central PMCID: PMC7969758.

23. Talbot LR, Romeiser JL, Spitzer ED, Gan TJ, Singh SM, Fries BC, et al. Prevalence of IgM and IgG antibodies to SARS-CoV-2 in health care workers at a tertiary care New York hospital during the Spring COVID-19 surge. *Perioper Med (Lond)*. 2021;10(1):7. Epub 2021/03/03. doi: 10.1186/s13741-021-00177-5. PubMed PMID: 33648573; PubMed Central PMCID: PMC7920632.
24. Wan KS, Tok PSK, Yoga Ratnam KK, Aziz N, Isahak M, Ahmad Zaki R, et al. Implementation of a COVID-19 surveillance programme for healthcare workers in a teaching hospital in an upper-middle-income country. *PloS One*. 2021;16(4):e0249394. Epub 2021/04/15. doi: 10.1371/journal.pone.0249394. PubMed PMID: 33852588.
25. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med*. 2020;173(2):W46-W7. Epub 2020/06/10. doi: 10.7326/120-0768. PubMed PMID: 32515983; PubMed Central PMCID: PMC7304657.
26. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert 3: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med*. 2020;173(6):W123-W4. Epub 2020/08/04. doi: 10.7326/120-1005. PubMed PMID: 32744870; PubMed Central PMCID: PMC7418491.
27. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert 4: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med*. 2020;173(8):143-4. Epub 2020/09/12. doi: 10.7326/120-1134. PubMed PMID: 32915642.
28. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert 5: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med*. 2020;173(11):W154-W5. Epub 2020/10/21. doi: 10.7326/120-1227. PubMed PMID: 33076695.
29. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert 6: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med*. 2020:Online ahead of print. Epub 2020/11/24. doi: 10.7326/120-1323. PubMed PMID: 33226856.
30. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Update Alert 8: Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med*. 2021. Epub 2021/03/30. doi: 10.7326/121-0143. PubMed PMID: 33780293.
31. Bahrs C, Kimmig A, Weis S, Ankert J, Hagel S, Maschmann J, et al. Prospective surveillance study in a 1,400-bed university hospital: COVID-19 exposure at home was the main risk factor for SARS-CoV-2 point seroprevalence among hospital staff. *Transbound Emerg Dis*. 2021. Epub 2021/02/20. doi: 10.1111/tbed.14041. PubMed PMID: 33605549.
32. Barrett ES, Horton DB, Roy J, Gennaro ML, Brooks A, Tischfield J, et al. Prevalence of SARS-CoV-2 infection in previously undiagnosed health care workers in New Jersey, at the onset of the U.S. COVID-19 pandemic. *BMC Infect Dis*. 2020;20(1):853. Epub 2020/11/18. doi: 10.1186/s12879-020-05587-2. PubMed PMID: 33198725; PubMed Central PMCID: PMC7668027.
33. Blairon L, Mokrane S, Wilmet A, Dessilly G, Kabamba-Mukadi B, Beukinga I, et al. Large-scale, molecular and serological SARS-CoV-2 screening of healthcare workers in a 4-site public hospital in Belgium after COVID-19 outbreak. *J Infect*. 2020. Epub 2020/08/03. doi: 10.1016/j.jinf.2020.07.033. PubMed PMID: 32739485; PubMed Central PMCID: PMC7392848.
34. Calcagno A, Ghisetti V, Emanuele T, Trunfio M, Faraoni S, Boglione L, et al. Risk for SARS-CoV-2 infection in healthcare workers, Turin, Italy. *Emerg Infect Dis*. 2020;27(1). Epub 2020/10/07. doi: 10.3201/eid2701.203027. PubMed PMID: 33021927.

35. El Abdellati K, Coppens V, Goossens J, Theeten H, Van Damme P, Berens A, et al. Hospital-wide SARS-CoV-2 antibody screening of staff in a university psychiatric centre in Belgium. *BJPsych Open*. 2021;7(1):e40. Epub 2021/01/21. doi: 10.1192/bjo.2020.172. PubMed PMID: 33468277.
36. El-Boghdady K, Wong DJN, Owen R, Neuman MD, Pocock S, Carlisle JB, et al. Risks to healthcare workers following tracheal intubation of patients with COVID-19: a prospective international multicentre cohort study. *Anaesthesia*. 2020. Epub 2020/06/10. doi: 10.1111/anae.15170. PubMed PMID: 32516833.
37. Ferreira VH, Chruscinski A, Kulasingam V, Pugh TJ, Dus T, Wouters B, et al. Prospective observational study and serosurvey of SARS-CoV-2 infection in asymptomatic healthcare workers at a Canadian tertiary care center. *PloS One*. 2021;16(2):e0247258. Epub 2021/02/17. doi: 10.1371/journal.pone.0247258. PubMed PMID: 33592074.
38. Grant J, Wilmore S, McCann N, Donnelly O, Lai R, Kinsella M, et al. Seroprevalence of SARS-CoV-2 antibodies in healthcare workers at a London NHS Trust. *Infect Control Hosp Epidemiol*. 2020:1-12. Epub 2020/08/05. doi: 10.1017/ice.2020.402. PubMed PMID: 32746953.
39. Houlihan CF, Vora N, Byrne T, Lewer D, Kelly G, Heaney J, et al. Pandemic peak SARS-CoV-2 infection and seroconversion rates in London frontline health-care workers. *Lancet*. 2020. Epub 2020/07/13. doi: 10.1016/s0140-6736(20)31484-7. PubMed PMID: 32653078.
40. Kassem AM, Talaat H, Shawky S, Fouad R, Amer K, Elnagdy T, et al. SARS-CoV-2 infection among healthcare workers of a gastroenterological service in a tertiary care facility. *Arab J Gastroenterol*. 2020. Epub 2020/08/01. doi: 10.1016/j.ajg.2020.07.005. PubMed PMID: 32732168; PubMed Central PMCID: PMC7373030.
41. Leeds JS, Raviprakash V, Jacques T, Scanlon N, Cundall J, Leeds CM. Risk factors for detection of SARS-CoV-2 in healthcare workers during April 2020 in a UK hospital testing programme. *EClinicalMedicine*. 2020. doi: 10.1016/j.eclinm.2020.100513.
42. Lumley SF, O'Donnell D, Stoesser NE, Matthews PC, Howarth A, Hatch SB, et al. Antibody status and incidence of SARS-CoV-2 infection in health care workers. *N Engl J Med*. 2020. Epub 2020/12/29. doi: 10.1056/NEJMoa2034545. PubMed PMID: 33369366; PubMed Central PMCID: PMC7781098.
43. Maltezou HC, Dedoukou X, Tseroni M, Tsonou E, Raftopoulos V, Papadima K, et al. SARS-CoV-2 infection in healthcare personnel with high-risk occupational exposure: evaluation of seven-day exclusion from work policy. *Clin Infect Dis*. 2020;29(5864498).
44. Milazzo L, Lai A, Pezzati L, Oreni L, Bergna A, Conti F, et al. Dynamics of the seroprevalence of SARS-CoV-2 antibodies among healthcare workers at a COVID-19 referral hospital in Milan, Italy. *Occup Environ Med*. 2021. Epub 2021/02/06. doi: 10.1136/oemed-2020-107060. PubMed PMID: 33542096; PubMed Central PMCID: PMC7868130.
45. Mutambudzi M, Niedwiedz C, Macdonald EB, Leyland A, Mair F, Anderson J, et al. Occupation and risk of severe COVID-19: prospective cohort study of 120 075 UK Biobank participants. *Occup Environ Med*. 2020. Epub 2020/12/11. doi: 10.1136/oemed-2020-106731. PubMed PMID: 33298533.
46. Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo CG, Ma W, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *Lancet Public Health*. 2020. Epub 2020/08/04. doi: 10.1016/s2468-2667(20)30164-x. PubMed PMID: 32745512.

47. Rashid-Abdi M, Krifors A, Sälléber A, Eriksson J, Månsson E. Low rate of COVID-19 seroconversion in health-care workers at a Department of Infectious Diseases in Sweden during the later phase of the first wave; a prospective longitudinal seroepidemiological study. *Infect Dis (Lond)*. 2020:1-7. Epub 2020/11/25. doi: 10.1080/23744235.2020.1849787. PubMed PMID: 33232190.
48. Rasmussen KMB, Andersen PA, Channir HI, Aanæs K, Knudsen JD, Kirkeby NS, et al. COVID-19 infection rate among tertiary referral center otorhinolaryngology healthcare workers. *Eur Arch Otorhinolaryngol*. 2021:1-8. Epub 2021/02/06. doi: 10.1007/s00405-021-06615-w. PubMed PMID: 33544196; PubMed Central PMCID: PMC7862982.
49. Schmidt SB, Gruter L, Boltzmann M, Rollnik JD. Prevalence of serum IgG antibodies against SARS-CoV-2 among clinic staff. *PloS One*. 2020;15(6):e0235417. Epub 2020/06/26. doi: 10.1371/journal.pone.0235417. PubMed PMID: 32584894.
50. Sims MD, Maine GN, Childers KL, Podolsky RH, Voss DR, Berkiw-Scenna N, et al. COVID-19 seropositivity and asymptomatic rates in healthcare workers are associated with job function and masking. *Clin Infect Dis*. 2020. Epub 2020/11/06. doi: 10.1093/cid/ciaa1684. PubMed PMID: 33150375.
51. Trieu MC, Bansal A, Madsen A, Zhou F, Sævik M, Vahokoski J, et al. SARS-CoV-2-specific neutralizing antibody responses in Norwegian healthcare workers after the first wave of COVID-19 pandemic: a prospective cohort study. *J Infect Dis*. 2020. Epub 2020/11/29. doi: 10.1093/infdis/jiaa737. PubMed PMID: 33247924.
52. Villanueva AMG, Lazaro J, Sayo AR, Myat Han S, Ukawa T, Suzuki S, et al. COVID-19 screening for healthcare workers in a tertiary infectious diseases referral hospital in Manila, the Philippines. *Am J Trop Med Hyg* 2020. Epub 2020/07/31. doi: 10.4269/ajtmh.20-0715. PubMed PMID: 32729461.
53. Vimercati L, Stefanizzi P, De Maria L, Caputi A, Cavone D, Quarato M, et al. Large-scale IgM and IgG SARS-CoV-2 serological screening among healthcare workers with a low infection prevalence based on nasopharyngeal swab tests in an Italian university hospital: Perspectives for public health. *Environ Res*. 2021;195:110793. Epub 2021/01/29. doi: 10.1016/j.envres.2021.110793. PubMed PMID: 33508260; PubMed Central PMCID: PMC7839391.
54. Weinberger T, Steffen J, Osterman A, Mueller TT, Muenchhoff M, Wratil PR, et al. Prospective longitudinal serosurvey of health care workers in the first wave of the SARS-CoV-2 pandemic in a quaternary care hospital in Munich, Germany. *Clin Infect Dis*. 2021. Epub 2021/01/04. doi: 10.1093/cid/ciaa1935. PubMed PMID: 33388756.
55. Akinbami LJ, Vuong N, Petersen LR, Sami S, Patel A, Lukacs SL, et al. SARS-CoV-2 seroprevalence among healthcare, first response, and public safety personnel, Detroit metropolitan area, Michigan, USA, May-June 2020. *Emerg Infect Dis*. 2020;26(12). Epub 2020/09/22. doi: 10.3201/eid2612.203764. PubMed PMID: 32956614.
56. Algado-Sellés N, Gras-Valentí P, Chico-Sánchez P, Mora-Muriel JG, Soler-Molina VM, Hernández-Maldonado M, et al. Frequency, associated risk factors, and characteristics of COVID-19 among healthcare personnel in a Spanish Health Department. *Am J Prev Med*. 2020;59(6):e221-e9. Epub 2020/11/23. doi: 10.1016/j.amepre.2020.07.014. PubMed PMID: 33220760; PubMed Central PMCID: PMC7434331.
57. Bai Y, Wang X, Huang Q, Wang H, Gurarie D, Ndeffo-Mbah M, et al. SARS-CoV-2 infection in health care workers: a retrospective analysis and a model study. *medRxiv*. 2020:2020.03.29.20047159. doi: 10.1101/2020.03.29.20047159.

58. Banerjee A, Mukherjee K, Bhattacharjee D, Garai D, Chakraborty R. Status of health-care workers in relation to COVID-19 Infection: a retrospective study in a Level 4 COVID hospital in Eastern India. *J Assoc Physicians India*. 2020;68(12):55-7. Epub 2020/11/29. PubMed PMID: 33247643.
59. Buchtele N, Rabitsch W, Knaus HA, Wohlfarth P. Containment of a traceable COVID-19 outbreak among healthcare workers at a hematopoietic stem cell transplantation unit. *Bone Marrow Transplant*. 2020. Epub 2020/06/03. doi: 10.1038/s41409-020-0958-6. PubMed PMID: 32483288.
60. Colaneri M, Novelli V, Cutti S, Muzzi A, Resani G, Monti MC, et al. The experience of the health care workers of a severely hit SARS-CoV-2 referral Hospital in Italy: incidence, clinical course and modifiable risk factors for COVID-19 infection. *J Public Health (Oxf)*. 2020. Epub 2020/11/04. doi: 10.1093/pubmed/fdaa195. PubMed PMID: 33140084.
61. Folgueira MD, Munoz-Ruiperez C, Alonso-Lopez MA, Delgado R. SARS-CoV-2 infection in health care workers in a large public hospital in Madrid, Spain, during March 2020. *medRxiv*. 2020:2020.04.07.20055723. doi: 10.1101/2020.04.07.20055723.
62. García IS, López M, Vicente AS, Abascal PL. SARS-CoV-2 infection among healthcare workers in a hospital in Madrid, Spain. *J Hosp Infect*. 2020. Epub 2020/07/24. doi: 10.1016/j.jhin.2020.07.020. PubMed PMID: 32702465.
63. Gras-Valentí P, Chico-Sánchez P, Algado-Sellés N, Gimeno-Gascón MA, Mora-Muriel JG, Jiménez-Sepúlveda NJ, et al. Sero-epidemiological study of SARS-CoV-2 infection among healthcare personnel in a healthcare department. *Enferm Infecc Microbiol Clin*. 2020. Epub 2020/11/10. doi: 10.1016/j.eimc.2020.09.015. PubMed PMID: 33162223; PubMed Central PMCID: PMC7556776.
64. Heinzerling A, Stuckey MJ, Scheuer T, Xu K, Perkins KM, Resseger H, et al. Transmission of COVID-19 to health care personnel during exposures to a hospitalized patient - Solano County, California, February 2020. *MMWR Morb Mortal Wkly Rep* 2020;69(15):472-6. Epub 2020/04/17. doi: 10.15585/mmwr.mm6915e5. PubMed PMID: 32298249.
65. Lai X, Wang M, Qin C, Tan L, Ran L, Chen D, et al. Coronavirus Disease 2019 (COVID-2019) infection among health care workers and implications for prevention measures in a tertiary hospital in Wuhan, China. *JAMA Netw Open*. 2020;3(5):e209666. Epub 2020/05/22. doi: 10.1001/jamanetworkopen.2020.9666. PubMed PMID: 32437575.
66. Moscola J, Sembajwe G, Jarrett M, Farber B, Chang T, McGinn T, et al. Prevalence of SARS-CoV-2 antibodies in health care personnel in the New York City area. *JAMA*. 2020. Epub 2020/08/12. doi: 10.1001/jama.2020.14765. PubMed PMID: 32780804.
67. Ng K, Poon BH, Kiat Puar TH, Shan Quah JL, Loh WJ, Wong YJ, et al. COVID-19 and the risk to health care workers: a case report. *Ann Intern Med*. 2020. Epub 2020/03/17. doi: 10.7326/120-0175. PubMed PMID: 32176257; PubMed Central PMCID: PMC7081171.
68. Pérez-García F, Pérez-Zapata A, Arcos N, De la Mata M, Ortiz M, Simón E, et al. SARS-CoV-2 infection among hospital workers of one of the most severely affected institutions in Madrid, Spain: a surveillance cross-sectional study. *Infect Control Hosp Epidemiol*. 2020:1-28. Epub 2020/10/30. doi: 10.1017/ice.2020.1303. PubMed PMID: 33118904.
69. Piapan L, De Michieli P, Ronchese F, Rui F, Mauro M, Peresson M, et al. COVID-19 outbreak in healthcare workers in Trieste hospitals (North-Eastern Italy). *J Hosp Infect*. 2020. Epub 2020/08/18. doi: 10.1016/j.jhin.2020.08.012. PubMed PMID: 32805309; PubMed Central PMCID: PMC7427613.

70. Ran L, Chen X, Wang Y, Wu W, Zhang L, Tan X. Risk factors of healthcare workers with Corona Virus Disease 2019: a retrospective cohort study in a designated hospital of Wuhan in China. *Clin Infect Dis*. 2020. Epub 2020/03/18. doi: 10.1093/cid/ciaa287. PubMed PMID: 32179890.
71. Sotgiu G, Barassi A, Miozzo M, Sadari L, Piana A, Orfeo N, et al. SARS-CoV-2 specific serological pattern in healthcare workers of an Italian COVID-19 forefront hospital. *BMC Pulm Med*. 2020;20(1):203. Epub 2020/07/31. doi: 10.1186/s12890-020-01237-0. PubMed PMID: 32727446; PubMed Central PMCID: PMC7388425.
72. Wang Q, Huang X, Bai Y, Wang X, Wang H, Hu X, et al. Epidemiological characteristics of COVID-19 in medical staff members of neurosurgery departments in Hubei province: A multicentre descriptive study. *medRxiv*. 2020:2020.04.20.20064899. doi: 10.1101/2020.04.20.20064899.
73. Wang X, Pan Z, Cheng Z. Association between 2019-nCoV transmission and N95 respirator use. *J Hosp Infect*. 2020(March 3). Epub 2020/03/03. doi: 10.1016/j.jhin.2020.02.021.
74. Wang X, Jiang X, Huang Q, Wang H, Gurarie D, Ndeffo-Mbah M, et al. Risk factors of SARS-CoV-2 infection in healthcare workers: a retrospective study of a nosocomial outbreak. *Sleep Med X*. 2020;2. doi: 10.1016/j.sleepx.2020.100028.
75. Zhang GQ, Pan HQ, Hu XX, He SJ, Chen YF, Wei CJ, et al. The role of isolation rooms, facemasks and intensified hand hygiene in the prevention of nosocomial COVID-19 transmission in a pulmonary clinical setting. *Infect Dis Poverty*. 2020;9(1):104. Epub 2020/07/25. doi: 10.1186/s40249-020-00725-z. PubMed PMID: 32703281; PubMed Central PMCID: PMC7376530.
76. Al Maskari Z, Al Blushi A, Khamis F, Al Tai A, Al Salmi I, Al Harthi H, et al. Characteristics of healthcare workers infected with COVID-19, a cross-sectional observational study. *Int J Infect Dis*. 2020. Epub 2020/10/12. doi: 10.1016/j.ijid.2020.10.009. PubMed PMID: 33039607; PubMed Central PMCID: PMC7543901.
77. Amendola A, Tanzi E, Folgori L, Barcellini L, Bianchi S, Gori M, et al. Low seroprevalence of SARS-CoV-2 infection among healthcare workers of the largest children hospital in Milan during the pandemic wave. *Infect Control Hosp Epidemiol*. 2020:1-6. Epub 2020/08/08. doi: 10.1017/ice.2020.401. PubMed PMID: 32758311.
78. Barallat J, Fernández-Rivas G, Quirant-Sánchez B, González V, Doladé M, Martínez-Caceres E, et al. Seroprevalence of SARS-CoV-2 IgG specific antibodies among healthcare workers in the Northern Metropolitan Area of Barcelona, Spain, after the first pandemic wave. *PloS One*. 2020;15(12):e0244348. Epub 2020/12/29. doi: 10.1371/journal.pone.0244348. PubMed PMID: 33370363; PubMed Central PMCID: PMC7769254.
79. Baker JM, Nelson KN, Overton E, Lopman BA, Lash TL, Photakis M, et al. Quantification of Occupational and Community Risk Factors for SARS-CoV-2 Seropositivity Among Health Care Workers in a Large U.S. Health Care System. *Ann Intern Med*. 2021. Epub 2021/01/30. doi: 10.7326/m20-7145. PubMed PMID: 33513035.
80. Dacosta-Urbieto A, Rivero-Calle I, Pardo-Seco J, Redondo-Collazo L, Salas A, Gómez-Rial J, et al. Seroprevalence of SARS-CoV-2 among pediatric healthcare workers in Spain. *Front Ped*. 2020;8:547. Epub 2020/10/13. doi: 10.3389/fped.2020.00547. PubMed PMID: 33042908; PubMed Central PMCID: PMC7516980.
81. Dalla Volta A, Valcamonico F, Pedersini R, Fornaro C, Tovazzi V, Monteverdi S, et al. The spread of SARS-CoV-2 infection among the medical oncology staff of ASST Spedali Civili

- of Brescia: efficacy of preventive measures. *Front Oncol.* 2020;10:1574. Epub 2020/10/06. doi: 10.3389/fonc.2020.01574. PubMed PMID: 33014806; PubMed Central PMCID: PMC7462005.
82. Ebinger JE, Botwin GJ, Albert CM, Alotaibi M, Arditi M, Berg AH, et al. Seroprevalence of antibodies to SARS-CoV-2 in healthcare workers: a cross-sectional study. *BMJ Open.* 2021;11(2):e043584. Epub 2021/02/14. doi: 10.1136/bmjopen-2020-043584. PubMed PMID: 33579769; PubMed Central PMCID: PMC7883610.
83. Eyre DW, Lumley SF, O'Donnell D, Campbell M, Sims E, Lawson E, et al. Differential occupational risks to healthcare workers from SARS-CoV-2 observed during a prospective observational study. *eLife.* 2020;9. Epub 2020/08/22. doi: 10.7554/eLife.60675. PubMed PMID: 32820721; PubMed Central PMCID: PMC7486122.
84. Faíco-Filho KS, Carvalho JMA, Conte DD, de Souza Luna LK, Bellei N. COVID-19 in health care workers in a university hospital during the quarantine in São Paulo city. *Braz J Infect Dis.* 2020. Epub 2020/09/16. doi: 10.1016/j.bjid.2020.08.003. PubMed PMID: 32931758.
85. Fusco FM, Pisaturo M, Iodice V, Bellopede R, Tambaro O, Parrella G, et al. COVID-19 infections among healthcare workers in an infectious diseases specialized setting in Naples, Southern Italy: results of a cross-sectional surveillance study. *J Hosp Infect.* 2020. Epub 2020/06/23. doi: 10.1016/j.jhin.2020.06.021. PubMed PMID: 32565367.
86. Garralda Fernandez J, Molero Vilches I, Bermejo Rodríguez A, Cano Torres I, Colino Romay EI, García Arata I, et al. Impact of SARS-CoV-2 pandemic among health care workers in a secondary teaching hospital in Spain. *PloS One.* 2021;16(1):e0245001. Epub 2021/01/15. doi: 10.1371/journal.pone.0245001. PubMed PMID: 33444392.
87. Goenka M, Afzalpurkar S, Goenka U, Das SS, Mukherjee M, Jajodia S, et al. Seroprevalence of COVID-19 amongst health care workers in a tertiary care hospital of a metropolitan city from India. *J Assoc Physicians India.* 2020;68(11):14-9. Epub 2020/11/14. PubMed PMID: 33187030.
88. Herzberg J, Vollmer T, Fischer B, Becher H, Becker AK, Sahly H, et al. Prospective Sero-epidemiological Evaluation of SARS-CoV-2 among Health Care Workers in a German Secondary Care Hospital. *Int J Infect Dis.* 2021;102:136-43. Epub 2020/10/20. doi: 10.1016/j.ijid.2020.10.026. PubMed PMID: 33075538; PubMed Central PMCID: PMC7566663.
89. Hunter BR, Dbeibo L, Weaver CS, Beeler C, Saysana M, Zimmerman MK, et al. Seroprevalence of severe acute respiratory coronavirus virus 2 (SARS-CoV-2) antibodies among healthcare workers with differing levels of coronavirus disease 2019 (COVID-19) patient exposure. *Infect Control Hosp Epidemiol.* 2020:1-2. Epub 2020/08/04. doi: 10.1017/ice.2020.390. PubMed PMID: 32741406.
90. Jeremias A, Nguyen J, Levine J, Pollack S, Engellenner W, Thakore A, et al. Prevalence of SARS-CoV-2 infection among health care workers in a tertiary community hospital. *JAMA Int Med.* 2020. Epub 2020/08/12. doi: 10.1001/jamainternmed.2020.4214. PubMed PMID: 32780100.
91. Jespersen S, Mikkelsen S, Greve T, Kaspersen KA, Tolstrup M, Boldsen JK, et al. SARS-CoV-2 seroprevalence survey among 17,971 healthcare and administrative personnel at hospitals, pre-hospital services, and specialist practitioners in the Central Denmark Region. *Clin Infect Dis.* 2020. Epub 2020/10/05. doi: 10.1093/cid/ciaa1471. PubMed PMID: 33011792.
92. Jones CR, Hamilton FW, Thompson A, Morris TT, Moran E. SARS-CoV-2 IgG seroprevalence in healthcare workers and other staff at North Bristol NHS Trust: A sociodemographic analysis. *J Infect.* 2020. Epub 2020/12/04. doi: 10.1016/j.jinf.2020.11.036. PubMed PMID: 33271169; PubMed Central PMCID: PMC7704342.



93. Korth J, Wilde B, Dolff S, Anastasiou OE, Krawczyk A, Jahn M, et al. SARS-CoV-2-specific antibody detection in healthcare workers in Germany with direct contact to COVID-19 patients. *J Clin Virol*. 2020;104437. Epub 2020/05/15. doi: 10.1016/j.jcv.2020.104437. PubMed PMID: 32405256; PubMed Central PMCID: PMC7219425.
94. Krastinova E, Garrait V, Lecam MT, Coste A, Varon E, Delacroix I, et al. Household transmission and incidence of positive SARS-CoV-2 RT-PCR in symptomatic healthcare workers, clinical course and outcome: a French hospital experience. *Occup Environ Med*. 2020. Epub 2020/12/06. doi: 10.1136/oemed-2020-106866. PubMed PMID: 33277384; PubMed Central PMCID: PMC7722356.
95. Lackermair K, William F, Grzanna N, Lehmann E, Fichtner S, Kucher HB, et al. Infection with SARS-CoV-2 in primary care health care workers assessed by antibody testing. *Fam Pract*. 2020. Epub 2020/08/09. doi: 10.1093/fampra/cmaa078. PubMed PMID: 32766704.
96. Lahner E, Dilaghi E, Prestigiacomo C, Alessio G, Marcellini L, Simmaco M, et al. Prevalence of Sars-Cov-2 infection in health workers (HWs) and diagnostic test performance: the experience of a teaching hospital in Central Italy. *Int J Environ Res Public Health*. 2020;17(12). Epub 2020/06/25. doi: 10.3390/ijerph17124417. PubMed PMID: 32575505.
97. Lombardi A, Consonni D, Carugno M, Bozzi G, Mangioni D, Muscatello A, et al. Characteristics of 1,573 healthcare workers who underwent nasopharyngeal swab for SARS-CoV-2 in Milano, Lombardy, Italy. *Clin Microbiol Infect*. 2020;Jun 19:S1198-743X(20)30354-2. doi: 10.1101/2020.05.07.20094276. PubMed Central PMCID: PMC7305713.
98. Martin C, Montesinos I, Dauby N, Gilles C, Dahma H, Van Den Wijngaert S, et al. Dynamics of SARS-CoV-2 RT-PCR positivity and seroprevalence among high-risk healthcare workers and hospital staff. *J Hosp Infect*. 2020;106(1):102-6. Epub 2020/07/01. doi: 10.1016/j.jhin.2020.06.028. PubMed PMID: 32593608; PubMed Central PMCID: PMC7316468.
99. Moncunill G, Mayor A, Santano R, Jiménez A, Vidal M, Tortajada M, et al. SARS-CoV-2 seroprevalence and antibody kinetics among health care workers in a Spanish hospital after 3 months of follow-up. *J Infect Dis*. 2021;223(1):62-71. Epub 2020/11/12. doi: 10.1093/infdis/jiaa696. PubMed PMID: 33175145; PubMed Central PMCID: PMC7717341.
100. Olalla J, Correa AM, Martín-Escalante MD, Hortas ML, Martín-Sendarrubias MJ, Fuentes V, et al. Search for asymptomatic carriers of SARS-CoV-2 in healthcare workers during the pandemic: a Spanish experience. *QJM*. 2020. Epub 2020/08/11. doi: 10.1093/qjmed/hcaa238. PubMed PMID: 32777050.
101. Pereckaitė L, Dambrauskienė A, Urbonienė D, Sadauskas S, Petrikonis K, Naudžiūnas A, et al. SARS-CoV-2 seroprevalence in healthcare workers of Kaunas hospitals during the first wave of the COVID-19 pandemic. *Medicina (Kaunas)*. 2021;57(2). Epub 2021/02/11. doi: 10.3390/medicina57020148. PubMed PMID: 33562085.
102. Schmitz D, Vos M, Stolmeijer R, Lameijer H, Schönberger T, Gaakeer MI, et al. Association between personal protective equipment and SARS-CoV-2 infection risk in emergency department healthcare workers. *Eur J Emerg Med*. 2020. Epub 2020/10/27. doi: 10.1097/mej.0000000000000766. PubMed PMID: 33105329.
103. Shields AM, Faustini SE, Perez-Toledo M, Jossi S, Aldera EL, Allen JD, et al. SARS-CoV-2 seroconversion in health care workers. *medRxiv*. 2020:2020.05.18.20105197. doi: 10.1101/2020.05.18.20105197.
104. Shields A, Faustini SE, Perez-Toledo M, Jossi S, Aldera E, Allen JD, et al. SARS-CoV-2 seroprevalence and asymptomatic viral carriage in healthcare workers: a cross-sectional study.

Thorax. 2020;75(12):1089-94. Epub 2020/09/13. doi: 10.1136/thoraxjnl-2020-215414. PubMed PMID: 32917840; PubMed Central PMCID: PMC7462045.

105. Stubblefield WB, Talbot HK, Feldstein L, Tenforde MW, Rasheed MAU, Mills L, et al. Seroprevalence of SARS-CoV-2 among frontline healthcare personnel during the first month of caring for COVID-19 patients - Nashville, Tennessee. *Clin Infect Dis*. 2020. Epub 2020/07/07. doi: 10.1093/cid/ciaa936. PubMed PMID: 32628750.

106. Varona JF, Madurga R, Peñalver F, Abarca E, Almirall C, Cruz M, et al. Seroprevalence of SARS-CoV-2 antibodies in over 6000 healthcare workers in Spain. *Int J Epidemiol*. 2021. Epub 2021/01/13. doi: 10.1093/ije/dyaa277. PubMed PMID: 33434269.

107. Venugopal U, Jilani N, Rabah S, Shariff MA, Jawed M, Mendez Batres A, et al. SARS-CoV-2 seroprevalence among health care workers in a New York City hospital: A cross-sectional analysis during the COVID-19 pandemic. *Int J Infect Dis* 2021;102:63-9. Epub 2020/10/20. doi: 10.1016/j.ijid.2020.10.036. PubMed PMID: 33075539; PubMed Central PMCID: PMC7566823.

108. von Freyburg A, Hagedorn H, Brucher B, Schmidt A, Scherer MA. [COVID-19 cluster study at a teaching hospital]. *MMW Fortschritte der Medizin*. 2020;162(9):64-7. Epub 2020/05/15. doi: 10.1007/s15006-020-0482-z. PubMed PMID: 32405834.

109. Yogo N, Greenwood KL, Thompson L, Wells P, Munday S, Smith T, et al. Point Prevalence Survey to Evaluate the Seropositivity for COVID-19 among High-Risk Healthcare Workers. *Infect Control Hosp Epidemiol*. 2020:1-17. Epub 2020/12/16. doi: 10.1017/ice.2020.1370. PubMed PMID: 33317655.

110. Zheng L, Wang X, Zhou C, Liu Q, Li S, Sun Q, et al. Analysis of the infection status of the health care workers in Wuhan during the COVID-19 outbreak: A cross-sectional study. *Clin Infect Dis*. 2020. Epub 2020/05/16. doi: 10.1093/cid/ciaa588. PubMed PMID: 32409825.

111. Zhou F, Li J, Lu M, Ma L, Pan Y, Liu X, et al. Tracing asymptomatic SARS-CoV-2 carriers among 3674 hospital staff: a cross-sectional survey. *EClinicalMedicine*. 2020:100510. Epub 2020/09/22. doi: 10.1016/j.eclinm.2020.100510. PubMed PMID: 32954232; PubMed Central PMCID: PMC7490283.

112. Çelebi G, Pişkin N, Bekleviç A, Altunay Y, Keleş AS, Tüz MA, et al. Specific risk factors for SARS-CoV-2 transmission among health care workers in a university hospital. *Am J Infect Control*. 2020. Epub 2020/08/11. doi: 10.1016/j.ajic.2020.07.039. PubMed PMID: 32771498; PubMed Central PMCID: PMC7409872.

113. Chatterjee P, Anand T, Singh KJ, Rasaily R, Singh R, Das S, et al. Healthcare workers & SARS-CoV-2 infection in India: A case-control investigation in the time of COVID-19. *Indian J Med Res*. 2020;151(5):459-67. Epub 2020/07/03. doi: 10.4103/ijmr.IJMR\_2234\_20. PubMed PMID: 32611916.

114. Khalil MM, Alam MM, Arefin MK, Chowdhury MR, Huq MR, Chowdhury JA, et al. Role of personal protective measures in prevention of COVID-19 spread among physicians in Bangladesh: a multicenter cross-sectional comparative study. *SN Compr Clin Med*. 2020:1-7. Epub 2020/09/10. doi: 10.1007/s42399-020-00471-1. PubMed PMID: 32904377; PubMed Central PMCID: PMC7454131.

115. Fusco FM, Pisaturo M, Iodice V, Bellopede R, Tambaro O, Parrella G, et al. COVID-19 among healthcare workers in a specialist infectious diseases setting in Naples, Southern Italy: results of a cross-sectional surveillance study. *J Hosp Infect*. 2020;105(4):596-600. Epub 2020/06/23. doi: 10.1016/j.jhin.2020.06.021. PubMed PMID: 32565367; PubMed Central PMCID: PMC7301109.

116. Wang M, Nie X, Huang S, Pi W, Wang D, Zhou M, et al. Epidemiological characteristics and transmission dynamics of paediatric cases with coronavirus disease 2019 in Hubei province, China. *J Paediatr Child Health*. 2020. Epub 2020/12/09. doi: 10.1111/jpc.15287. PubMed PMID: 33289923.