

Face masks for the general public in high risk settings during the current spike of COVID-19 in Melbourne, Victoria

In the absence of effective treatments, a vaccine and a true point of care test, public health responses to the SARS-CoV-2 virus require a comprehensive package of interventions to reduce transmission. One prevention strategy, the use of **face masks (cloth face coverings or medical/surgical masks)** for the **general public** has been applied variably across jurisdictions. At present, there is **no available direct evidence** (from studies on COVID19 and in healthy people in the community) on the effectiveness of universal masking of healthy people in the community to prevent infection with respiratory viruses, including COVID-19. Whilst low on the hierarchy of infection control, there is the potential for benefit but also for harm.

Current Policy and Guidelines

1. World Health Organisation¹ - *to prevent COVID-19 transmission effectively in areas of community transmission, governments should encourage the general public to wear masks in specific situations and settings as part of a comprehensive approach to suppress SARS-CoV-2 transmission. People aged over 60 and those with underlying comorbidities should use medical-grade masks.*
2. US CDC² - *recommends that people wear cloth face coverings in public settings when around people outside of their household, especially when other social distancing measures are difficult to maintain.*
3. AHPPC³ - *wearing of face masks by the general population is not currently recommended. Should significant community transmission in Australia occur, mask wearing in public is an available option.*

Recommendation

There is a **potential benefit in face mask use as part of a comprehensive package of measures to prevent transmission of COVID-19, in areas where social distancing is not possible.** Potential harms of reduced adherence to other prevention measures are not supported by evidence. Application of a precautionary principle of public health would support this recommendation of face masks in Melbourne whilst the community transmission is increasing, coupled with communication interventions. Further qualitative research on acceptability of masks, monitoring of real-time trends (adherence to prevention measures) and monitoring of local market availability of masks during implementation is recommended.

¹ [https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak)

² <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html>

³ <https://www.pm.gov.au/media/update-coronavirus-measures-24april20>

Efficacy of Face Masks in reducing viral droplets and aerosols

The currently best available evidence suggests that SARS-CoV-2 virus is most commonly spread by respiratory droplets and contact routes (through fomites). At the moment, although there is consensus that SARS-CoV-2 mainly spreads through large droplets and contact, further research is needed on the role of aerosol spread⁴. There is strong biological plausibility for masks reducing spread of respiratory viruses in lab-based experimental studies^{5,6}. In a randomised trial of surgical masks in children and adults with acute viral infections confirmed on PCR, surgical masks significantly reduced detection of influenza virus RNA in respiratory droplets and human seasonal coronavirus RNA in aerosols, with a trend toward reduced detection of coronavirus RNA in respiratory droplets. There was no virus detected in respiratory droplets or aerosols collected from participants with coronavirus wearing face masks.

The Effectiveness of Face Masks in reducing transmission of COVID-19

Masks may prevent an infected wearer from transmitting the virus to others (source control) and protect a health wearer against infection (prevention). Importantly, in SARS-CoV-2, masks may also prevent the possibility of transmission from people who are infected and shedding virus but have not yet developed symptoms; pre-symptomatic transmission⁷.

A **systematic review and meta-analysis** looking at how physical distancing, face masks, and eye protection affect the spread of COVID-19, SARS, and MERS in both community and healthcare was published in The Lancet online on 1 June⁸. It included 172 observational studies across 16 countries. There were no published randomised controlled trials (RCT), and it would be neither feasible nor ethical to conduct an RCT during the pandemic on these prevention measures. Based on a pooled sample size of 2,647, the review found that **face mask use could result in an 85% risk reduction** (margin of error or 95% confidence interval of 66% to 93%) for contacts of cases. They found stronger associations with N95 or similar respirators compared with disposable surgical masks or similar (e.g., reusable 12–16-layer cotton masks). The use of face masks was protective for both health-care workers and people in the community exposed to infection. The association was seen irrespective of causative virus, health-care setting versus non-health-care

⁴ <https://www.nap.edu/catalog/25769/rapid-expert-consultation-on-the-possibility-of-bioaerosol-spread-of-sars-cov-2-for-the-covid-19-pandemic-april-1-2020>

⁵ <https://www.nejm.org/doi/full/10.1056/NEJMc2007800>

⁶ <https://www.nature.com/articles/s41591-020-0843-2>

⁷ <https://www.medrxiv.org/content/10.1101/2020.05.10.20097543v2>

⁸ [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31142-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31142-9/fulltext)

setting, and by type of face mask. The six studies of COVID-19 transmission found the same risk reduction as SARS and MERS studies.

The limitations of this study were the bias in the observational primary studies, degree of quantitative estimates and the generalisability of the findings given 3 of 29 studies were from non-health care settings, and all with SARS infection.

An ecological study in the United States analysed daily county-level trends in case reporting before and after 15 states and the District of Columbia mandated the use of face masks in public spaces between 8 April and 15 May⁹. **The daily case rate declined** by 1.4, 1.7, and 2.0 percentage-points within 11–15, 16–20, and 21+ days after the mandate, respectively. All of these declines were statistically significant.

In addition, the most recent modelling (24 June) by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington forecasts that **33,000 deaths could be avoided in the US** by 1st October if 95 percent of people wore masks in public¹⁰.

Public risks, acceptability and trust

There have been major shifts in policies on the wearing of face masks by prominent health organisations, such as the WHO, US-CDC, and Public Health England. Initial reluctance to advise the non-ill public to use masks was based on (a) fears of shortages for healthcare workers and (b) potential harm to the user. There is no available evidence to confirm the latter, rather conjecture (e.g., people wearing masks would touch their faces more and/or not practice physical distancing i.e. risk-compensation behaviour). All three of the above organisations now recommend face coverings in spaces where physical distancing is not possible.

Distancing is not possible in many settings in Melbourne, particularly on public transport. People who rely on public transport to travel to work (essential workers or people without a car who are travelling to essential services) should be offered all mitigations available as a principle of health equity.

On the other hand, there are also risks to address in equitable delivery - cost and access. Jurisdictions that have implemented face mask policies have asked citizens to purchase or make their own masks. Allocations could be considered for particular vulnerable groups.

The term “precautionary principle” of public health can apply to two situations (a) when harm is not currently happening, but a proposed intervention may cause harm and (b) when serious harm is currently happening and a proposed intervention may reduce that harm. The latter is particularly relevant to the COVID-19 pandemic, especially when science and evidence is weak. **There is currently no evidence that the**

⁹ <https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.00818>

¹⁰ <http://www.healthdata.org/news-release/new-ihme-covid-19-model-projects-nearly-180000-us-deaths>

use of home-made face coverings or surgical masks by the general public for source control causes any harm beyond minor irritation behind the ears¹¹.

The Lancet meta-analysis reported on 5 qualitative studies showed >95% willingness to wear masks (China 4 studies) and that the risk perception of COVID-19 threat significantly increased the likelihood of wearing medical masks (Viet Nam)⁸. Whilst face masks are an embedded social practice in parts of Asia, it emerged from the 1919 Flu pandemic a collective, science-based response to a public health threat¹². Whilst there have not been studies from Australia or similar settings, there have not been reports of issues around low public acceptability in Europe and North America.

In Melbourne, a preliminary analysis conducted for this brief of qualitative research undertaken by Burnet Institute and partners (*Davis A, Hellard M et al.*) on people's experiences during the COVID-19 pandemic has revealed a **high level of confusion about the effectiveness of masks** due to mixed information in the media and concern that wearing a mask as a precaution could negatively impact on frontline health workers who don't have enough PPE (maybe valid early in the pandemic). There are dual concerns from Asian Australians who fear racism and personal safety related to wearing a mask in public, but are also concerned about going out into public spaces where community members are not wearing masks. Overall, participants reported a desire for a "proactive" government response supported by clear messaging - including explanation of public health rationale and actual resources (not just guidelines or instructions) to help people cooperate with response measures. We **postulate that masks may have an effect in increasing public cooperation** with prevention by providing a visual symbol of the need for whole-of-community participation.

Public transport in Melbourne: hypothetical scenario

In Melbourne, around 100 people have acquired coronavirus through community transmission -- unknown source -- in the past ten days¹³. A further 40 cases are still under investigation. In 2009, 37% of Melbourne residents used public transport at least once a month; this may be higher in 2020 because of increased parking restrictions in the CBD¹⁴. Of those, 45% used public transport 3-7 times a week. While public transport use dropped in the March to May period, public transport data show the number of people on buses almost doubled in some Victorian areas in June, while train use in hotspot council areas spiked by

¹¹ <https://onlinelibrary.wiley.com/doi/full/10.1111/jep.13415>

¹² <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1467-9566.2012.01466.x>

¹³ <https://www.covid19data.com.au/transmission-sources>. NB. The Victorian DHHS only provides cumulative epidemiological information on the website. Therefore, it is difficult to calculate the number of community transmissions during a specific period of time, particularly as so many cases are still under investigation.

¹⁴ <https://www.abs.gov.au/ausstats/abs@.nsf/Products/4602.2~Oct+2009~Chapter~Public%20Transport>

up to 40 per cent¹⁵. In hotspot Casey, numbers on trains grew by 40 per cent in the week of 10 June. Travellers on buses grew by 92 per cent in Nillumbik, and 63 per cent in Cardinia, another hotspot.

Of the approximately 140 people who may have acquired coronavirus through community transmission in the past ten days, between 25 and 52 may have used public transport prior to their diagnosis. These people may have infected between 50 and 104 others if physical distancing was not observed. Based on the data published in The Lancet, **wearing masks could have prevented between 42 and 88 primary cases** and potentially higher numbers of secondary cases. Moreover, there is always the possibility of one of these infected passengers being a super-spreader, a phenomenon that is now well documented.

Summary and Recommendations

In responding to COVID-19, we only have a few prevention tools. Test, trace and isolate is a key public health measure. Personal protection is limited to physical distancing, hand hygiene, staying home when ill, and, although not yet implemented in Australia, wearing face masks. The experience of countries such as Austria and the Czech Republic demonstrates that face masks can be a critical (and acceptable) component of protection during the relaxation of restrictions. As a public health principle, all effective interventions that are available should be deployed, so long as they are supported by evidence and safe. The addition of face masks for the public in areas where distancing is not possible or in hot spot areas is sound public health practice, with the balance firmly on benefit over harm. These settings may include shopping centres or queues where adequate physical distancing is challenging.

Any recommendation to the public should be clear that wearing a mask (cloth or surgical) is advised in any confined space where physical distancing is not possible. Clear communications and messaging on how to properly use and care for a mask would be essential. Both WHO and US-CDC websites offer useful health promotion materials and videos on this topic.

Authors: *Prof Mike Toole AM, Scott Umali, Dr Suman Majumdar, Burnet Institute*

¹⁵ <https://www.theage.com.au/national/victoria/military-hits-hotspots-as-daily-virus-infections-surge-to-three-month-high-20200627-p556u5.html?btis>