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Usher Network for COVID-19 Evidence Reviews

Summary: Which occupations and activities might benefit from mask wearing to reduce the transmission of COVID-19?

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THE UNIVERSITY of EDINBURGH | usher institute

Title: Which occupations and activities might benefit from mask wearing to reduce the transmission of COVID-19?

Summary answer:

This review was conducted on 22 April 2020. It was updated on 27 May 2020 to incorporate evidence from fluid mechanics studies. This review sought to answer two sub-questions:

- Which high proximity activities in the UK might benefit from mask wearing to reduce the transmission of COVID-19?
- Which occupations, outside of those already advised to wear a face mask in the UK, might benefit from wearing a face mask at work to reduce the transmission of COVID-19?

We found four relevant epidemiological papers relating to influenza. All were observational studies, with a GRADE rating of **very low quality**. None specified mask type.

Two cross-sectional studies in **schools** examined mask use and influenza infection. One found evidence of a statistically significant reduction in risk of influenza infection for parent/carer-reported 'habitual' face mask wearers (adjusted OR 0.859, 95% CI 0.778–0.949). The other found a reduction in risk of influenza infection amongst 'continuous' mask wearers (OR 0·51, 95% CI 0·30–0·88). However, an ecological study in 29 Japanese elementary schools found no correlation between habitual mask wearing at a population level and the influenza epidemic level within the school (p=0.776).

We found one case-control study about mask use and H1N1 for aeroplane passengers. It found a statistically significant reduction in risk of infection for aeroplane passengers wearing face masks for the whole duration of the journey from New York to Hong Kong (OR 0, 95% CI 0-0.71).

No relevant papers for other respiratory infections were identified for occupations outside of those advised to wear face masks in the UK. One paper involving face masks was found relating to the military, but this was excluded due to the communal living involved on an aircraft carrier.

Overall, the epidemiological data are not robust, are extrapolated from influenza and are confounded by the fact those who wore masks during these activities are liable to be wearing masks more frequently in community contexts outside of these high proximity activities. As only one poor quality, small case-control study for aeroplane travel was identified, and because the studies in schools did not appear to explicitly ask about use in the particular context of school, **there is insufficient epidemiological evidence from this review to know whether mask wearing in aeroplanes or schools is beneficial**.

However, although the epidemiological evidence is limited and of low quality, there is robust evidence from laboratory studies which measure the extent to which droplets and aerosol are dispersed. Droplets ejected by unfiltered sneezes can reach 7 – 8 metres (Bourouiba, 2020), coughs can reach 4 – 6 metres (Bourouiba et al, 2014) and aerosols more than 1 metre (Bourouiba et al, 2014; Tang et al, 2009; Viola et al, 2020). The ranges depend on temperature, humidity and environmental airflows. Furthermore, there is evidence from this type of study that wearing a mask can reduce these distances to a few centimetres (Tang et al 2009; Viola et al, 2020). Hence, from a mechanical point of view, there is evidence that masks CAN mitigate virus transmission. 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.

Extended abstract:

Titles and abstracts were each screened by one reviewer (CC, MG, MP). A second reviewer then screened all excluded abstracts. Where there was a conflict, the abstract was included in full text screening. The included full text articles were each screened by one reviewer (CC). A second reviewer then screened all excluded full texts (MG, MP). Conflicts were resolved by discussion. Data extraction for each article was conducted by a single reviewer (CC). A second reviewer then checked the data extraction (MG). All papers were appraised and assigned a GRADE classification by two separate reviewers (CC and MG). The NIH QAT was used for critical appraisal of cross-sectional and case-control papers. As no established tool exists for ecological studies, we employed the template used by Betran et al in their 2015 systematic reviewto assess Uchida 2018. Data were synthesized narratively. Because of the heterogeneity of the evidence, a meta-analysis was not appropriate. Using the GRADE system two reviewers (CC, MG) graded the certainty of the evidence.

This review was updated on 27 May 2020 to incorporate evidence from 4 additional articles on fluid mechanics (Bourouiba, 2020; Bourouiba et al, 2014; Tang et al, 2009; Viola et al, 2020).

Link to full review: https://edin.ac/facemasks

Date completed: 22 April 2020

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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:

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