

## UPDATE ALERTS

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

This is the first monthly update alert for a living review on the epidemiology of and risk factors for coronavirus infections in health care workers (HCWs) (1). Searches were updated from 24 April 2020 to 24 May 2020, using the same search strategies as the original review, and we identified 1125 citations. Applying the same inclusion criteria, we identified 37 additional studies for this update (2-33-34-38). All evaluated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, except for 2 studies, identified from reference lists, on Middle East Respiratory Syndrome coronavirus (MERS-CoV) infection (12, 24).

The original rapid review included 15 studies on the burden of SARS-CoV-2 infection (Supplement Tables 1 and 2; all supplemental tables are available at Annals.org). Twenty-nine new studies ( $N = 573\ 352$ ) were added: 11 cohort (2, 6, 8, 11, 14, 18, 21-23, 32, 35), 17 case-control (3, 5, 7, 13, 17, 19, 20, 25-31, 33, 36, 37), and 1 case series (15). Four studies were conducted in China, 4 in the United States, 18 in Europe, and 2 in Iran, and 1 study was conducted in both the United States and United Kingdom. Fourteen studies had not been peer-reviewed (2, 6, 9, 16, 17, 21-23, 28-30, 34, 35, 38). Other study limitations were inadequate information on clinical presentation or selection for testing; there was also variability in populations, clinical setting, and methods for diagnosing SARS-CoV-2 infection. In the new studies, the proportion of HCWs with coronavirus disease 2019 (COVID-19) ranged from 1.1% to 23.3% (7 studies) (2, 3, 8, 14, 35-37); SARS-CoV-2 infection (not necessarily meeting COVID-19 criteria) ranged from 0.4% to 49.6% (19 studies) (5-7, 11, 15, 17-19, 21-23, 25-29, 31-33), and SARS-CoV-2 antibodies ranged from 1.6% to 24.4% (3 studies) (13, 28, 30). As in the original rapid review, SARS-CoV-2 infection seemed to be somewhat less severe in HCWs than in non-HCWs (5, 6, 15, 16), with a case-fatality rate of 0% and 1.2% in 2 studies (15, 16). One analysis of all cases in Italy estimated slightly higher mortality due to COVID-19 in physicians and dentists (0.046%) than in the general population (0.039%), due to increased infection incidence (20). Eight new studies were consistent with previous findings that HCWs in areas affected by COVID-19 report high levels of depression, anxiety, and psychological distress (Supplement Table 2) (4, 9, 10, 16, 26, 34, 36, 38). Like prior studies, the new studies used a cross-sectional design, did not control for baseline symptoms, did not have a non-HCW control group, and did not control for work exposures.

Ten new studies ( $N = 149\ 240$ ) evaluated risk factors for SARS-CoV-2 infection in HCWs (Supplement Table 3) (2, 6, 13, 14, 17, 22, 28, 33, 35, 37). All were susceptible to recall bias and did not adjust for confounders. The most frequently addressed risk factors were age, sex, hospital department, and HCW role or position. Results were consistent with the original rapid review (Supplement Tables 6 to 10).

Two small studies ( $n = 40$  and 9) identified through reference list review addressed MERS-CoV infections in HCWs

(Supplement Tables 1 and 5) (12, 24). Results did not change the conclusions of the original rapid review.

Roger Chou, MD

Tracy Dana, MLS

Pacific Northwest Evidence-based Practice Center and Oregon Health & Science University, Portland, Oregon

David I. Buckley, MD, MPH

Pacific Northwest Evidence-based Practice Center and School of Public Health, Oregon Health & Science University-Portland State University, Portland, Oregon

Shelley Selph, MD, MPH

Pacific Northwest Evidence-based Practice Center and Oregon Health & Science University, Portland, Oregon

Rongwei Fu, PhD

Pacific Northwest Evidence-based Practice Center and School of Public Health, Oregon Health & Science University-Portland State University, Portland, Oregon

Annette M. Totten, PhD

Pacific Northwest Evidence-based Practice Center and Oregon Health & Science University, Portland, Oregon

**Disclaimer:** The original review was funded by WHO. WHO staff developed the key questions and scope for the original review but did not have any role in the selection, assessment, or synthesis of evidence for this update.

**Disclosures:** Disclosures can be viewed at [www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L20-0768](http://www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=L20-0768).

**Corresponding Author:** Roger Chou, MD, Oregon Health & Science University, 3181 SW Sam Jackson Park Road, Mail Code BICC, Portland, OR 97239; e-mail, [chour@ohsu.edu](mailto:chour@ohsu.edu).

doi:10.7326/L20-0768

**References**

1. Chou R, Dana T, Buckley DI, et al. Epidemiology of and risk factors for coronavirus infection in health care workers. *Ann Intern Med*. 2020. [PMID: 32369541] doi:10.7326/M20-1632
2. Bai Y, Wang X, Huang Q, et al. SARS-CoV-2 infection in health care workers: a retrospective analysis and a model study. Preprint. medRxiv. Posted 1 April 2020. doi:10.1101/2020.03.29.20047159
3. Clemency BM, Varughese R, Scheafer DK, et al. Symptom criteria for COVID-19 testing of health care workers. *Acad Emerg Med*. 2020. [PMID: 32396670] doi:10.1111/acem.14009
4. Du J, Dong L, Wang T, et al. Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan [Letter]. *Gen Hosp Psychiatry*. 2020. [PMID: 32381270] doi:10.1016/j.genhosppsych.2020.03.011
5. Felice C, Di Tanna GL, Zanus G, et al. Impact of COVID-19 outbreak on healthcare workers in Italy: results from a national E-survey. *J Community Health*. 2020. [PMID: 32440724] doi:10.1007/s10900-020-00845-5
6. Folgueira MD, Munoz-Ruiperez C, Alonso-Lopez MA, et al. SARS-CoV-2 infection in health care workers in a large public hospital in Madrid, Spain, during March 2020. Preprint. medRxiv. Posted 27 April 2020. doi:10.1101/2020.04.07.20055723

7. Gheysarzadeh A, Sadeghifard N, Safari M, et al. Report of 5 nurses infecting COVID-19 during patient care: case Series [Editorial]. *New Microbes New Infect.* 2020;100694. [PMID: 32405418] doi:10.1016/j.nmni.2020.100694
8. Heinzerling A, Stuckey MJ, Scheuer T, 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;69:472-476. [PMID: 32298249] doi:10.15585/mmwr.mm6915e5
9. Huang F, Yang Z, Wang Y, et al. Study on health-related quality of life and influencing factors of pediatric medical staff during the COVID-19 outbreak. Preprint. Research Square. Posted 12 May 2020. doi:10.21203/rs.3.rs-27641/v1
10. Huang JZ, Han MF, Luo TD, et al. [Mental health survey of medical staff in a tertiary infectious disease hospital for COVID-19]. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi.* 2020;38:192-195. [PMID: 32131151] doi:10.3760/cma.j.cn121094-20200219-00063
11. Khalil A, Hill R, Ladhani S, et al. COVID-19 screening of health-care workers in a London maternity hospital [Letter]. *Lancet Infect Dis.* 2020. [PMID: 32437699] doi:10.1016/S1473-3099(20)30403-5
12. Kim T, Jung J, Kim SM, et al. Transmission among healthcare worker contacts with a Middle East respiratory syndrome patient in a single Korean centre [Letter]. *Clin Microbiol Infect.* 2016;22:e11-e13. [PMID: 26384679] doi:10.1016/j.cmi.2015.09.007
13. Korth J, Wilde B, Dolff S, et al. SARS-CoV-2-specific antibody detection in healthcare workers in Germany with direct contact to COVID-19 patients. *J Clin Virol.* 2020;128:104437. [PMID: 32434708] doi:10.1016/j.jcv.2020.104437
14. Lai X, Wang M, Qin C, 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:e209666. [PMID: 32437575] doi:10.1001/jamanetworkopen.2020.9666
15. Lapolla P, Mingoli A, Lee R. Deaths from COVID-19 in healthcare workers in Italy-What can we learn? *Infect Control Hosp Epidemiol.* 2020;1-2. [PMID: 32408922] doi:10.1017/ice.2020.241
16. Liu Y, Liu X, Gao B, et al. Mental distress among frontline health care workers outside the central epidemic area during the novel coronavirus disease (COVID-19) outbreak in China: a cross-sectional study. Preprint. Research Square. Posted 11 May 2020. doi:10.21203/rs.3.rs-26633/v1
17. Lombardi A, Consonni D, Carugno M, et al. Characteristics of 1,573 health care workers who had nasopharyngeal swab for SARS-CoV-2 in Milano, Lombardy, Italy. Preprint. medRxiv. Posted 11 May 2020. doi:10.1101/2020.05.07.20094276
18. Luigi V, Alessandro D, Giovanni M, et al. Prevention and protection measures of healthcare workers exposed in health settings to severe acute respiratory infections from SARS-CoV-2 in a university hospital in Bari, Apulia Region, Southern Italy. *J Hosp Infect.* 2020. [PMID: 32445776] doi:10.1016/j.jhin.2020.05.024
19. Maida M, Sferrazza S, Savarino E, et al; Italian Society of Gastroenterology (SIGE). Impact of the COVID-19 pandemic on gastroenterology divisions in Italy: a national survey. *Dig Liver Dis.* 2020. [PMID: 32425733] doi:10.1016/j.dld.2020.05.017
20. Manzoni P, Milillo C. Covid-19 mortality in Italian doctors [Letter]. *J Infect.* 2020. [PMID: 32445726] doi:10.1016/j.jinf.2020.05.034
21. Murphy DL, Barnard LM, Drucker CJ, et al. Occupational exposures and programmatic response to COVID-19 pandemic: an emergency medical services experience. Preprint. medRxiv. Posted 24 May 2020. doi:10.1101/2020.05.22.20110718
22. Mutambudzi M, Niedzwiedz CL, Macdonald EB, et al. Occupation and risk of COVID-19: prospective cohort study of 120,621 UK Biobank participants. Preprint. medRxiv. Posted 23 May 2020. doi:10.1101/2020.05.22.20109892
23. Nguyen LH, Drew DA, Joshi AD, et al. Risk of COVID-19 among frontline healthcare workers and the general community: a prospective cohort study. Preprint. medRxiv. Posted 25 May 2020. doi:10.1101/2020.04.29.20084111
24. Park JY, Kim BJ, Chung KH, et al. APSR6-0642: Factors associated with transmission of Middle East Respiratory Syndrome among Korean health care workers: infection control via extended health care contact management in a secondary outbreak hospital. In: Poster Presentation. *Respirology*, 21:80-213. doi:10.1111/resp.12939\_15
25. Rivett L, Sridhar S, Sparkes D, et al; CITIID-NIHR COVID-19 BioResource Collaboration. Screening of healthcare workers for SARS-CoV-2 highlights the role of asymptomatic carriage in COVID-19 transmission. *Elife.* 2020;9. [PMID: 32392129] doi:10.7554/eLife.58728
26. Romero CS, Catalá J, Delgado C, et al. COVID-19 psychological impact in 3109 healthcare workers in Spain: the PSIMCOV group. *Psychol Med.* 2020;1-14. [PMID: 32404217] doi:10.1017/S0033291720001671
27. Roxby AC, Greninger AL, Hatfield KM, et al. Outbreak investigation of COVID-19 among residents and staff of an independent and assisted living community for older adults in Seattle, Washington. *JAMA Intern Med.* 2020. [PMID: 32437547] doi:10.1001/jamainternmed.2020.2233
28. Shields AM, Faustini SE, Perez-Toledo M, et al. SARS-CoV-2 seroconversion in health care workers. Preprint. medRxiv. Posted 19 May 2020. doi:10.1101/2020.05.18.20105197
29. Sikkema RS, Pas S, Nieuwenhuijse DF, et al. COVID-19 in healthcare workers in three hospitals in the South of the Netherlands, March 2020. Preprint. medRxiv. Posted 1 May 2020. doi:10.1101/2020.04.26.20079418
30. Sikora K, Barwick I, Hamilton C. Serological prevalence of antibodies to SARS CoV-2 amongst cancer centre staff. medRxiv. Posted 20 May 2020. doi:10.1101/2020.05.16.20099408
31. Tang JW, Young S, May S, et al. Comparing hospitalised, community and staff COVID-19 infection rates during the early phase of the evolving COVID-19 epidemic [Letter]. *J Infect.* 2020. [PMID: 32442455] doi:10.1016/j.jinf.2020.05.029
32. Treibel TA, Manisty C, Burton M, et al. COVID-19: PCR screening of asymptomatic health-care workers at London hospital [Letter]. *Lancet.* 2020;395:1608-1610. [PMID: 32401714] doi:10.1016/S0140-6736(20)31100-4
33. von Freyburg A, Hagedorn H, Brücher B, et al. [COVID-19 cluster study at a teaching hospital]. *MMW Fortschr Med.* 2020;162:64-67. [PMID: 32405834] doi:10.1007/s15006-020-0482-z
34. Wang B, Sun J, Gao F, et al. A study on mental health status among the staff in a designated hospital for COVID-19. Preprint. Research Square. Posted 30 April 2020. doi:10.21203/rs.3.rs-23224/v1
35. Wang Q, Huang X, Bai Y, et al. Epidemiological characteristics of COVID-19 in medical staff members of neurosurgery departments in Hubei province: a multicentre descriptive study. Preprint. medRxiv. 24 April 2020. doi:10.1101/2020.04.20.20064899
36. Zhang SX, Liu J, Afshar Jahanshahi A, et al. At the height of the storm: healthcare staff's health conditions and job satisfaction and their associated predictors during the epidemic peak of COVID-19 [Letter]. *Brain Behav Immun.* 2020. [PMID: 32387345] doi:10.1016/j.bbi.2020.05.010
37. Zheng L, Wang X, Zhou C, 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. [PMID: 32409825] doi:10.1093/cid/ciaa588
38. Zhou Q, Lai X, Wan C, et al. Prevalence and impact of burnout, secondary traumatic stress and compassion satisfaction on hand hygiene of health care workers in medical aid team during COVID-19 pandemic. Preprint. Research Square. Posted 24 April 2020. doi:10.21203/rs.3.rs-28820/v1