PUBLIC HEALTH COMMUNICATION CENTRE AOTEAROA

Why NZ should consider adopting “mass masking” as an additional step to speed elimination of the Covid-19 pandemic

21 April 2020

Ling Chan, Sophie Febery

Widespread public mask use is common in some Asian countries as a control measure in the current Covid-19 pandemic. There is some suggestive laboratory and epidemiological evidence of benefit for such mask use. Since the costs of mass masking are relatively low and there are no apparent substantial down-sides, it should be given serious consideration by the NZ Government to speed progress towards the elimination goal.

There is no doubt that surgical masks can be used to reduce the spread of respiratory infections [1]. In health care settings masks are used widely for infection control – though it is still not proven that N95 respirator masks are superior to surgical masks eg, for preventing influenza infection [2]. In this blog we focus more on the potential role of masks in contributing to reducing the spread of SARS-CoV-2, the virus causing the Covid-19 pandemic.

Photo supplied by Ling Chan with permission

Transmission dynamics of SARS-CoV-2 and rationale of mask use to stop spread

From the most recent evidence, the following conclusions on SARS-CoV-2 can be drawn:

a. The primary route of transmission of SARS-CoV-2 is likely via small droplets and can spread through talking [3][4].
b. The droplets can sometimes travel a lot further than the current 2m distancing guidelines [5].
c. Perhaps a half or more of people infected with SARS-CoV-2 never develop any symptoms (ie, are asymptomatic [6]). Others might be infectious just before they develop symptoms (ie, when pre-symptomatic). One estimate is that as many as 50% of infections are transmitted from pre-symptomatic or asymptomatic individuals [7].

Perhaps the most compelling evidence for masks comes from Leung et al [8], who showed that a non-fitted surgical mask can block up to 100% of droplets containing coronavirus. A further, small study looked at cotton mask use on Covid-19 infected patients and found a 96% reduction in viral load from a cough [9].

There is now also some indirect evidence of benefits from mask use from an observational study emerging from Hong Kong [10], where physical distancing as a control measure is more constrained due to population density. With self-reported mask use at 99% when outside the home (and other control measures), Hong Kong has maintained an effective reproduction number of under 1 for several weeks now.

The above is only suggestive evidence for a benefit of mass use in public. We do not yet have clear, randomised controlled trial evidence that face-masks will slow the spread of the Covid-19 pandemic [11] [12]. However, as Greenhalgh et al argue:

> *"in the face of a pandemic the search for perfect evidence may be the enemy of good policy. As with parachutes for jumping out of aeroplanes, it is time to act without waiting for randomised controlled trial evidence. A recently posted preprint of a systematic review came to the same conclusion. Masks are simple, cheap, and potentially effective. We believe that, worn both in the home (particularly by the person showing symptoms) and also outside the home in situations where meeting others is likely (for example, shopping, public transport), they could have a substantial impact on transmission with a relatively small impact on social and economic life"* [13].

Addressing concerns over limited supply of surgical masks and

effectiveness of cloth masks

The concerns over the supply of medical masks for the public is a valid one and we propose the use of cloth masks for the general public to reserve the surgical masks for healthcare professionals. Although good quality evidence is lacking at present; recent studies have shown that a layer of cloth can be effective in reducing droplet spread [4] [9]. Speech emits particles of around 1µm [3] and common household materials have been shown to have between a 49% and 86% filtration rate for 0.02µm exhaled particles whereas surgical masks filtered 89% of those particles [14]. A cloth mask may therefore only be marginally (15%) less effective than surgical masks in blocking emissions of particles and fivefold more effective than not wearing a mask at all [14]. Anfinrud et al [4] used laser light-scattering to demonstrate virtually no droplets ‘expelled’ with a damp homemade cloth mask.

Photo by Iva Kaderková with permission

A frequently cited study by MacIntyre et al has cautioned against the use of cloth masks [15]. However, this study compared the efficacy of surgical and cloth masks for rhinovirus infection in a hospital setting, and lacked a ‘no mask’ control group. Other studies have shown that masks can have poor filtration for rhinovirus but can effectively

filter droplets with coronavirus [8] [9]. As this study by MacIntyre et al does not demonstrate the effects of cloth masks versus no masks in a community setting for control of SARS-CoV-2, it should probably not be used as a basis for discouraging cloth mask use in the current Covid-19 pandemic.

Research on risk compensation behaviour has found no adverse outcomes at population level

Risk compensation behaviour (due to the public overvaluing the protection of a mask and neglecting physical distancing) has been raised as a reason to not promote mask usage. However, research into other public health safety measures (HIV prevention, seatbelt use and motorcycle helmet use) has found no increase in adverse effects at the population level but rather improvements in safety and wellbeing [16] [17] [18]. Advising against mask use due to lack of trust in the public to act responsibly is not in line with other preventive public health policies. Arguments on improper mask use can also be mitigated by appropriate public education.

Universal mask use might avoid stigma

The current World Health Organization (WHO) and NZ Ministry of Health's advice to use a mask only if you are sick may lead to stigmatisation [19]. Such stigma could lead to a reluctance to wear a mask by a Covid-19 patient who may not be adhering to isolation, increasing the risk of spread. Mass masking is likely to take away the stigma of being labelled as 'infected' and serves as a visible signal and a reminder of the pandemic. Reminders of the ongoing pandemic can potentially increase the compliance with other health measures, such as physical distancing and hand washing [20].

Photo by Judy Henderson with permission

Mass mask use in the NZ context

NZ appears to be making progress towards its elimination goal. But as restrictions are eased (ie, the planned shift to Level 3) we need to consider all control options, even if the evidence is only suggestive. Mass mask use is one of these options and fortunately it is relatively low cost. The first steps to assess feasibility in the NZ situation might be to first require mask use by: (i) everyone inside a healthcare setting; and (ii) all retail workers who interact with the public. If these steps were successful over a two week period, then mask use could then be rolled out more widely eg, to all essential workers or to all people in public places.

References

1. Jefferson T et al., “Physical interventions to interrupt or reduce the spread of

respiratory viruses," Cochrane Database Syst Rev, vol. 6, no. 7, 2011.
2. Long Y et al., "Effectiveness of N95 respirators versus surgical masks against influenza: A systematic review and meta-analysis.," 2020.
3. Asadi S et al., "Aerosol emission and superemission during human speech increase with voice loudness," Scientific Reports, p. 9:2348, 2019.
4. Anfinrud P et al., "Could SARS-CoV-2 be transmitted via speech droplets?," medRxiv preprint, 2020.
5. Bourouiba L. et al., "Turbulent Gas Clouds and Respiratory Pathogen Emissions: Potential Implications for Reducing Transmission of COVID-19.," JAMA, 2020.
6. Heneghan C et al., "COVID-19: What proportion are asymptomatic?," Centre for Evidence-Based Medicine, 2020.
7. Ganyani T. et al., "Estimating the generation interval for COVID-19 based on symptom onset data.," medRxiv, 2020.
8. Leung NH et al., "Respiratory virus shedding in exhaled breath and efficacy of face masks," Nature Medicine, pp. 1-5, 2020.
9. Bae S et al., "Effectiveness of Surgical and Cotton Masks in Blocking SARS-CoV-2: A Controlled Comparison in 4 Patients," Annals of Internal Medicine, 2020.
10. Cowling BJ et al., "Impact assessment of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong: an observational study," Lancet Public Health, 2020.
11. Marasinghe KM. et al., "A systematic review investigating the effectiveness of face mask use in limiting the spread of COVID-19 among medically not diagnosed individuals: shedding light on current recommendations provided to individuals not medically diagnosed with covid-19.," Research Square pre-print, 2020.
12. Xiao J et al., "Nonpharmaceutical Measures for Pandemic Influenza in Nonhealthcare Settings—Personal Protective and Environmental Measures," Emerg Infect Dis, 2020.
13. Greenhalgh T et al., "Face masks for the public during the COVID-19 crisis," BMJ, 2020.
14. Davies A et al., "Testing the Efficacy of Homemade Masks: Would They Protect in an Influenza Pandemic?," Disaster Medicine and Public Health Preparedness, vol. 7, no. 4, pp. 413-418, 2013.
15. MacIntyre CR et al., "A cluster randomised trial of cloth masks compared with medical masks in healthcare workers," BMJ Open, vol. 5, no. 4, 2015.
16. Houston DJ et al., "Risk compensation or risk reduction? Seatbelts, state laws, and traffic fatalities," Social Science Quarterly, no. 88, pp. 913-936, 2007.
17. Peng Y et al., "Universal Motorcycle Helmet Laws to Reduce Injuries: A Community Guide Systematic Review.," Am. J Prev Med, no. 52, pp. 820-832, 2017.
18. Cassell MM et al., "Risk compensation: the Achilles' heel of innovations in HIV prevention?," BMJ, no. 332, pp. 605-7, 2006.
19. Joachim G et al., "Stigma of Visible and Invisible Chronic Conditions," Journal of Advanced Nursing, no. 32, pp. 243-8, 2000.
20. Howard J et al., "Face Masks Against Covid-19: An Evidence Review," Preprints, 2020. https://www.preprints.org/manuscript/202004.0203/v1

Public Health Expert Briefing (ISSN 2816-1203)
