

UPDATE ALERTS

Update Alert 8: Masks for Prevention of Respiratory Virus Infections, Including SARS-CoV-2, in Health Care and Community Settings

This is the eighth update alert for a living rapid review (1) on the use of masks for the prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings. The first 3 updates (2–4) were monthly, after which the interval was switched to bimonthly (5, 6). Beginning in June 2021, the interval was extended to biannually. For this update, searches were done from 3 December 2021 to 2 June 2022 using the same search methods as the original review. Inclusion was restricted to randomized trials and observational studies that controlled for confounders. Non-peer-reviewed studies were excluded unless they were based on data collected after February 2021 to capture evidence on mask use in the B.1.617.2 (Delta) and B.1.1.529 (Omicron) variant predominant periods. The update searches identified 1592 citations. No new randomized controlled trials (RCTs) and 5 new observational studies on the association of mask use and SARS-CoV-2 infection met inclusion criteria (Supplement Table 1). Three studies were done in community settings (7–9), and 2 studies (10, 11) were done in health care settings. One preprint study (9) of mask use in community settings collected data during Delta and Omicron predominant periods; the other studies were done before the emergence of these variants. All studies had methodological limitations, including unclear or low participation rate, potential recall bias, and failure to report attrition or missing data (Supplement Table 2).

COMMUNITY SETTINGS

Three new observational studies (7–9), all done in the United States, evaluated the association between mask use in community settings and risk for SARS-CoV-2 infection.

In previous updates, the evidence for mask use versus no use for prevention of SARS-CoV-2 infection in community settings was assessed as low to moderate strength favoring mask use, based on 2 RCTs (12, 13) and 8 observational studies (14–21). For this update, 2 new observational studies were consistent with prior evidence finding mask use associated with reduced risk for SARS-CoV-2 infection (Supplement Table 3). The adjusted odds ratio (OR) for mask use in public indoor settings versus no use was 0.51 (95% CI, 0.29 to 0.93) in 1 new study (7). The second, non-peer-reviewed study evaluated mask use for any interaction within a distance of less than 6 feet (excluding household members) (9). Wearing a mask for at least 1 day for such interactions within the preceding 10 days was associated with decreased risk for SARS-CoV-2 infection versus no mask use. The reduction in risk was similar in the pre-Delta (July 2020 to June 2021; adjusted OR, 0.60 [CI, 0.52 to 0.70]) and Delta-predominant (July 2021 to November 2021; adjusted OR, 0.65 [CI, 0.53 to 0.81]) eras but attenuated in the Omicron-predominant era (December 2021 to February 2022; adjusted OR, 0.86 [CI, 0.76 to 0.97]). Because the new studies were observational and had methodological limitations, the evidence for benefits of mask use versus no use for prevention of SARS-CoV-2 infection in the community remains low to moderate (Supplement Table 4).

One of the new fair-quality studies (7) found surgical masks (adjusted OR, 0.34 [CI, 0.13 to 0.90]) and N95 or KN95 respirators (adjusted OR, 0.17 [CI, 0.05 to 0.64]) each associated with reduced risk for SARS-CoV-2 infection versus no mask use (Supplement Table 3). Cloth mask use was also associated with a reduced risk for infection compared with no use, but the estimate was imprecise (adjusted OR, 0.44 [CI, 0.17 to 1.17]). The study did not report risk estimates comparing mask types. On the basis of the adjusted estimates for masks versus no masks provided in the study, we calculated adjusted ORs for N95 and KN95 respirators versus surgical masks (adjusted OR, 0.50 [CI, 0.10 to 2.48]) and surgical versus cloth masks (adjusted OR, 0.77 [CI, 0.20 to 3.03]), which were imprecise. The correlation among the adjusted ORs was not reported; we assumed correlation equals 0, resulting in wider CIs than if correlation was present. The new fair-quality study provided insufficient evidence for N95 versus surgical mask (no prior studies) and did not change previous assessments (Supplement Table 4) of low strength of evidence for surgical masks versus no masks in community settings (based on 2 prior RCTs [12, 13] and 1 observational study [15]), low strength of evidence for no difference between surgical and cloth masks (based on 1 prior RCT [13] and 1 prior observational study [15]), and insufficient evidence for cloth masks versus no masks (based on 1 prior RCT [13] and 1 observational study [15]) and N95 respirators versus no masks (no prior studies).

One other new study (8) evaluated the association between adherence to mask use among health care workers when outside of work and risk for SARS-CoV-2 infection, but the estimate was imprecise (for adherence all of the time versus most of the time, some of the time, or never: adjusted hazard ratio, 0.8 [CI, 0.5 to 1.6]). The strength of evidence for consistent or always mask use versus inconsistent mask use in the community is insufficient (no prior studies) (Supplement Table 4).

HEALTH CARE SETTINGS

Two new cohort studies (10, 11) evaluated mask use and risk for SARS-CoV-2 infection in health care settings (Supplement Tables 2 and 4). One was a secondary publication (11) for a previously included study (22). In univariate analysis, it found N95 respirator use associated with increased risk for SARS-CoV-2 infection versus nonuse (OR, 7.8 [CI, 4.0 to 15.2]) (Supplement Table 3), but in multivariate analysis, the association between N95 respirator use was not statistically significant enough to be included in the multivariate model (criteria for selecting variables for model not reported); thus, the observed univariate association was likely related to confounding due to increased exposures or other factors in health care workers using N95 masks. The new study did not change the previous assessment of evidence on N95 versus no masks as insufficient (based on 3 prior studies [23–25]) (Supplement Table 4). One other new study (10) evaluated the association between consistency of mask use and risk for SARS-CoV-2 infection, but the estimate was very imprecise (for mask use at work all or nearly all of the time versus less than nearly all of the time (adjusted OR, 4.0 [CI, 0.7 to 19.5]) (Supplement Table 3). Therefore, the evidence on consistency of mask use remains insufficient (Supplement Table 4).

Although this was planned as the final update, a large randomized trial of N95 versus surgical masks (26) has been completed, although results are not yet published. Because this

trial could affect findings for this comparison, 1 additional update will be done after its publication.

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Correction: The Supplement was amended on 27 September 2022 to correct errors in two of the tables. The results and strength of evidence described in Update Alert 8 were not affected by the corrections. A correction has been published (doi:10.7326/L22-0373).

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References

- Chou R, Dana T, Jungbauer R, et al. Masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings. A living rapid review. *Ann Intern Med.* 2020;173:542-55. [PMID: 32579379] doi:10.7326/M20-3213
- Chou R, Dana T, Jungbauer R, et al. Update alert: masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings [Letter]. *Ann Intern Med.* 2020;173:W86. [PMID: 32687391] doi:10.7326/L20-0948
- Chou R, Dana T, Jungbauer R, et al. Update alert 2: masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings [Letter]. *Ann Intern Med.* 2020;173:132. [PMID: 32853032] doi:10.7326/L20-1067
- Chou R, Dana T, Jungbauer R, et al. Update alert 3: masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings [Letter]. *Ann Intern Med.* 2020;173:169. [PMID: 33105095] doi:10.7326/L20-1292
- Chou R, Dana T, Jungbauer R, et al. Update alert 4: masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings [Letter]. *Ann Intern Med.* 2021;174:W24. [PMID: 33370171] doi:10.7326/L20-1429
- Chou R, Dana T, Jungbauer R, et al. Update alert 5: masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings. *Ann Intern Med.* 2021;174:W47. [PMID: 33683928] doi:10.7326/L21-0116
- Andrejko KL, Pry JM, Myers JF, et al; California COVID-19 Case-Control Study Team. Effectiveness of face mask or respirator use in indoor public settings for prevention of SARS-CoV-2 infection - California, February-December 2021. *MMWR Morb Mortal Wkly Rep.* 2022;71:212-16. [PMID: 35143470] doi:10.15585/mmwr.mm7106e1
- Doernberg SB, Holubar M, Jain V, et al; CHART Study Consortium. Incidence and prevalence of COVID-19 within a healthcare worker cohort during the first year of the SARS-CoV-2 pandemic. *Clin Infect Dis.* 2022. [PMID: 35279023] doi:10.1093/cid/ciac210
- Tjaden AH, Gibbs M, Runyon M, et al. Association between self-reported masking behavior and SARS-CoV-2 infection wanes from Delta to Omicron-predominant periods—North Carolina COVID-19 Community Research Partnership. *medRxiv.* Preprint posted online 28 May 2022. doi:10.1101/2022.05.27.22275689
- Howard-Anderson JR, Adams C, Dube WC, et al. Occupational risk factors for severe acute respiratory coronavirus virus 2 (SARS-CoV-2) infection among healthcare personnel: a 6-month prospective analysis of the COVID-19 Prevention in Emory Healthcare Personnel (COPE) Study. *Infect Control Hosp Epidemiol.* 2022;1-8. [PMID: 35156597] doi:10.1017/ice.2021.518
- Piapan L, De Michieli P, Ronchese F, et al. COVID-19 outbreaks in hospital workers during the first COVID-19 wave. *Occup Med (Lond).* 2022;72:110-17. [PMID: 34919710] doi:10.1093/occmed/kqab161
- Bundgaard H, Bundgaard JS, Raaschou-Pedersen DET, et al. Effectiveness of adding a mask recommendation to other public health measures to prevent SARS-CoV-2 infection in Danish mask wearers. A randomized controlled trial. *Ann Intern Med.* 2021;174:335-43. [PMID: 33205991] doi:10.7326/M20-6817
- Abaluck J, Kwong LH, Styczynski A, et al. Impact of community masking on COVID-19: a cluster-randomized trial in Bangladesh. *Science.* 2022;375:eabi9069. [PMID: 34855513] doi:10.1126/science.abi9069
- Wang Y, Tian H, Zhang L, et al. Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. *BMJ Glob Health.* 2020;5. [PMID: 32467353] doi:10.1136/bmjgh-2020-002794
- Doung-Ngern P, Suphanchaimat R, Panjangampatthana A, et al. Case-control study of use of personal protective measures and risk for SARS-CoV 2 infection, Thailand. *Emerg Infect Dis.* 2020;26:2607-616. [PMID: 32931726] doi:10.3201/eid2611.203003
- van den Broek-Altenburg EM, Atherly AJ, Diehl SA, et al. Jobs, housing, and mask wearing: cross-sectional study of risk factors for COVID-19. *JMIR Public Health Surveill.* 2021;7:e24320. [PMID: 33315576] doi:10.2196/24320
- Gonçalves MR, Dos Reis RCP, Tólio RP, et al. Social distancing, mask use, and transmission of severe acute respiratory syndrome coronavirus 2, Brazil, April-June 2020. *Emerg Infect Dis.* 2021;27:2135-143. [PMID: 34087090] doi:10.3201/eid2708.204757
- Lio CF, Cheong HH, Lei CI, et al. Effectiveness of personal protective health behaviour against COVID-19. *BMC Public Health.* 2021;21:827. [PMID: 33926406] doi:10.1186/s12889-021-10680-5
- Rebmann T, Loux TM, Arnold LD, et al. SARS-CoV-2 transmission to masked and unmasked close contacts of university students with COVID-19 - St. Louis, Missouri, January-May 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70:1245-48. [PMID: 34499631] doi:10.15585/mmwr.mm7036a3
- Sharif N, Alzahrani KJ, Ahmed SN, et al. Protective measures are associated with the reduction of transmission of COVID-19 in Bangladesh: a nationwide cross-sectional study. *PLoS One.* 2021;16:e0260287. [PMID: 34807962] doi:10.1371/journal.pone.0260287
- Sugimura M, Chimed-Ochir O, Yumiya Y, et al. The association between wearing a mask and COVID-19. *Int J Environ Res Public Health.* 2021;18. [PMID: 34501719] doi:10.3390/ijerph18179131
- Piapan L, De Michieli P, Ronchese F, et al. COVID-19 outbreak in healthcare workers in hospitals in Trieste, North-east Italy. *J Hosp Infect.* 2020;106:626-8. [PMID: 32805309] doi:10.1016/j.jhin.2020.08.012
- Sims MD, Maine GN, Childers KL, et al. Coronavirus disease 2019 (COVID-19) seropositivity and asymptomatic rates in healthcare workers are associated with job function and masking. *Clin Infect Dis.* 2021;73:S154-62. [PMID: 33150375] doi:10.1093/cid/ciaa1684
- Wang X, Pan Z, Cheng Z. Association between 2019-nCoV transmission and N95 respirator use [Letter]. *J Hosp Infect.* 2020;105:104-5. [PMID: 32142885] doi:10.1016/j.jhin.2020.02.021
- Venugopal U, Jilani N, Rabah S, 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. [PMID: 33075539] doi:10.1016/j.ijid.2020.10.036
- Medical Masks vs N95 Respirators for COVID-19 [clinical trial]. Accessed at www.clinicaltrials.gov/ct2/show/NCT04296643 on 29 June 2022.