Supplementary Material*

Chou R, Dana T, Jungbauer R. Update alert 8: masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings. Ann Intern Med. 2022. [Epub ahead of print]. doi:10.7326/L22-0272

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

Supplement Table 1. Study characteristics of new observational studies of mask use – Update Alert #8

Author, year Country Study design	Inclusion criteria	Sample size	Age	Female (%)	Definition of infection
Community setting					
Andrejko et al 2022 (7) United States Case-control	Cases (SARS-CoV-2 infection) and controls (no SARS-CoV-2 infection) who underwent PCR testing	Cases: 652 Controls: 1,176	Mean age not reported Cases: 32% age 18-29 years, 36% age 30-49 years Controls: 30% 18-29 years, 35% 30-49 years	Cases: 51% Controls: 51%	Cases and controls: SARS-CoV-2 infection based on PCR testing
Doernberg et al 2022 (8) United States Prospective cohort	HCWs from one of three medical centers in the San Francisco, CA area	2,435	Mean age 40 years	79%	SARS-CoV-2 seropositivity or infection based on PCR testing
Tjaden et al 2022* (9) United States Case-control	Self-reported cases (SARS-CoV-2 positive test) and controls (no SARS-CoV-2 positive test); approximately one-third of community enrolled participants were HCWs	Cases: 3,901 Controls: 27,813	Mean age not reported Cases: 27% age 18-39 years, 38% 40-54 years, 22% 55-64 years Controls: 29% age 18-39 years, 29% 40-54 years, 21% 55-64 years	Cases: 72% Controls: 69%	Self-report SARS-CoV-2 infection
Healthcare setting					
Howard-Anderson et al 2022 (10) United States Prospective cohort	HCWs at an academic health system comprised of 4 hospitals and associated clinics	301	Mean age not reported; 57% <40 years	77%	SARS-CoV-2 seropositivity
Piapan et al 2020 (22) and 2021 (11)	HCWs with known exposure to a COVID-19-infected patient	963	Mean 44 years	71%	SARS-CoV-2 infection based on PCR testing

Author, year Country Study design	Inclusion criteria	Sample size	Age	Female (%)	Definition of infection
Italy Retrospective cohort					

Abbreviations: HCW=healthcare worker; PCR=polymerase chain reaction; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2
*Not peer reviewed

Supplement Table 2. Quality assessment of new observational studies of mask use – Update Alert #8

Author, year	Did the study attempt to enroll all (or a random sample of) patients meeting inclusion criteria (inception cohort)?	Did the study use accurate methods for ascertaining exposures and potential confounders?	Were outcome assessors and/or data analysts blinded to exposure being studied?	Did the article report attrition or missing data?	Is there high attrition or missing data?	Were outcomes pre-specified and defined, and ascertained using accurate methods?	Controlled for confounders?	Quality rating
Community setting								
Andrejko et al 2022 (7)	Yes (participants randomly selected for study inclusion; actual participation 13% for cases and 9% for controls)	Unclear (potential recall bias)	No	No	Unclear	Yes	Yes	Fair
Doernberg et al 2022 (8)	No (participation rate 62% among those screened)	Unclear (potential recall bias)	No	Yes	Unclear	Yes	Yes	Fair
Tjaden et al 2022* (9)	Unclear (participation rate not reported)	Unclear (potential recall bias)	No	No	Unclear	Yes	Yes	Fair
Healthcare setting								
Howard-Anderson et al 2022 (10)	Unclear (participation rate not reported)	Unclear (potential recall bias)	No	No	Unclear	Yes	Yes	Fair
Piapan et al 2021 (11)	Unclear (participation rate not reported)	Unclear (potential recall bias)	No	No	Unclear	Yes	Yes	Fair

*Not peer reviewed

Supplement Table 3. Mask use and risk for SARS-CoV-2 infection

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
Community setting - RCTs				
Abaluck et al, 2021 (13)	*Symptomatic SARS-CoV-2 seroprevalence* Mask promotion intervention vs. no intervention: ***adjusted prevalence ratio 0.90 (95% CI 0.82 to 0.995)*** *COVID-19 symptoms, based on WHO criteria* Mask promotion intervention vs. no intervention: ***adjusted prevalence ratio 0.88 (95% CI 0.83 to 0.93)***	*Symptomatic SARS-CoV-2 seroprevalence* Mask promotion intervention vs. no intervention, surgical mask villages: ***adjusted prevalence ratio 0.89 (95% CI 0.78 to 0.997)*** • Age <40 y: 0.97 (95% CI 0.83 to 1.10) • Age 40-49 y: 1.01 (95% CI 0.82 to 1.20) • Age 50-59 y: ***0.77 (95% CI 0.60 to 0.95)*** • Age ≥60 y: ***0.65 (95% CI 0.45 to 0.84)*** Mask promotion intervention vs. no intervention, cloth mask villages: ***adjusted prevalence ratio 0.94 (95% CI 0.78 to 1.10)*** • Age <40 y: 1.06 (95% CI 0.87 to 1.25) • Age 40-49 y: ***0.71 (955 CI 0.46 to 0.97)*** • Age 50-59 y: 0.84 (95% CI 0.52 to 1.15) • Age ≥60 y: 1.08 (95% CI 0.77 to 1.40) *COVID-19 symptoms, based on WHO criteria* Mask promotion intervention vs. no intervention • Surgical mask villages: ***adjusted prevalence ratio 0.87 (95% CI 0.81 to 0.94***) Cloth mask villages: ***adjusted prevalence ratio 0.91 (95% CI 0.82 to 0.99)***	--	--
Bundgaard et al, 2020 (12)	Surgical mask vs. no mask: OR 0.82 (95% CI 0.52 to 1.23)	--	--	--
Community setting – Observational studies				
Andrejko et al 2022 (7) **Added for Update Alert #8**	Any mask use vs. no mask use: ***adjusted OR 0.51 (95% CI 0.29 to 0.93)*** Cloth mask use vs. no mask: adjusted OR 0.44 (95% CI 0.17 to 1.17)	N95/KN95 vs. surgical mask: adjusted OR 0.50 (95% CI 0.10 to 2.48)^ Surgical mask vs. cloth mask: adjusted OR 0.77 (95% CI 0.20 to 3.03)^	Mask use some of the time: adjusted OR 0.71 (95% CI 0.35 to 1.46) Mask use most of the time: adjusted OR 0.55 (95% CI 0.29 to 1.05)	--

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
	Surgical mask use vs. no mask: ***adjusted OR 0.34 (95% CI 0.13 to 0.90)*** N95/KN95 use vs. no mask: ***adjusted OR 0.17 (95% CI 0.05 to 0.64)***		Mask use all of the time: ***adjusted OR 0.44 (95% CI 0.24 to 0.82)*** No mask use: reference	
Doernberg et al 2022 (8) **Added for Update Alert #8**	--	--	Wearing a mask when not at work: All of the time: 2.8% (49/1778); adjusted HR 0.8 (0.5-1.6) Most/some of the time or never: 3.3% (21/641); reference	--
Doung-Ngern et al, 2020 (15)	Surgical (medical) mask vs. no mask: adjusted OR 0.25 (95% CI 0.12 to 0.53) Cloth (nonmedical) mask vs. no mask: adjusted OR 0.78 (95% CI 0.32 to 1.90) Any mask vs. no mask: adjusted OR 0.46 (95% CI 0.13 to 1.64)	Surgical (medical) mask vs. cloth (nonmedical) mask: OR 1.06 (95% CI 0.63 to 1.79)* Mask type and risk of SARS-CoV-2 infection: p=0.54	Always wearing a mask vs. not wearing a mask: ***adjusted OR 0.23 (95% CI 0.09 to 0.60)*** Sometimes wearing a mask vs. not wearing a mask: adjusted OR 0.87 (95% CI 0.41 to 1.84)	--
Goncalves et al 2021 (17)	*Third seroprevalence survey only* Mask use vs. no mask: ***adjusted OR 0.10 (95% CI 0.03 to 0.25)***	--	--	--
Lio et al 2021 (18)	Mask use when outdoors vs. no mask: ***adjusted OR 0.31 (95% CI 0.11 to 0.87)***	--	--	--
Rebmann et al 2021 (19)	Masked exposure to index case vs. not masked: ***adjusted OR 0.20 (95% CI 0.03 to 0.71)***	--	--	--

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
Sharif et al 2021 (20)	Mask use vs. no mask: ***adjusted OR 0.04 (95% CI 0.02 to 0.43)***	--	--	--
Sugimura et al 2021 (21)	Mask use vs. no mask: ***adjusted RR 0.60 (95% CI 0.30 to 0.90)***	--	--	---
Tjaden et al 2022 (9) **Added for Update Alert #8**	Mask vs. no mask • Pre-Delta (July 2020-June 2021) variant: ***adjusted OR 0.60 (95% CI 0.52 to 0.70)*** • Delta (July-November 2021) variant: ***adjusted OR 0.65 (95% CI 0.53 to 0.81)*** • Omicron variant (December 2021-February 2022): ***adjusted OR 0.86 (95% CI 0.76 to 0.98)***	--	--	--
van den Broek-Altenburg et al, 2021 (16)	Mask use outside of work (yes vs. no): OR 2.35 (0.67-8.25)	--	--	-
Wang Y et al, 2002 (14)	Unadjusted OR (95% CI) for household with secondary infection of family member Mask use all the time by: • All family members (including index case) vs. no family members before index case illness onset: 0.20 (0.07 to 0.60) • Some family members vs. no family members: 0.72 (0.30-1.73) • At least one family member (including index case) vs. no family members prior to index case illness onset: 0.22 (0.07-0.69) Adjusted OR (95% CI) for household with secondary infection of family member	-	Unadjusted OR (95% CI) for household with secondary infection of family member Primary case or family members wore mask (N95, surgical, or cloth) after index case illness onset: • All the time vs. never: 0.30 (0.11-0.82) • Sometimes vs. never: 1.15 (0.11-0.82) Mask use after index case symptom onset not included in multivariate model	--

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
	• Mask use all the time by at least one family member or index case vs. no family members prior to index case illness onset: 0.21 (0.06-0.79)			
Healthcare setting – Observational studies				
Akinbami et al, 2020 (26)	--	--	Always use N95 vs. less than always: ***adjusted OR 0.83 (0.72-0.95)*** Always use surgical mask vs. less than always: ***adjusted OR 0.86 (0.75-0.98)***	--
Chatterjee et al, 2020 (27)	Any mask vs. no mask: ***OR 0.35 (0.22-0.57)****	--	--	--
Davido et al, 2021 (28)	--	--	Systematic use of facemask vs. no systematic use: ***adjusted OR 0.07 (0.003-0.56)***	--
Fletcher et al, 2021 (29)	--	<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)	--	--
Haller et al, 2021 (30)	--	Mostly FFP2 use vs. mostly surgical mask use: adjusted HR 0.80 (0.64-1.00)	--	--
Heinzerling et al, 2020 (31)	--	--	Always facemask (non-N95) during aerosol generating procedures: OR 0.77 (0.03-20.02) Always facemask (non-N95) during non-aerosol	--

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
			generating procedures: OR 1.29 (0.05-30.38)	
Howard-Anderson et al 2022 (10) **Added for Update Alert #8**	--	--	Used a mask all/nearly all the time: (17/227); reference Used a mask less than nearly all the time: (4/18); adjusted OR 4.0 (0.7-19.5)	--
Khalil et al, 2020 (32)	Medical/surgical mask (yes vs. no): 1.40 (0.30-6.42)	--	--	--
Piapan et al, 2020 (22)	Mask (FFP2-3 or surgical) vs. no mask: adjusted OR 1.6 (0.9-2.9)	FFP2 mask vs. surgical mask: ***adjusted OR 7.1 (3.6-13.9)***	--	--
Piapan et al 2021 (11) **Added for Update Alert #8**	N95 use (yes vs. no): ***OR 7.8 (4.0-15.2***); not included in multivariate model	--	--	--
Sims et al, 2020 (23)	Any mask vs. no mask: ***OR 0.58 (0.50-0.66)*** N95 or surgical mask vs. no mask: ***OR 0.57 (0.50-0.66)*** N95 vs. no mask: ***OR 0.54 (0.47-0.62)*** Surgical mask vs. no mask: ***OR 0.71 (0.58-0.86)***	N95 vs. surgical mask: ***OR 0.76 (0.63-0.92)***	--	--
Venugopal et al, 2021 (25)	N95 only (yes vs. no): OR 0.87 (0.50-1.54)* Surgical mask only (yes vs. no): OR 1.70 (1.08-2.69)* N95 and surgical mask (yes vs. no): OR 0.64 (0.41-1.00)*	N95 only vs. surgical mask only: OR 0.60 (0.31-1.15)	--	--

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
Wang X. et al, 2020 (24)	In department with mask use (no vs. yes): ***adjusted OR 464.82 (97.73– ∞)***	--	--	--

*Variable not included in a multivariate model
^Calculated from data provided in the study, assuming correlation=0

Supplement Table 4. Masks for prevention of respiratory virus infections evidence map – Update Alert #8

Comparison (intervention A vs. intervention B)	SARS-CoV-2 infection	SARS-CoV-1 or MERS-CoV infection †	Influenza, influenzalike illness, and other viral respiratory illness (excluding pandemic coronaviruses) ‡
Community setting			
Mask (type not specified) vs. no mask in household contacts and other community settings • SARS-CoV-2*: k=2 RCTs (12, 13) and 10 observational studies (7, 9, 14-21) • SARS-CoV-1/MERS-CoV: k=3 observational studies (33-35)	◆/●	◆	-
N95§ vs. surgical mask in household contacts and other community settings • SARS-CoV-2*: k=1 observational study (7) • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: 1 RCT (36)	■	-	◆
N95§ vs. no mask in household contacts and other community settings • SARS-CoV-2*: k=1 observational study (7) • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: k=1 RCT (36)	■	-	◆
Surgical mask vs. no mask in household contacts and other community settings • SARS-CoV-2*: k=2 RCTs (12, 13) and 2 observational studies (7, 15) • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: 12 RCTs (36-46)	◆	-	●
Cloth mask vs. no mask in household contacts and other community settings* • SARS-CoV-2*: k=1 RCT (13) and 2 observational studies (7, 15) • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	-	-
Surgical vs. cloth mask in household contacts and other community settings • SARS-CoV-2*: k=1 RCT (13) and 2 observational studies (7, 15)	◆	-	-

Comparison (intervention A vs. intervention B)	SARS-CoV-2 infection	SARS-CoV-1 or MERS-CoV infection †	Influenza, influenzalike illness, and other viral respiratory illness (excluding pandemic coronaviruses) ‡
• SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: no studies			
Consistent/always mask use vs. inconsistent mask use • SARS-CoV-2*: k=1 observational study (8) • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	-	-
Healthcare setting – moderate or higher risk (inpatient)			
Any mask vs. no mask • SARS-CoV-2*: k=3 observational studies (7, 23, 27) • SARS-CoV-1/MERS-CoV: k=12 observational studies (47-58) • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	●	-
N95 vs. no mask • SARS-CoV-2*: k=4 observational studies (11, 23-25) • SARS-CoV-1/MERS-CoV: k=4 observational studies (47, 53-55) • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	◆	-
Surgical mask vs. no mask • SARS-CoV-2: k=3 observational studies (23, 25, 32) • SARS-CoV-1/MERS-CoV: k=6 observational studies (47, 48, 50, 53, 54, 57) • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	■	-
N95 or surgical mask vs. no mask • SARS-CoV-2: k=1 observational study (23) • SARS-CoV-1/MERS/CoV: k=1 observational study (58) • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	■	-
N95 and surgical mask vs. no mask	■	-	-

Comparison (intervention A vs. intervention B)	SARS-CoV-2 infection	SARS-CoV-1 or MERS-CoV infection †	Influenza, influenzalike illness, and other viral respiratory illness (excluding pandemic coronaviruses) ‡
• SARS-CoV-2: k=1 observational study (25) • SARS-CoV-1/MERS/CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: no studies			
Mask (type not specified) vs. no mask • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: k=5 observational studies (49, 51, 54, 56, 57) • Influenza, influenzalike illness or other viral respiratory illness: no studies	-	◆	-
Cloth mask vs. no mask • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: k=3 observational studies) (47, 52, 57) • Influenza, influenzalike illness or other viral respiratory illness: no studies	-	■	-
Consistent/always mask use vs. inconsistent mask use • SARS-CoV-2*: k=3 observational studies (10, 26, 28) • SARS-CoV-1/MERS-CoV: k=4 observational studies (48, 51, 59, 60) • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	◆	-
N95 vs. surgical mask • SARS-CoV-2: k=5 observational studies (22, 23, 25, 29, 61) • SARS-CoV-1/MERS-CoV: k=5 observational studies (47, 48, 53, 58, 62) • Influenza, influenzalike illness or other viral respiratory illness: k=3 RCTs (63-65)	■	◆	●
N95 or surgical mask vs. cloth mask • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: k=3 observational studies (47, 49, 57) • Influenza, influenzalike illness or other viral respiratory illness: no studies	-	■	-
Surgical mask vs. cloth mask	-	-	◆

Comparison (intervention A vs. intervention B)	SARS-CoV-2 infection	SARS-CoV-1 or MERS-CoV infection †	Influenza, influenzalike illness, and other viral respiratory illness (excluding pandemic coronaviruses) ‡
• SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: k=1 RCT (66)			
Healthcare setting – lower risk (outpatient)			
N95 vs. surgical mask • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: k=1 RCT (67)	-	-	●

* New evidence added for this update
† Only observational evidence was included for these infections
‡ Only RCT evidence was included for these infections§ N95 or equivalent (e.g. P2 mask)

Strength of evidence
- ● Moderate
- ◆ Low
- ■ Insufficient
- \- No evidence

Direction of effect
- Favors intervention A
- Effects similar or no difference
- No or too little evidence to determine

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