



UNCOVER

Usher Network for COVID-19
Evidence Reviews

Summary: Does the use of face masks in the general population make a difference to spread of infection?

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THE UNIVERSITY
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Title: Does the use of face masks in the general population make a difference to spread of infection?

Review produced by UNCOVER <https://www.ed.ac.uk/usher/uncover>

Summary answer:

- Based on the evidence from three recent systematic reviews and meta-analyses [including our re-analysis focusing on community trials] wearing face masks in the community was not significantly associated with a reduction in episodes of influenza-like illness [ILI]; the overall assessment of the quality was classified as low.
- Jefferson 2020 [re-analysed]: 7 RCTs in the general population with ILI outcome [OR (95% CI) 0.92 (0.87, 1.07)]
- Xiao 2020: 10 RCTs in non-healthcare settings with pandemic influenza outcomes [OR (95% CI) 0.97 (0.79, 1.18)]
- Brainard 2020: various study designs with respiratory illness outcome; OR (95% CI): 0.94 (0.75, 1.19)
- SARS-CoV-2 is transmissible by contact and droplets [aerodynamic diameter >5µm]. SARS-CoV-2 can be detectable and viable in aerosols [aerodynamic diameter ≤5µm], suggesting possible transmission routes by aerosols. However, there is little current evidence demonstrating actual aerosol transmission episodes by SARS-CoV-2.
- The quality of the epidemiological evidence on face mask effectiveness is moderate to low. Many of the cohort and cross-sectional studies rely on self-reported symptoms not confirmed clinically or using lab tests. There is very little information on duration or frequency of use or correct usage of masks.
- Whilst some of the RCTs specify the type of mask used, many of the studies do not define the type of mask or the materials masks are made from. This makes it difficult to evaluate the evidence.
- We screened 549 records and found 11 articles that looked at **homemade facemasks**. The most informative study we found was by Davies et al (2013). Overall, the quality of the evidence available was very low. Key findings:
 - Homemade masks are not effective at filtering respiratory aerosols. Van der Sande et al (2008) compared the effectiveness of different masks at filtering respiratory aerosols from the outside to the inside of the mask. FFP respirators, which provide a minimum of 94% filtration, were found to be 25 times more effective than surgical masks, which were in turn about twice as protective as homemade masks.
 - Although they are not effective at filtering respiratory aerosols, homemade masks worn by sick people can reduce virus transmission by mitigating aerosol dispersal (Tang et al, 2009; Viola et al, 2020). Homemade masks worn by sick people can also reduce transmission through droplets. By reducing the number of droplets reaching surfaces, homemade masks can play a role in reducing the risk of transmitting or acquiring COVID-19 through reducing environmental (surface) contamination.
 - Suitable household materials for making homemade masks must combine filtration properties with breathability. There is a trade-off between filtration and breathability. T-shirt or jersey material combined with a non-woven filter, such as kitchen paper, have been proposed as the optimum materials; however evidence is limited. Much of the evidence about suitable materials focuses only on filtration properties tested in laboratories and not on comfort and breathability tested in human subjects.
- Many epidemiological studies did not gather information on general hygiene and other relevant health behaviours (e.g. hand sanitiser, hand-washing) in conjunction with mask wearing. Many of the studies do not make a distinction between indoor and outdoor settings.
- Much of the evidence is not generalizable to a UK community setting. For example, 8 of the 24 studies focus on face mask use during the annual hajj pilgrimage in Saudi Arabia – a very specific context in very different climatic conditions. The influence of cultural and socio-

behavioural factors (e.g. fear, stigma, altruism) on levels of compliance during a pandemic may differ meaningfully from other circumstances.

- There is little evidence on the behavioural aspects of facemask use. The most-studied aspect relates to frequency / consistency of use, with more consistent use linked to a greater reported protective effect (although this must be taken in the context of our overall findings which failed to find a clear protective effect of facemasks). One study found that facemasks contribute to an increased sense of isolation.
- Public health awareness campaigns [Aiello-2010], specific education [Barasheed-2016] and provision of free facemasks [Alabdeen-2005] all appeared to incentivise greater uptake of facemasks. There were little data on how long people can be expected to comply with requirements to wear a facemask. One review reported that “in one study, rates of self-reported adherence were found to decline over a 5-day period” [PHE-2014].

Conclusion

This review found mixed and low quality epidemiological evidence on the use of face masks to prevent community transmission of respiratory illness, with much of the epidemiological evidence generated in very different contexts from the UK. Based on the epidemiological evidence, the effectiveness of face masks has not been demonstrated; however, evidence from laboratory and mechanistic studies suggests that facemasks can be effective in mitigating aerosol and droplet dispersion. Of course, these fluid mechanics studies do not account for potential behavioural factors associated with mask use (e.g. perhaps touching your face more, washing your hands less, engaging more readily in high risk exposures, reusing a contaminated mask etc). As these may play a role in actual transmission rates there is an ongoing need for robust epidemiological studies to assess the real world impact of mask use on SARS-CoV-2 transmission rates. Key issues are the need for better quality research in community settings, which focuses not only on evaluating different types of mask but also on evaluating adherence (duration and frequency of mask use, correct procedure for putting on and removing masks) and the use of masks in conjunction with hand hygiene.

Note: This review was conducted very quickly, and as such has the following weaknesses: full text screening, extracted data and quality assessment were not checked by a second reviewer, thus introducing a risk of bias. We will continue to update and refine this review going forward.

Reviewers note that the WHO Expert Panel reported on 6/4/2020 that “the wide use of masks by healthy people in the community setting is not supported by current evidence and carries uncertainties and critical risks”.

Extended abstract:

Methods:

We adapted rapid review methods outlined by the Cochrane Collaboration. We sought publications in four main inter-connected areas:

- sub-review 1: what is the effectiveness of face masks in preventing respiratory transmission in the community?
- sub-review 2: what is the relative effectiveness of medical masks versus non-medical masks or equivalent barriers?
- sub-review 3: what important behavioural aspects of wearing masks in terms of compliance with advice and impact on risk taking behaviour can be identified?
- sub-review 4: what is known about the nature and spread of respiratory airway particles?

Literature Search: We excluded publications focusing only on health care settings, modelling data, animal models, and articles providing commentary but no data. We focused on studies reporting on COVID-19 but included data from other related respiratory viruses, where appropriate. We became aware that a number of recent existing reviews on related relevant topics. Since there is currently no register of existing reviews we compiled this from websites of partners taking part in the WHO Evidence Collaborative and identified ~170 COVID-19 evidence reviews, including some on use of face masks. We searched the literature for prior reviews and evidence summaries on facemasks to

prevent transmission of infection. We appraised the 14 prior reviews/summaries found, and for this update rapid review selected the three most recent, on-topic, and robust quality [Jefferson 2020, Brainard 2020, Xiao 2020] for updating and re-analysis. We sought publications with data on face masks of any study design and of published or pre-published status by updating the literature searches of three systematic reviews. The search was limited to publications from the date onward that each of the systematic review had stopped their search. We searched the databases used in the prior reviews (PubMed, Medline, Embase, Scopus, CENTRAL, CINAHL) and augmented the methods by including a search for pre-prints on medRxiv. The searches were carried out by one reviewer (MD). From the updated search results set, we excluded publications published before 2020, from nosocomial settings, modelling data, animal models, providing commentary but no data. All component studies of the three systematic reviews were included in this update. There were no language limitations as part of the search, but due to time and resource constraints, non-English publications were not included in analysis.

Homemade facemasks search: conducted 19 April 2020 in 4 bibliographic data bases (PubMed, CINAHL, Web of Science and MedRxiv) plus reference screening and forward citation tracking of key articles.

This review was updated on 27 May 2020 to incorporate additional evidence on fluid mechanics. Two new citations were added (Tang et al, 2009; Viola et al, 2020).

Link to full review and any relevant updates: <https://edin.ac/facemasks>

Date completed: 7 April 2020, updated 16 April (community effectiveness) and 19 April (homemade facemasks). This summary was updated on 27 May 2020.

The UNCOVER network is committed to responding quickly and impartially to requests from policymakers for evidence reviews. This document has therefore been produced in a short timescale and has not been externally peer-reviewed.

Key references:

Brainard J, Jones N, Lake I, et al. Facemasks and similar barriers to prevent respiratory illness such as COVID-19: A rapid systematic review. 2020

Davies A. et al (2013) [Testing the efficacy of homemade masks: would they protect in an influenza pandemic?](#) Disaster Medicine & Public Health Preparedness7(4):413-8

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