McMaster University | HEALTH FORUM

Living Evidence Synthesis

Effectiveness of masking in community and healthcare settings for reducing the incidence, transmission, hospitalizations and deaths from respiratory infectious diseases

25 March 2024

[MHF product code: LES 14.2]

Note that this living evidence synthesis (LES) is part of a suite of LESs of the best-available evidence about the effectiveness of PHSMs (quarantine and isolation, masks, ventilation, hand hygiene, cleaning, and disinfecting) in preventing transmission of respiratory infectious diseases. This is the 2nd version of this LES, which includes enhancements in scope from the first version by: 1) expanding the primary outcomes from COVID-19 transmission to include other prioritized respiratory infectious diseases (seasonal influenza, H1N1 and RSV); and 2) expanded searches to include these outcomes and to search to further back in time. The next update to this and other LESs in the series is to be determined, but the most up-to-date versions in the suite are available here. We provide context for synthesizing evidence about public health and social measures in Box 1.

Context

- During the COVID-19 pandemic, the use of public health and social measures (PHSMs) was recommended as a means of preventing SARS-CoV-2 transmission.
- The Canadian public learned a great deal about what PHSMs are, why they are important, and how to effectively use them.
- The use of different types of masks (e.g., respirators, medical and non-medical masks) was recommended throughout the COVID-19 pandemic as a means of preventing transmission in healthcare and community settings.
- Moving out of a pandemic context, there is a need to update recommendations and guidance with evidence about the prevention of respiratory infectious diseases (RIDs) more broadly based on what was learned from the pandemic and from before the pandemic when masks may have been used to prevent other RIDs.
- This LES has been requested to synthesize the best-available evidence about the effectiveness of mask wearing for reducing the incidence, transmission, hospitalizations and deaths related to RIDs.

Questions

1) What is the effectiveness of wearing a mask (any type) in comparison to not wearing one for reducing the incidence, transmission, hospitalizations, and deaths related to COVID-19, seasonal influenza, H1N1, and respiratory syncytial virus (RSV) in community and healthcare settings?
2) What is the comparative effectiveness of different types of masks (respirators, medical, and non-medical masks) versus each other or not wearing one, for reducing the incidence, transmission, hospitalizations, and deaths related to COVID-19, seasonal influenza, H1N1, and RSV in community and healthcare settings?
3) What is the effectiveness of mask mandates for reducing the transmission, hospitalizations, and deaths related to COVID-19, seasonal influenza, H1N1, and RSV?

High-level summary of key findings

Profile of included studies

- We identified 5,726 articles, from which we included 186 studies that addressed question 1 (n=107), question 2 (n=31) and/or question 3 (n=61), and:

- Almost all of the included studies (n=150) were published between 2020-2023 (databases were searched from 2000 to February 2024)
- COVID-19 was the disease most commonly studied (n=144), followed by Influenza and Influenza-like illness (n=19), SARS 1/MERS (n=18), and other clinical and confirmed respiratory illnesses and infections (n=9) (no studies addressed RSV)
- Study designs included RCTs (n=7), cluster RCTs (n=15), quasi-experimental (n=16), cohort (n=40), case-control (n=33), cross-sectional (n=28), and ecological (n=47)
- Findings from healthcare settings (n=63) and community settings (n=123) are analyzed separately.

- In addition, studies: focused on the general population (n=108), healthcare workers (n=55), and infants, children, and adolescents (n=19); provided information for the transmission/incidence outcome (n=180), some for hospitalizations (n=7), and some for deaths (n=15); and were commonly conducted in the U.S. (n=71), China (n=20), Canada (n=8), Germany (n=7), and France (n=6).
- We also drew on findings from two existing network meta-analyses that compare the effectiveness of different types of masks (all the studies included in these network meta-analyses were also included in our LES)

Key findings in relation to question 1: Effectiveness of mask-wearing in comparison to no mask-wearing

- COVID-19 transmission
  - 44 of 51 studies conducted in community settings found a benefit in reducing seropositivity (varying from 6% to 3.5 times less), transmission (varying from 19% to 97% less), and the number of cases (varying from 14% to 33 times less); other studies found no difference. *(GRADE profile = High certainty)*
  - 17 of 21 studies in healthcare settings found a benefit in reducing seropositivity (varying from 33% to 72% less), transmission (varying from 80% to more than 13 times less), and the number of cases (varying from 69% to 5.5 times less); other studies found no difference. *(GRADE profile = Low certainty)*
- COVID-19 deaths
  - In community settings, four studies assessing the impact of mask-wearing adjusted by other PHSMs reported a reduction in deaths ranging from 1% to 16%. *(GRADE profile = Moderate certainty)*
- SARS/MERS transmission
  - From two studies conducted in community settings, one reported a benefit in reducing transmission, and the other reported no difference. *(GRADE profile = Very low certainty)*
  - In healthcare settings, 11 of 14 studies reported a benefit (principally with N95) in reducing transmission (varying from 44% to 12 times less) and a reduction in the number of cases (varying from two to 10 times less). *(GRADE profile = Moderate certainty)*
- Influenza/Influenza-like illness transmission
  - In community settings, six of 12 studies reported a benefit in reducing transmission (varying from 19% to six times less) and number of cases (varying from 70% to 2.2 times less); the other six studies reported no difference. *(GRADE profile = Very low certainty)*
  - From two studies conducted in healthcare settings, one reported a benefit of medical masks in reducing the number of cases, and the other reported no difference. *(GRADE profile = Very low certainty)*
- Transmission of other clinical and confirmed respiratory illnesses and infections
  - In community settings, two of three studies reported a benefit in reducing cases of bronchiolitis (IRR 0.49 (95% CI 0.25 to 0.94) and secondary attack rate of upper respiratory infections and influenza (OR 0.82 [CI 95% 0.70, 0.97]); while one study reported that the facemask used by Hajj pilgrims was not effective against laboratory-confirmed viral respiratory infections (OR 1.4; [95% CI 0.9 to 2.1, p = 0.18]) nor clinical respiratory infection (OR 1.1; [95% CI, 0.9 to 1.4, p = 0.40]). *Very low certainty*
  - In healthcare settings, we included three studies; two reported a benefit and one reported no difference. *Very low certainty*
    - One study reported that an increase of 10% in the prevalence of masking was associated with a decrease in emergency department visits due to viral illnesses (17%), exacerbations of asthma (8.8%) and chronic obstructive pulmonary diseases (9.4%).
    - One study reported reducing respiratory viral infections of very low birth weight infants (from 1.1 to 0.3 per 1,000 patient days).

Key findings in relation to question 2: Comparative effectiveness of different types of masks

- COVID-19 transmission
  - In community settings, one study found no superiority of N95/respirators over medical/surgical masks, nor of medical/surgical masks over cloth masks; another study reported no superiority of medical/surgical masks over closed face shields. *(GRADE profile = Moderate certainty)*
  - In healthcare settings, 10 studies compared two or more types of masks. *(GRADE profile = Low certainty)*
    - Two studies reported the superiority of N95 over medical masks, which included one cohort (OR 0.76 [95%CI: 0.63-0.92]), and one case-control study (adjusted OR 0.39 [95%CI: 0.29-0.51]).
    - Five studies found no superiority of N95/respirators over medical/surgical masks.
    - Two studies found no superiority of FFP2 over medical/surgical mask.
    - One study reported no superiority of medical/surgical masks over closed-face shields.
    - One study reported no superiority of medical/surgical masks over cloth masks.
  - Two network meta-analyses reported a superiority of N95/respirators in protecting against COVID-19 when compared to other types of masks, one reported an OR of 0.30 [95% CI, 0.20–0.44] and the other reported an RR of 0.67 [95% CI 0.38–1.19].
- SARS/MERS transmission
  - In healthcare settings, eight studies found that N95/respirators and multiple layers of cotton medical/surgical masks have beneficial effects when compared to not wearing a mask. *(GRADE profile = Low certainty)*
- Influenza/Influenza-like illness transmission
  - In healthcare settings, five studies found that medical/surgical masks were not inferior to N95/respirators. *(GRADE profile = High certainty)*
- Transmission of other clinical and confirmed respiratory illnesses and infections
  - In healthcare settings, two studies found more cases in the medical/surgical mask arm than in the N95/respirator arm. *(GRADE profile = Moderate certainty)*
    - In one study, the difference was statistically significant (incidence in medical mask 17% vs 7.2% in N95 arm).
    - In the other study, cases in the medical/surgical mask were double those in the N95 arm, but the difference was not statistically significant.
- Additional insights from existing network meta-analyses
  - One network meta-analysis that included 35 randomized controlled trials and observational studies found that high compliance to mask-wearing conferred significantly better protection than low compliance (the level of compliance was extracted from the stratified analysis of studies that include that information) (OR, 0.43 [95% CI 0.23–0.82]).
  - Another network meta-analysis that included 16 randomized controlled trials found that participants wearing fit-tested N95 respirators were likely to have lesser infection risk than those without mask-wearing (RR 0.67, [95% CI 0.38–1.19, P-score 0.80]), than non-fit-tested N95 (RR 0.73, [95% CI 0.12–4.36, P-score 0.63]) and non-fit-tested FFP2 respirators (RR 0.80, [95% CI 0.38–1.71, P-score 0.63])
    - It was also found that participants wearing double-layered cloth masks had a higher infection risk than those not wearing a mask (RR 4.80, [95% CI 1.42–16.27, P-score 0.01])..

Key findings in relation to question 3: Effectiveness of mask mandates in comparison to no mandate

- COVID-19 transmission
  - In community settings, 45 of 52 studies found a benefit in reducing transmission (varying from 2.4% to 3.6 times less) and the number of cases (varying from 2% to 2.3 times less); other studies found no difference. *(GRADE profile = High certainty)*
  - In healthcare settings, all five studies found a benefit in reducing seropositivity (varying from a decrease of 0.49% to 1.7% per day), transmission, and the number of cases (a decline from 4.3 to 14.3 cases per week). *(GRADE profile = Moderate certainty)*
  - COVID-19 hospitalizations
    - In community settings, four of six studies reported reduced hospitalizations (varying from 2.4% to 60% less). *Very low certainty*

- COVID-19 deaths
  - In community settings, seven of 10 studies reported a reduction in deaths (varying from 0.7 to 13 deaths per 100.000 inhabitants less), two studies reported no difference, and one study reported an increase in deaths after mask mandate. *(GRADE profile = Very low certainty)*

- Influenza/Influenza-like illness transmission
  - In community settings, two studies found a favourable effect of mask mandates; one reported a reduction of 7.75% in the transmission of influenza, and the other reported that after lifting the mask mandate in Hong Kong, influenza transmission increased substantially. *(GRADE profile = Moderate certainty)*
- It is worth noting that much of the evidence about mask mandates is from a period of time with high rates of transmission and using masks in combination with other public health and social measures. These findings should be considered in light of this context and in combination with the findings of our living evidence synthesis about the effects of combinations of public health hand social measures

Equity considerations

- Only one study reported equity considerations, and this study found that in the most socially vulnerable counties in New York State, mask mandates were associated with a decrease in cases and deaths, with a narrowing of infection disparities between low and mid terciles of vulnerability as well as a narrowing of mortality disparities among mid and high terciles of vulnerability compared to the lowest tercile.

Box 1: Context for synthesizing evidence about public health and social measures (PHSMs)

This series of living evidence syntheses was commissioned to understand the effects of PHSMs during a global pandemic to inform current and future use of PHSMs for preventing transmission of respiratory infectious diseases.

General considerations for identifying, appraising and synthesizing evidence about PHSMs

- PHSMs are population-level interventions and typically evaluated in observational studies.
  - Many PHSMs are interventions implemented at a population level, rather than at the level of individuals or clusters of individuals such as in clinical interventions.
  - Since it is typically not feasible and/or ethical to randomly allocate entire populations to different interventions, the effects of PHSMs are commonly evaluated using observational study designs that evaluate PHSMs in real-word settings.
  - As a result, a lack of evidence from RCTs does not necessarily mean the available evidence in this series of LESs is weak.
- Instruments for appraising the risk of bias in observational studies have been developed; however, rigorously tested and validated instruments are only available for clinical interventions.
  - Such instruments generally indicate that a study has less risk of bias when it was possible to directly assess outcomes and control for potential confounders for individual study participants.
  - Studies assessing PHSMs at the population level are not able to provide such assessments for all relevant individual-level variables that could affect outcomes, and therefore cannot be classified as low risk of bias.
- Given feasibility considerations related to synthesizing evidence in a timely manner to inform decision-making for PHSMs during a global pandemic, highly focused research questions and inclusion criteria for literature searches were required.
  - As a result, we acknowledge that this series of living evidence syntheses – about the effectiveness of specific PHSMs (i.e., quarantine and isolation; mask use, including unintended consequences; ventilation, reduction of contacts, physical distancing, hand hygiene and cleaning and disinfecting measures), interventions that promote adherence to PHSMs, and the effectiveness of combinations of PHSMs – does not incorporate all existing relevant evidence on PHSMs.
  - Ongoing work on this suite of products will allow us to broaden the scope of this review for a more comprehensive understanding of the effectiveness of PHSMs.
  - Decision-making with the best available evidence requires synthesizing findings from studies conducted in real-world settings (e.g., with people affected by misinformation, different levels of adherence to an intervention, different definitions and uses of the interventions, and in different stages of the pandemic, such as before and after availability of COVID-19 vaccines).

Our approach to presenting findings with an appraisal of risk of bias (ROB) of included studies

To ensure we used robust methods to identify, appraise and synthesize findings and to provide clear messages about the effects of different PHSMs, we:

- acknowledge that a lack of evidence from RCTs does not mean the evidence available is weak
- assessed included studies for ROB using the approach described in the methods box
- typically introduce the ROB assessments only once early in the document if they are consistent across sub-questions, sub-groups and outcomes, and provide insight about the reasons for the ROB assessment findings (e.g., confounding with other complementary PHSMs) and sources of additional insights (e.g., findings from LES 20 in this series that evaluates combinations of PHSMs)
- note where there are lower levels of ROB where appropriate
- note where it is likely that risk of bias (e.g., confounding variables) may reduce the strength of association with a PHSM and an outcome from the included studies
- identify when little evidence was found and when it was likely due to literature search criteria that prioritized RCTs over observational studies.

Implications for synthesizing evidence about PHSMs

Despite the ROB for studies conducted at the population level that are identified in studies in this LES and others in the series, they provide the best-available evidence about the effects of interventions in real life. Moreover, ROB (and GRADE, which was not used for this series of LESs) were designed for clinical programs, services and products, and there is an ongoing need to identify whether and how such assessments and the communication of such assessments, need to be adjusted for public-health programs, services and measures and for health-system arrangements.

Box 2: Approach and supporting materials

We retrieved candidate studies by searching: 1) PubMed, 2) Embase, 3) EBM Reviews via OVID, 4) pre-print servers (MedRxiv); and 5) ClinicalTrials.gov. Searches were conducted for studies reported in English, French, Spanish, Portuguese, Arabic and Chinese conducted with humans and published since 2000 until 2 February 2024. Our detailed search strategy is included in **Appendix 1**.

Any experimental design such as interventional trials and cluster trials or observational designs including cohort, case-control, before-after studies, interrupted time series, ecological studies, and case series, were considered for inclusion. For all outcomes, evidence syntheses were tracked, and any relevant primary studies from them were pulled out for our analysis. A full list of included studies is provided in **Appendix 2**. Studies excluded at the last stages of reviewing are provided in **Appendix 3**.

Artificial Intelligence (AI): We used Covidence's active learning process feature to identify all relevant records as early as possible. Determining the optimal cutoff to decide when to stop the screening process is still a topic of discussion among scholars (Boetje and van de Schoot 2024). We decided to stop the screening when: 1) more than 75% of all identified records were screened; 2) no new decisions of inclusion were made in the last 200 records; 3) the number of studies eligible for full-text assessment was more than 400; 4) three researchers agreed to stop; and 5) the trade-off between losing a potential eligible article and use the resources in other stages of the synthesis favoured the former.

Population of interest: all populations included, with analysis disaggregated by setting.

Intervention and control/comparator: the interventions and comparators were: 1) wearing a mask vs not wearing one (as an individual PHSM or adjusted by other PHSMs), 2) N95/respirators vs medical/surgical mask vs FPP2-3 vs cloth/paper mask; 3) mask mandate vs no mandate (as an individual PHSM or adjusted by other PHSMs).

Outcomes: 1) Transmission/incidence of COVID-19, Influenza and Influenza-like illness, SARS 1 and MERS, and other respiratory illness and infections (e.g., reproductive rate, attack rate, incidence, number of cases); 2) hospitalizations due to COVID-19, Influenza and Influenza-like illness, SARS 1 and MERS, and other respiratory illness and infections; 3) deaths due to COVID-19, Influenza and Influenza-like illness, SARS 1 and MERS, and other respiratory illness and infections.

Settings: we performed separated analyses for community settings (at individual and population level), and healthcare settings.

Data extraction: Data extraction was conducted by one team member.

Critical appraisal: We kept the risk of bias (ROB) assessment of individual studies that were performed in the first version of this LES, in other cases we kept the one performed in the living systematic review of Chou et al., 2023. For randomized controlled trials, ROB-2 was used, and for observational studies, the previous version used ROBINS-I, and the Chou et al. systematic review used an adapted modified version of the U.S. Preventive Services Task Force, details are provided in **Appendices 4 and 5**.

We rated the certainty of the evidence for each intervention, condition, setting and outcome, using the GRADE approach (the GRADE evidence profiles are provided in **Appendix 6)**.

What we found

We identified 5,726 articles from our searches, and after removing 342 duplicates, we excluded 4,956 titles and abstracts, 4,327 after full screening, and 1,057 after the Covidence Machine Learning tool indicated low relevance (see Figure 1 for details). We reviewed 422 full-text articles and included 186 studies of which: 107 addressed research question 1 and assessed the effectiveness of wearing vs not wearing a mask (including 26 studies that evaluated masks among other PHSMs); 31 studies addressed research question 2 and compared the effectiveness of different types of masks; 61 studies addressed research question 3 and assessed the effectiveness of mask mandates vs no mandates (including 18 studies that evaluated mask mandates among other PHSMs), and 15 studies that addressed more than one research question.

We identified studies from several sources to ensure comprehensiveness, including:
1) the previous version of this LES that focused on COVID-19 transmission in community settings as the primary outcome (n=35) (1)
2) a living rapid review on masks for the prevention of respiratory virus infection (n=60) (2)
3) an LES on combinations of PHSMs (n=13) (3)
4) new studies identified in the search strategy (n=78).

We performed de novo data extraction for 138 studies and retained the data extractions from 48 studies included in the previous version of this LES and the last version of the LES that evaluated combinations of PHSMs.(1; 3) We kept the risk of bias appraisal available in previous publications (n=84), but we did not perform risk of bias appraisal for the newly identified studies (n=102) given time constrictions (although this may be prioritized as an enhancement for a future version of this LES). We used the GRADE approach to rate the certainty of the evidence for interventions, conditions, settings and outcomes (for further details about the GRADE approach, please visit the GRADE Working Group Website). When judging the first domain of GRADE about the risk of bias, we used the available risk of bias appraisals, and a general approach to judging the possible risk of bias of the body of evidence considering the intervention assessed, the study design, and specific details highlighted during data extraction (e.g., if the statistical analysis was adjusted by covariables; if the data came from appropriate sources of information and there were few missing data; and if the study tries to control measurement bias). GRADE evidence profiles are provided in Appendix 6.

Studies were published between 2020-2023 (n=150), 2016-2019 (n=4), 2012-2015 (n=5), 2008-2011 (n=13), 2004-2007 (n=12), and 2000-2003 (n=2). COVID-19 was the disease most commonly studied (n=144), followed by Influenza and Influenza-like illness (n=19), then SARS 1/MERS (n=18), and other clinical and confirmed respiratory illnesses and infections (n=9) (see Appendix 2 for details of studies included). We did not identify studies that addressed respiratory syncytial virus (RSV) infections. Studies focused on the general population (n=108), healthcare workers (n=55), and infants, children, and adolescents (n=19). Most studies provided information for the transmission/incidence outcome (n=180), some for hospitalizations (n=7), and some for deaths (n=15). We analyzed studies separately based on those conducted in healthcare settings (n=63) and studies conducted in community settings (n=123). Community settings were approached from an individual level (e.g., in clinical trials and cohort studies that collected person-by-person data) (n=51), or from a population level (e.g., in ecological or quasi-experimental studies that collected data from jurisdictional surveillance databases) (n=72). We also identified 17 studies that evaluated mask use in schools as a specific community setting. The studies were mostly conducted in a single country (n=163), with 31 countries identified, with some adopting a multi-country approach to evaluation (n=23). The countries most commonly studied were the U.S. (n=71), China (n=20), Canada (n=8), Germany (n=7), and France (n=6). Lastly, the study designs included RCTs (n=7), cluster RCTs (n=15), quasi-experimental studies (n=16), cohort studies (n=40), case-control studies (n=33), cross-sectional studies (n=28), and ecological studies (n=47).

We provide an overview of all findings in this LES in Table 1 below for each of the three questions (columns) by disease and outcome (rows).

Table 1: Overview of LES findings by question, disease and outcome

Disease, outcome and setting			Question 1: Mask-wearing vs no mask-wearing						Question 2: Types of masks			Question 3: Mask mandate vs no mandate							
			Mask-wearing as a single intervention			Mask-wearing adjusted by other PHSMs						Mask mandate as a single intervention				Mask mandate adjusted by other PHSMs			
			Favours (n=62)	No difference (n=19)	GRADE	Favours (n=)	No difference (n=)	GRADE	Favours one mask over other (n=22)	No difference among types of mask n=(10)	GRADE	Favours (n=36)	No difference (n=6)	Against	GRADE	Favours (n=15)	No difference (n=2)	Against	GRADE
COVID-19	Transmission/ incidence	Healthcare	16	4	Low certainty in its benefits for reduction of seropositivity, transmission, and number of cases	1	0	Not performed	8	5	Low certainty in FFP2 and medical/surgical masks have stronger effects when compared to no-mask-wearing	5	0	0	Moderate certainty in its benefits for reduction of transmission and number of cases				
		Community	25	4	High certainty in its benefits for reduction of seropositivity, transmission, and number of cases	19	0	High certainty in its benefits for reduction of seropositivity, transmission, and number of cases	3	1	Moderate certainty in that N95/respirators and medical/surgical masks have stronger beneficial effects when compared to not mask-wearing	33	5	1	High certainty in its benefits for reduction of seropositivity, transmission, and number of cases	12	2	1	High certainty in its benefits for reduction of seropositivity, transmission, and number of cases
	Hospitalization	Healthcare																	
		Community										3	1	1	Low certainty in its benefits for reduction of hospitalizations	0	1	0	Not performed
	Death	Healthcare																	
		Community				4	0	Moderate certainty in its benefit reducing number of deaths				5	0	1	Very low certainty if there is any benefit reducing the number of deaths	2	1	1	Very low certainty if there is any benefit reducing the number of deaths
SARS/MERS	Transmission/ incidence	Healthcare	11	3	Moderate certainty in its benefits for reduction of transmission and number of cases				7	1	Low certainty in N95/respirators and multiple-layers of cotton medical/surgical masks have stronger effects when compared to no mask-wearing								
		Community	1	1	Very low certainty if there is any benefit reducing the number of cases														
	Hospitalization	Healthcare																	

		Community																	
	Death	**Healthcare**																	
		Community																	
Influenza and Influenza-like illness	**Transmission/ incidence**	**Healthcare**	1	1	Very low certainty if there is any benefit reducing the number of cases				1	4	High certainty in medical/surgical masks are not inferior to N95/respirators								
		Community	5	5	Very low certainty if there is any benefit reducing the number of cases	1	1	Very low certainty if there is any benefit reducing the number of cases								3	1	0	Moderate certainty in its benefits for reduction of transmission and number of cases
	Hospitalization	**Healthcare**																	
		Community																	
	Death	**Healthcare**																	
		Community																	
Other respiratory illness and infections*(with a footnote of what includes)	**Transmission/ incidence**	**Healthcare**	1	1	Very low certainty if there is any benefit reducing the number of cases				1	1	Moderate certainty in fewer cases when N95/respirator is used compared to other types of masks								
		Community	2	1	Very low certainty if there is any benefit reducing the number of cases	1	0	Not performed								1	0	0	Not performed
	Hospitalization	**Healthcare**																	
		Community																	
	Death	**Healthcare**																	
		Community																	

Key findings for question 1: Effectiveness of mask-wearing in comparison to no mask-wearing

COVID-19

Overall, we included 72 studies that addressed the effectiveness of mask-wearing vs. no mask-wearing (RCT=1, cluster RCT=1, quasi-experimental=1, cohort=21, case-control=16, cross-sectional=22, ecological=11). 49 studies assessed masks as an individual PHSM, and 23 studies assessed the effectiveness of masks adjusted by other PHSMs.

Mask use in community settings

Overall, we included 51 studies that addressed the effectiveness of mask-wearing vs no mask-wearing in community settings, 29 studies assessed masks as an individual PHSM, and 22 studies assessed masks adjusted by other PHSMs.

Transmission (high certainty)

From the 51 studies included, 48 provided information about transmission/incidence, 29 studies assessed masks as an individual PHSM, and 19 studies assessed masks adjusted by other PHSMs.

We identified 29 studies that assessed the effectiveness of wearing a mask vs not wearing one for reducing the transmission of COVID-19 (RCT=1, cluster RCT= 1, cohort=5, case-control=9, cross-sectional=10, ecological=3). Most studies favoured wearing masks (n=25) to reduce transmission, while few found a non-significant difference between wearing and not wearing masks (n=4).(4-7) Wearing a mask was associated with less seropositivity (varying from 6% to 59% less),(8-11) with reduced transmission (varying from 19% to 86% less),(12-23) and a reduction in the number of cases (varying from 73% to 33 times less).(24-32) Two studies found a non-significant difference but reported fewer cases among those wearing masks.(4; 5) The certainty in these findings was high according to the GRADE assessment, which means that further research is very unlikely to change our confidence in the benefit of this intervention.

We found 19 additional studies that assessed masks adjusted for use of other PHSMs (for instance, lockdowns, public transport bans, international travel restrictions, and school closures) (cohort n=4, case-control n=3, cross-sectional n=5 and ecological n=7). All studies favoured mask-wearing. Compared to not wearing a mask, wearing a mask was associated with less seropositivity (around 3.5 times less),(33; 34) with reduced transmission (varying from 23% to 97% less),(17; 35-40) and a reduction in the number of cases (varying from 14% to 2.7 times less).(41-49) In schools, wearing a mask was associated with a smaller number of cases among students and staff.(44; 47) The certainty in these findings was high according to GRADE assessment, which means that further research is very unlikely to change our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths (moderate certainty)

We found four studies that assessed the impact of mask-wearing adjusted by other PHSMs (quasi-experimental=1, cross-sectional=1, ecological=2). All studies favoured mask-wearing,(50-53) showing a reduction in the number of deaths varying from 1% (50) to 16%.(53) The certainty in these findings was moderate according to the GRADE assessment, which means that further research is likely to change our confidence in the benefit of this intervention.

Healthcare settings

Transmission/incidence (low certainty)

We identified 20 studies that assessed the effectiveness of mask-wearing vs. no mask-wearing in healthcare settings (cohort=9, case-control=4, cross-sectional=7). Most studies favoured mask-wearing (principally N95) (n=16), while few found a non-significant difference between wearing and not wearing masks (n=4).(54-57)

Wearing a mask was associated with less seropositivity (varying from 33% to 72% less),(58; 59) with reduced transmission (varying from 80% to more than 13 times less),(60-67) and a reduction in the number of cases (varying from 69% to 5.5 times less).(68-73) One of the studies that reported a non-significant difference mentioned that most healthcare workers were unprotected during this cohort study (i.e., they did not use the masks).(54) The certainty in these findings was low according to the GRADE assessment, which means that further research is very likely to have an important impact on our confidence in the benefit of this intervention in this setting.

We identified one additional cohort study that assessed mask use adjusted for the use of other PHSMs. Results from this study's binary logistic regression analysis suggested that self-reported mask use was associated with an adjusted reduction of cases of 75.4% .(74)

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

SARS 1/MERS

We included 16 studies that addressed the effectiveness of mask-wearing vs no mask-wearing (cohort=7, case-control=9), and all of these studies assessed masks as an individual PHSM.

Community settings

Transmission (very low certainty)

We included two studies that assessed the effectiveness of mask-wearing vs no mask-wearing on transmission of SARS 1. A case-control study reported a beneficial effect on reducing transmission (OR 4.16 [95% CI 2.37-7.30],(75) and a cohort study reported no difference (OR 1.04 [95% CI 0.05-19.52]).(76) The certainty of these findings was very low according to the GRADE assessment, which means that the effect is very uncertain.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Healthcare settings

Transmission/incidence (moderate certainty)

We identified 14 studies that assessed the effectiveness of mask-wearing vs. no mask-wearing in healthcare settings (cohort = 6, case-control = 8), thirteen studies focused on SARS-CoV-1 and one on MERS-CoV. Most studies favoured wearing masks (principally N95) (n=11), while few found a non-significant difference between mask-wearing and no mask-wearing (n=3) (see dataset for details of findings in those studies).(75; 77; 78)

Wearing a mask was associated with reduced transmission of SARS-CoV-1 and MERS-CoV (varying from 44% to 12 times less),(79-87) and a reduction in cases (varying from two to 10 times less).(88; 89) Consistent use of masks (principally N95) was associated with a strong protective effect against SARS-CoV-1 and MERS-CoV.(79; 81; 84) The certainty in these findings was moderate according to the GRADE assessment, which means that further research is likely to have an important impact on our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Influenza/Influenza-like illness

Overall, we included 14 studies that addressed the effectiveness of mask-wearing vs no mask-wearing (RCT=3, cluster RCT=10, cross-sectional=1). 12 studies assessed masks as an individual PHSM, and two studies assessed mask use adjusted for use of other PHSMs.

Community settings

Transmission (very low to low certainty)

We identified ten studies that assessed the effectiveness of mask-wearing vs no mask-wearing (RCT=1, cluster RCT=8, cross-sectional=1). Half of the studies favoured mask-wearing (n=5),(90-94) and the other half reported a non-significant difference between wearing and not wearing masks (n=5).(95-99)

Wearing a mask was associated with reduced transmission (varying from 19% to six times less),(91; 93) and a reduction in the number of cases (varying from 70% to 2.2 times less).(90; 92; 94) Three studies reported no difference in transmission,(96; 97; 99) and two found no difference in the number of cases.(95; 98) The certainty in these findings was very low according to the GRADE assessment, which means that the effect is very uncertain.

We identified two additional studies (one RCT and one cluster RCT) that assessed mask use adjusted for the use of other PHSMs. The RCT found a reduction in the rate of Influenza-like illness of 35% to 51% after four weeks of intervention in the group of participants using masks and hand hygiene in comparison to the group of participants not wearing masks. However, this difference was not found to be statistically significant, nor was the difference between participants using masks and hand hygiene compared to the group only wearing masks.(100) The cluster RCT reported a reduction in the rate of Influenza-like illness ranging from 48% to 75%.(101) The certainty in this evidence was low according to the GRADE assessment, which means that further research is very likely to have an important impact on our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Healthcare settings

Transmission/incidence (very low certainty)

We identified two studies that assessed the effectiveness of mask-wearing vs. no mask-wearing in healthcare settings (one RCT and one cluster RCT). The RCT found that the rate of Influenza-like illness did not differ between those being compliant with medical or cloth masks and those not wearing a mask.(102) The cluster RCT found that medical masks were protective against Influenza-like illness.(103) The certainty of these findings was very low according to the GRADE assessment, which means that the effect is very uncertain.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Other clinical and confirmed respiratory illnesses and infections

We included six studies that addressed the effectiveness of mask-wearing vs no mask-wearing (RCT=2, cluster RCT=2, quasi-experimental=1, ecological=1), six studies assessed mask as individual PHSM, and one study assessed mask use adjusted for use by other PHSMs.

Community settings

Transmission/incidence (very low certainty)

We identified two cluster RCTs that assessed the effectiveness of mask-wearing vs no mask-wearing. One study reported that the facemask used by Hajj pilgrims was not effective against laboratory-confirmed viral respiratory infections (OR 1.4; [95% CI 0.9 to 2.1, p = 0.18]) nor clinical respiratory infection (OR 1.1; [95% CI, 0.9 to 1.4, p = 0.40]), possibly due to poor adherence to the protocol (i.e., those assigned to control group wore a mask and those assigned to the intervention group did not).(104) The other study reported that wearing a mask was associated with a lower secondary attack rate of upper respiratory infections (OR 0.82 [CI 95% 0.70, 0.97]) .(91) The certainty of these findings was very low according to the GRADE assessment, which means that the effect is very uncertain.

We identified one additional quasi-experimental study that assessed the impact of mask-wearing adjusted for use of other PHSMs. This study found that wearing a mask indoors reduced the cumulative cases of bronchiolitis (IRR 0.49 [95% CI 0.25 to 0.94]).(105)

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Healthcare settings

Transmission/incidence (very low certainty)

We identified three studies that assessed the effectiveness of mask-wearing vs. no mask-wearing in healthcare settings (one RCT, one quasi-experimental, and one ecological study). The RCT found that the rate of clinical respiratory illness did not differ between those being compliant with medical or cloth masks and those not wearing a mask.(102) The quasi-experimental study assessed the effect of masking on the health of very low birth weight infants and found a decrease in respiratory viral infections from 1.1 to 0.3 per 1,000 patient days.(66) The ecological study reported that increasing the prevalence of masking by 10% was associated with a decrease in emergency department (ED) visits for viral illnesses (17% less), exacerbations of asthma (8.8% less), and chronic obstructive pulmonary disease (COPD) (9.4% less).(106) The certainty of these findings was very low according to the GRADE assessment, which means that the effect is very uncertain.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Key findings for question 2: Comparative effectiveness of different types of masks

COVID-19

We included 17 studies that addressed the comparative effectiveness of different types of masks (RCT=2, cluster RCT=1, cohort=4, case-control=7, cross-sectional=3).

Community settings

Transmission (moderate certainty)

We identified four studies (RCT=1, cluster RTC=1, case-control=2) that assessed the effectiveness of different types of masks. Overall, N95/respirators and medical/surgical masks reduced the odds of a positive test when compared to no mask-wearing (adjusted OR 0.17 [95% CI 0.05-0.64] for N95, and adjusted OR 0.34 [95% CI: 0.13-0.90] for medical/surgical mask)..(9) Cloth masks had a subtle beneficial effect compared to no mask-wearing (adjusted OR 0.44 [0.17–1.17]).(8; 9) Two studies found no superiority of N95/respirators over medical/surgical masks,(32) medical/surgical masks over closed face shields,(107) or superiority of medical/surgical masks over cloth masks.(32) The certainty in this evidence was moderate according to the GRADE assessment, which means that further research is likely to have an important impact on our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Healthcare settings

Transmission/incidence (low certainty)

We identified 13 studies (RCT=1, cohort=4, case-control=5, cross-sectional=3) that assessed the comparative effectiveness of different types of masks. Overall, FFP2 and medical/surgical masks resulted in lower seropositivity, lower transmission, and lower risk of infection when compared to no mask-wearing (OR 0.43 [95%CI: 0.32-0.57] for FFP2, and OR 0.51 [95%CI: 0.39-0.65] for medical/surgical mask).(59; 108-111)

Two studies reported the superiority of N95 over medical masks, which included one cohort (OR 0.76 [95%CI: 0.63-0.92]),(59) and one case-control study (adjusted OR 0.39 [95%CI: 0.29-0.51]).(112) Other studies found no superiority of N95/respirators over medical/surgical masks,(113-117) medical/surgical masks over closed face shields,(113) FFP2 over medical/surgical mask,(118; 119) or superiority of medical/surgical masks over cloth masks.(32) The certainty of this evidence was low according to the GRADE assessment, which means that further research is very likely to have an important impact on our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

SARS 1/MERS

We included eight studies that addressed the comparative effectiveness of different types of masks (cohort=3, case-control=5).

Community settings

We did not identify studies that addressed this setting.

Healthcare settings

Transmission (low certainty)

We identified eight studies (cohort=3, case-control=5) that assessed the comparative effectiveness of different types of masks. Overall, N95/respirators and multiple layers of cotton medical/surgical masks were found to have stronger beneficial effects when compared to no mask-wearing.(80; 82; 85; 120)

Three studies reported the superiority of a double-layer cotton mask (OR 0.40 [95%CI: 0.25-0.64]) (120) or masks with multiple layers over a single-layer mask (OR 0.41 [95%CI: 0.17-0.97]).(80; 82) One study reported the superiority of N95/respirator over medical/surgical masks (OR 0.18: [95%CI: 0.06-0.53]),(77) and another reported superiority of N95/respirator over paper masks.(85) Other studies found no superiority of N95/respirators over medical/surgical masks,(81; 85) N95/respirators over disposable masks,(80) N95 over 12-or-16 layer cotton surgical masks,(80) or superiority of 12-or-16 layer cotton medical/surgical masks over disposable masks.(80; 87) The

certainty in this evidence was low according to the GRADE assessment, which means that further research is very likely to have an important impact on our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Influenza/Influenza-like illness

We included five studies that addressed the comparative effectiveness of different types of masks (RCT=1, cluster RCT=4).

Community settings

We did not identify studies that addressed this setting.

Healthcare settings

Transmission (high certainty)

We identified five studies (RCT=1, cluster RCT =4) that assessed the comparative effectiveness of different types of masks. Overall, medical/surgical masks were not inferior to N95/respirators.(92; 121-123) One study found that medical/surgical masks were superior to cloth masks.(103) The certainty in this evidence was high according to the GRADE assessment, which means that further research is unlikely to have an important impact on our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Other clinical and confirmed respiratory illnesses and infections

We included two cluster RCTs that addressed the comparative effectiveness of different types of masks.

Community settings

We did not identify studies that addressed this setting.

Healthcare settings

Transmission (moderate certainty)

We identified two cluster RCTs that assessed the comparative effectiveness of different types of masks. Both studies reported more cases in the medical/surgical mask arm in comparison to the N95/respirator arm. In one study, the difference was statistically significant (incidence in medical mask 17% vs 7.2% in N95 arm) (the conditions studied were clinical respiratory illness, ILI, laboratory-confirmed respiratory virus infection, influenza, laboratory-confirmed bacterial colonization of Streptococcus pneumoniae, legionella, Bordetella pertussis, chlamydia, Mycoplasma pneumoniae, or Haemophilus influenzae type B).(124) In the other study, cases in the medical/surgical mask were double the cases in the N95 arm, but the difference was not statistically significant (the conditions studied were clinical respiratory illness, ILI, laboratory-confirmed respiratory virus infection and influenza).(122) The certainty in this evidence was moderate according to the GRADE assessment, which means that further research is likely to have an important impact on our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

Additional insights from existing network meta-analysis

One network meta-analysis included 35 randomized controlled trials and observational studies investigating specific mask effectiveness against influenza virus, SARS-CoV, MERS-CoV and SARS-CoV-2 over the rate of respiratory viral infection. The study found that high compliance to mask-wearing (the level of compliance was extracted from the stratified analysis of studies that include that information) significantly improves protection compared to low compliance (OR, 0.43 [95% CI 0.23–0.82]). Across sub-group analyses of different viruses and clinical settings, N95/respirators or equivalent masks were consistently the most effective in protecting against coronavirus infections (OR, 0.30; [95% CI, 0.20–0.44]). The effectiveness of medical/surgical masks against influenza or coronavirus infections (SARS, MERS and COVID-19) was weak. This study recommended using N95/respirators or their equivalents (e.g., FPP2) for best personal protection in healthcare settings until more evidence on medical/surgical masks is accrued.(125)

Another network meta-analysis included 16 randomized controlled trials reporting the protective efficacy of mask-wearing against respiratory infections. Overall, the evidence was weak, lacking statistical power due to the small number of participants and substantial inconsistency in the findings. Participants with fit-tested N95 respirators were more likely to have lesser infection risk compared to those without mask-wearing (RR 0.67, [95% CI 0.38–1.19, P-score 0.80]), followed by those with non-fit-tested N95(RR 0.73, [95% CI 0.12–4.36, P-score 0.63]), and by those with non-fit-tested FFP2 respirators (RR 0.80, [95% CI 0.38–1.71, P-score 0.63]). Medical mask-wearing with hand hygiene practices had modest risk improvement over not mask-wearing (RR 0.89, [95% CI 0.67–1.17, P-score 0.55]), similar to any medical mask-wearing without hand hygiene practices over not mask-wearing(RR 0.92, [95% CI 0.70–1.22, P-score 0.51]). Participants wearing double-layered cloth masks were found to have a higher infection risk than those not wearing a mask (RR 4.80, [95% CI 1.42–16.27, P-score 0.01]). Eleven out of 16 RCTs that underwent a pairwise meta-analysis revealed a substantially lower infection risk in those wearing medical/surgical masks than those without masks (RR 0.83 [95% CI 0.71–0.96]). The study recommended mask-wearing given the protective benefits in reducing respiratory transmissions.(126)

Key findings about question 3: Effectiveness of mask mandates

COVID-19

Overall, we included 61 studies that addressed the effectiveness of mask mandates vs no mandates (quasi-experimental=13, cohort=9, case-control=2, cross-sectional=2, ecological=35). 43 studies assessed mask mandates as an individual PHSM, and 18 studies that assessed mask mandates adjusted for use of other PHSMs.

Community settings

Overall, we included 52 studies that addressed the effectiveness of mask mandates vs no mandates in community settings, 37 assessed mask mandates as an individual PHSM, and 15 assessed mask mandates adjusted for use of other PHSMs.

Transmission (high certainty)

We identified 37 studies focused on the effectiveness of mask mandates vs no mandates (quasi-experimental=8, cohort=5, case-control=2, cross-sectional=1, ecological=21). Most studies favoured mask mandates (n=33), (127-156) few found a non-significant difference between mask mandates and no mandates (n=6),(157-162) and one ecological study (counties in Texas, the U.S.) reported an increase in the number of cases, hospitalizations and deaths in the period after the mask mandate was issued (with a five-day lag) when adjusted by other covariables.(163) Mask mandates were associated with less seropositivity,(155) with reduced transmission (varying from 2.4% to 3.6 times less),(127-129; 134; 143; 144; 150-152; 164; 165) and a reduction in the number of cases (varying from 11% to 2.3 times less).(130-133; 135-142; 145-149; 153; 154; 156) The certainty in these findings was high according to the GRADE assessment, which means that further research is very unlikely to change our confidence in the benefit of this intervention.

In schools, the ratio of community-acquired to school-acquired infections was about 12.4,(128) and was associated with a low rate of primary and secondary infections among staff and students.(128; 130; 133; 141; 143; 153-155; 166) Among the six studies that found a non-significant difference between mask mandate and no mandate, three analyzed transmission/incidence in children and students in schools,(157; 159; 161) and the other three were focused on the general population.(158; 160; 162) In addition, in schools, mask mandates were associated with a low rate of primary and secondary infections.(167; 168)

We found 15 additional studies that assessed the impact of mask mandates adjusted for the use of other PHSMs (such as lockdowns, public transport bans, international travel restrictions, and school closures) (quasi-experimental=2, cohort=3, ecological=10). Most studies found that mask mandates have a benefit in controlling the pandemic in addition to the other PHSMs (n=12). Two multi-country studies reported no difference when a mask mandate was added to the PHSMs implemented,(169; 170) and one study (covering the period from January 1 to April 20, 2020, during the first wave of the COVID-19 pandemic reported an increase in cases after the mask mandate was issued in 30 European countries.(171) In multivariable analysis considering other PHSMs, mask mandate was associated with reduced transmission (varying from 12% to 2.3 times less),(168; 172-175) and a reduction in the number of cases (varying from 2% to 19% less).(167; 176-181) The certainty in these findings was high according to the GRADE assessment, which means that further research is very unlikely to change our confidence in the benefit of this intervention.

Hospitalizations (very low certainty)

We identified five studies that assessed the effectiveness of mask mandate vs no mandate for reducing hospitalizations (quasi-experimental=2, ecological=3). Three studies reported a reduction in the hospitalization rate (60% in one study, and 11 per 100,000 inhabitants on average in another study),(137; 138; 144) one study found a

non-significant difference between mask mandates and no mandates,(158) and one ecological study (counties in the US, Texas) reported a higher average number of positive hospitalized patients, patients in the ICU, and on a ventilator after mask mandates were issued (considering a 10-day lag).(163) The certainty in these findings was very low according to the GRADE assessment, which means that the effect is very uncertain.

We found one additional ecological study that assessed mask mandates adjusted by other PHSMs. This study reported a decrease of 2.38% in the proportion of hospital admissions.(177)

Deaths (very low certainty)

We identified six studies that assessed the effectiveness of mask mandate vs no mandate for reducing mortality (quasi-experimental=2, ecological=4). Five studies reported a reduction in the death rate.(136-138; 154; 182) One study in New York State (the U.S.) reported a reduction of 11% in the risk of deaths in middle socially vulnerable counties and a reduction of 13% in high socially vulnerable counties.(136) Another study in Kansas (the U.S.) reported a reduction of 65% in the mean of deaths in counties that implemented mask mandates versus counties that did not.(137) Another study in the U.S. reported that state mask mandates reduced new weekly COVID-19 deaths by 0.7 per 100,000 inhabitants on average.(138) One study in Portugal reported an increase in deaths of 3.2% per day after lifting mask mandates.(154) One study in Switzerland reported a 5 −10% reduction in male mortality, but not in female mortality.(182) One ecological study conducted in counties of Texas (the U.S.) reported a higher average number of deaths after mask mandates were issued.(163) The certainty in these findings was very low according to the GRADE assessment, which means the effect is very uncertain.

We found four additional studies that assessed the impact of mask mandates adjusted for use of other PHSMs (quasi-experimental=1, cohort=1, ecological=2). Two studies found that the adoption of a public-mask mandate was associated with a decrease in 13 deaths per 100.000 inhabitants.(172; 177) Another study reported no difference when a mask mandate was added to the PHSMs implemented,(169) and one study (covering the period from January 1 to April 20, 2020, during the first wave of the COVID-19 pandemic) reported an increase in deaths after the mask mandate was issued in 30 European countries.(171) The certainty in these findings was very low according to the GRADE assessment, which means that the effect is very uncertain.

Equity considerations
Only one study reported an equity consideration. This study found that in the most socially vulnerable counties in New York State, mask mandates were associated with a decrease in cases and deaths, with a narrowing of infection disparities between low and mid terciles of vulnerability as well as a narrowing of mortality disparities among mid and high terciles of vulnerability compared to the lowest tercile.(136)

Healthcare settings

Transmission/incidence (moderate certainty)

We identified five studies that assessed the comparative effectiveness of mask mandates vs. no mandates in healthcare settings (quasi-experimental=2, cohort=1, ecological=2). All studies favoured mask mandates,(164; 165; 183-185) reporting that they were associated with less seropositivity (varying from a decrease of 0.49% to 1.7% per day),(165; 183-185) a reduction in transmission,(183) and a reduction in the number of cases (a decline from 4.3 to 14.3 cases per week).(164; 165; 183) The certainty in these findings was moderate according to the GRADE assessment, which means that further research is likely to change our confidence in the benefit of this intervention.

Hospitalizations

We did not identify studies that addressed this outcome.

Deaths

We did not identify studies that addressed this outcome.

SARS 1/MERS

We did not identify studies that address this disease.

Influenza/Influenza-like illness

Community settings

Transmission (Moderate certainty)

We identified two ecological studies that evaluated the impact of mask mandates for COVID-19 adjusted by other PHSMs on the transmission/incidence of Influenza. Both studies found a favourable effect of mask mandates, one reported a reduction of 7.75% in the transmission of Influenza,(186) and the other reported that after lifting the mask mandate in Hong Kong, Influenza transmission increased substantially.(187)

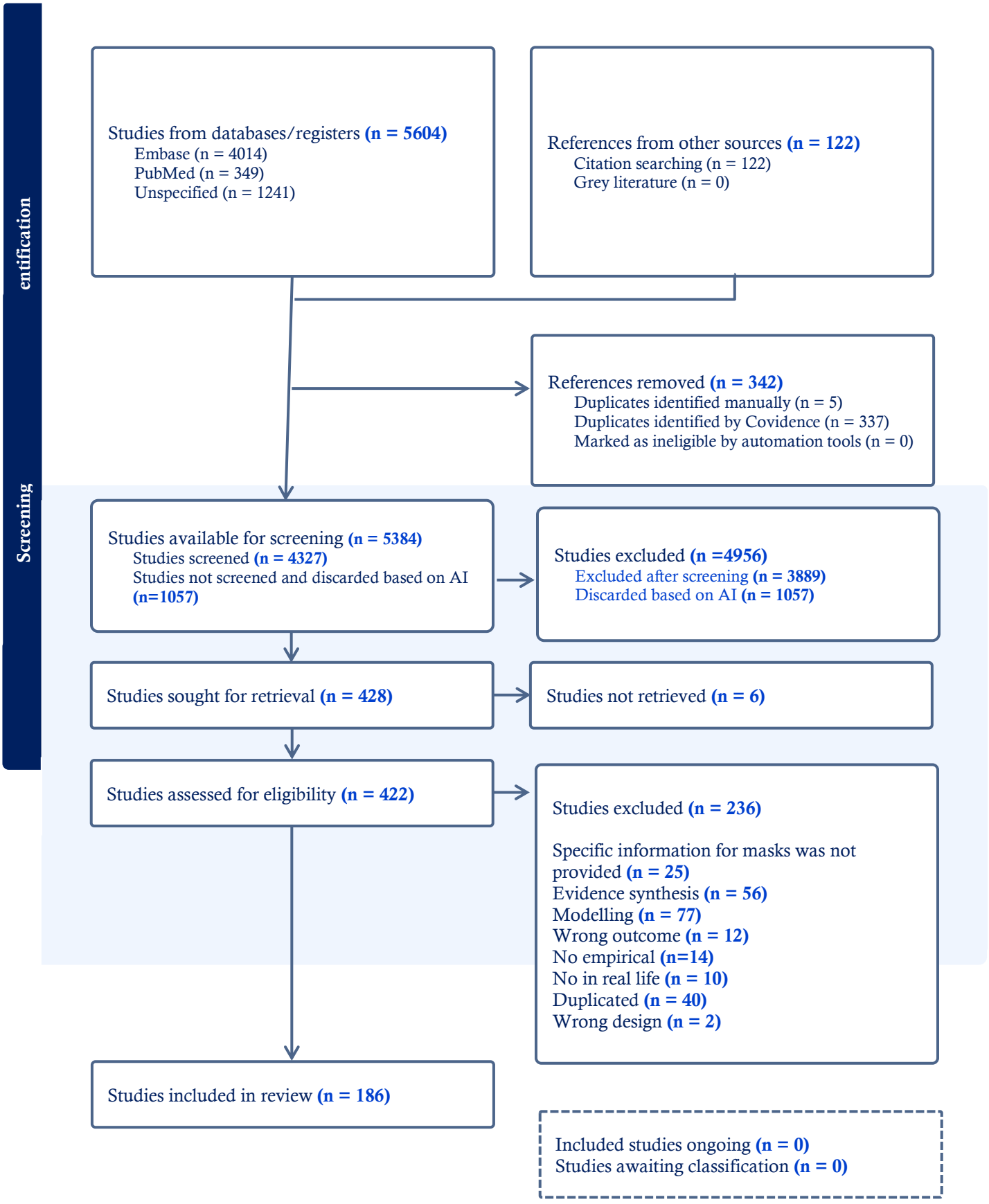
Healthcare settings

We did not identify studies that addressed this outcome.

Other clinical and confirmed respiratory illnesses and infections

We did not identify studies that addressed this outcome.

Figure 1. Prisma Chart



Vélez CM, Wilson MG, Lavis JN. Living Evidence Synthesis 14.2: Effectiveness of masking in community and healthcare settings for reducing the incidence, transmission, hospitalizations and deaths from respiratory infectious diseases. Hamilton: McMaster Health Forum, 25 March 2024.

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