

# Mass masking: an alternative to a second lockdown in Aotearoa

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**A**otearoa New Zealand succeeded in eliminating COVID-19, but this success has been challenged by poor management of cases at the border in mid-June 2020. Elimination status for the country may remain fragile given likely increases in arrivals from countries where COVID-19 is circulating, especially if border restrictions are eased further. In this editorial, we explore how outbreak prevention could be strengthened via universal (mass) masking. We describe why New Zealand needs to adopt mass masking in certain high-risk settings immediately, how to build mask use into a revised Alert Level system, and why it is important to make masks an acceptable part of respiratory hygiene practice. These challenges are urgent because universal adoption of non-medical masks may be an essential intervention to prevent lockdown in the event of future COVID-19 outbreaks (the so-called 'second wave').

## COVID-19 infection and mass masking: where are we now?

Mass masking refers to the use of face coverings to prevent the spread of respiratory infections in non-medical settings. This practice has been well-established in Asian societies for many years due to previous experience with significant epidemics and pandemics, but until very recently there has been reluctance in Western countries to use masks in public places. The COVID-19 pandemic has provoked considerable debate about mass masking. Much of the difference of opinion has arisen from confusion between mass masking and medical masking (discussed in a later section of this article), as well as conflicting interpretations of the research evidence.

The updated World Health Organization (WHO) advice on masks<sup>1</sup> of 5 June 2020 has provided welcome clarity on the issue. The report presents an updated review of evidence about COVID-19 transmission and medical and non-medical mask use, and provides detailed guidance for policy makers. The major change from WHO's previous stance on mask use is expressed in the statement that *"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"*. Similar advice is given by the Centers for Disease Control and Prevention (CDC).<sup>2</sup> In the following sections, we consider what this new guidance means for Aotearoa New Zealand.

## COVID-19 transmission and risks to elimination status

Aotearoa New Zealand has adopted an elimination strategy to control the COVID-19 pandemic.<sup>3</sup> Arrival of new cases through the borders has the potential to introduce new transmission chains into a national population that is immunologically naïve and thus highly susceptible to COVID-19 infection.

All of the COVID-19 control measures employed in this country to date work in one of two ways: either they reduce the probability of close contact between infectious and susceptible individuals (eg, border controls, quarantine, isolation and physical distancing [lockdown]) or they reduce the probability of viral transmission during close contact (eg, cough etiquette, respiratory and hand hygiene).

Preventing spread of this highly transmissible infection is challenging. The pandemic virus, SARS-CoV-2, replicates in the upper respiratory tract<sup>4</sup> and the major routes of transmission are by larger particles (>5 microns; also referred to as droplets) and small particles (<5 microns; also referred to as aerosols) generated by breathing, talking and coughing.

A single individual in an enclosed space can trigger a cascade of infections within a short space of time by spreading virus to distances well over two metres.<sup>5</sup> The risk of super-spreading is thus highest in crowded, closed spaces with poor ventilation, where individuals are in close contact, eg, when speaking loudly in social settings.<sup>6,7</sup> Pre-symptomatic individuals present a substantial risk of SARS-CoV-2 transmission as they can be highly infectious in the two days before experiencing symptoms<sup>8</sup> while not being aware of the need to isolate themselves from others.

In the time period since New Zealand's stringent lockdown was lifted, measures for preventing transmission in public spaces have included physical distancing (maintaining a 1–2m distance in Alert Level 2), respiratory and hand hygiene, and cough etiquette. All have limitations. In particular, physical distancing is not feasible on aircraft; hand hygiene can be difficult to achieve on suburban buses and trains; and coughing into an elbow may not be highly effective in preventing viral spread.

Large viral-laden droplets that are expelled by an infectious individual quickly evaporate into smaller particles that stay suspended for longer periods, travel further on air currents, can be inhaled into the alveoli and are hard to contain unless they are blocked at source by covering the mouth and nose. This type of protection is known as 'source control'. In optimal conditions, a multi-layered cloth covering can block over 99% of speech droplets.<sup>9</sup> The principle of mass masking is that each mask wearer protects those around them. Mass masking thus works particularly at a population level to control COVID-19 transmission,<sup>10</sup> although such masks also provide some individual protection for the wearer.<sup>11</sup>

## Using mass masking to maintain elimination

Border controls such as quarantine are not failsafe, as some of us have shown with modelling work for Australia to New Zealand travel.<sup>12</sup> This modelling work also suggests that masks are likely to have an important role in reducing the risk of transmission on aircraft and for preventing pre-symptomatic spread by incoming travellers (eg, use in the first two weeks after arrival). Even with quarantine measures in place, infectious individuals may be released into the community if these measures are not strictly applied, as happened in New Zealand in June 2020. Should border controls fail and there is an outbreak of COVID-19 in the community, we would lose our elimination status and increasing alert levels (lockdowns) could be necessary.

A logical approach to using non-medical masks to reduce the risk of such transmission is to consider settings where:

- There is increased risk of infectious individuals being present;
- Multiple individuals from different households are in close contact in an enclosed space for prolonged periods; and
- Other transmission protection measures may be less effective as outlined above.

Settings that meet these criteria and therefore have increased transmission risk include (but are not limited to):

- International flights, airports and border control facilities for quarantine and isolation;
- Domestic travel settings (airplanes, trains, buses and ferries); and
- Interfaces between public and medical spaces where physical distancing cannot be maintained and ventilation may be poor, eg, general practice waiting rooms, emergency departments of hospitals, and residential care homes (Table 1).

In the event of a border control failure causing an outbreak, intensive testing and contact tracing would be implemented. At this point Aotearoa New Zealand would

**Table 1:** Recommended mandated mask use requirements at different Alert Levels.

New Zealand-related setting	Alert level where masks use should be mandated
Inbound international flights and airport terminals, quarantine and isolation facilities (staff and passengers)	All levels (airlines required to provide the masks on the aircraft for free)
Domestic transport (flights, trains, buses and ferries)	Level 2 and above (airlines, train, bus and ferry companies all required to provide the masks to passengers for free) *
Health worker/public interface settings (medical waiting rooms, care homes)	Level 2 and above *
Indoor public settings (workplaces, educational facilities, shops etc)	Level 2 and above
Outdoor public settings (gatherings and events with more than 10 people)	Level 3 and above

\*There is an argument for mask use during winter at all levels in these settings as part of routine infection control and to increase public familiarity with mask wearing, ie, establish a mask-using culture.

need to consider additional measures to regain pandemic control, notably re-imposing lockdown at a regional or national level, or controlling viral spread using mandatory universal mass masking (Table 1). In such situations, universal mask adoption—a ‘mouth and nose lockdown’—could help to avoid the need for another ‘full body lockdown’.<sup>13</sup>

### Mass masking versus medical masking

There has been widespread confusion between the use of face coverings in community settings and the use of medical masks as a component of personal protective equipment (PPE) in healthcare settings. The latter settings serve to protect health workers from patients’ droplets so correct ‘donning’ and ‘doffing’ techniques are essential. These techniques do not apply to the public using mass masking as source control to prevent their own droplets from infecting others: effective mass masking in populations can be implemented using home-made equipment with straightforward instructions for correct use. Table 2 lists some key differences between mass masking and medical masking.

### Implementation of mass masking

Aotearoa New Zealand is not able to draw on wide population experience with mass masking and currently only a minority are

likely to own a mask. We therefore need to act now to establish a mask culture so that this key respiratory hygiene measure is available for widespread use if required to control future COVID-19 outbreaks. Unfortunately, previous public messaging about mask use in this country has been negative or at best ambivalent. As a result, additional effort by the government will be necessary to implement masking as an effective component of the COVID-19 elimination strategy. Key steps include:

- **Mandating mask use for border control settings**, notably international flights, airports, transport to quarantine locations, and within quarantine facilities themselves. This measure should happen immediately.
- Developing and disseminating **accessible, clear information** about all aspects of mass masking. WHO has produced resources that can provide a useful basis for communication. Information should include why and where masks should be worn; recommended types; how to obtain or make them; how to use them; and how to dispose of them appropriately after use.
- Ensuring **wide availability** of masks. Masks may be supplied in different ways depending on the context (mass masking in high-risk settings or universal adoption). Both cost and

**Table 2:** Comparison between mass masking and medical masking for preventing transmission of COVID-19 infection.

Characteristics	Mass masking	Medical masking
Goal	To support COVID-19 pandemic control by reducing the probability of transmission during close contact in public spaces	To support COVID-19 pandemic control by preventing cross-transmission between patients and the health workforce in healthcare settings
Implemented by	The population as a whole	The health sector
Who is protected	Primarily protects the people around the mask wearer (ie, it is source control), although the wearer may be protected to some extent	Protects both the wearer (source control) and healthcare workers (prevention of cross-transmission)
Compliance	May be voluntary or mandatory (but mandatory is probably necessary in the context of the COVID-19 pandemic)	Strict guidelines usually in place as part of infection prevention and control and health and safety requirements
Instructions for use	Ministry of Health guidance on mask use and mandated settings	Local and international infection prevention and control guidance
Types of mask	A variety of face coverings may be used, including disposable or reusable (cloth) masks. However, use of disposable medical masks may deplete medical stocks and is less sustainable	Masks are regulated medical devices and must comply with New Zealand standards; surgical masks or respirators may be used depending on context
Procedure after each use	Safe disposal or domestic washing	Safe disposal or specialised reprocessing procedures
Effectiveness at preventing dispersal of respiratory virus into the environment	Variable filtration efficiency, pressure drop and filter quality factor (see Table 3 in the WHO guidelines for current evidence on different textiles). However, the potential for effective infection prevention and control is high, if correctly constructed and used	Generally higher performance than non-medical masks with well-defined standards (eg, at least 95% initial filtration)

convenience may be limitations. In some settings (or universally) they should be provided free at the point of use to ensure wide uptake (Table 1). The New Zealand Government should consider the approach of Hong Kong in supplying free masks to all its citizens (eg, if the country returned to Alert Level 2). Mass purchasing of masks can get costs down to around US\$0.2 per mask, ie, 20 cents per mask). There is an immediate need to develop sources and stocks. A range of sizes will be required.

- Consulting key groups to identify and address the **equity implications** of mass masking. Two key aspects include cost (as above) and those for whom mask wearing may introduce difficulties. For individuals who cannot mask up, eg, close contacts of those who depend on lipreading for communication or others (particularly young children and those with breathing difficulties) who will be challenged by wearing masks, there can be medical electronic certificates allowing them freedom from masking. Additional strategies

include adaptations to masks, for example incorporating transparent panels into mask design to facilitate communication.

- **Promoting sustainability.** Single-use disposable masks are a poor option for mass masking as they incur a significant environmental cost. Cloth masks are effective and have the added advantage of preserving single-use mask stocks for medical use. Consideration should be given to supporting local industry by obtaining masks in New Zealand rather than outsourcing production overseas.

## Conclusions

Active risk reduction is required to maintain New Zealand's elimination status while COVID-19 remains a global health threat. Emerging evidence strongly supports the value of mass masking as a pandemic control measure. Mask use can provide another barrier to reduce the risk

of importing this infection through airports and seaports. International airlines, border control settings and quarantine facilities should have mask wearing mandated immediately. This multi-barrier approach is a key feature of health protection systems for diverse hazards including waterborne, foodborne and biosecurity hazards.

In the event of border control failures and COVID-19 outbreaks in this country, mandatory mass masking (a 'mouth and nose lockdown'<sup>13</sup>), in addition to other hygiene measures, may help to avoid the need for the 'full-body lockdown' the country experienced earlier in 2020. Preventing a 'second wave' in this way would require universal adoption of masks within days of identifying the threat; there is now an urgent need for policy makers and the public to prepare for this eventuality. Key next steps include updating the Alert Level system to include mandatory mask provisions, and ensuring that each person in Aotearoa has a mask and knows how it must be worn.

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### Competing interests:

Nil.

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