

How to Systematically Reduce the Border Failure Risk for COVID-19 in Aotearoa/NZ

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With the 2020 election over and with a newly elected government, it is an excellent time for a systematic review by NZ health authorities to identify optimal methods for reducing the risk of future COVID-19 outbreaks in Aotearoa/NZ. The persisting occurrence of cross-border incursions of the pandemic virus (five since 1 August, including a large outbreak in Auckland) highlights the need for such a review. In this blog we provide a framework for this systematic assessment and specific ideas for further risk reduction.

Aotearoa/NZ is a top performing nation internationally when it comes to eliminating community transmission of the COVID-19 pandemic.¹⁻³ The response to COVID-19 also appears to have eliminated seasonal influenza and has reduced overall weekly deaths for NZ in 2020.^{4,5} The economic damage from the response to COVID-19 in the country has been somewhat mitigated by strong government intervention packages and rapid post-outbreak returns in consumer confidence. There are various social, economic, and (in the case of NZ citizens) human rights reasons to facilitate some travel to NZ from international destinations that are experiencing active COVID-19 community transmission. Additionally, shipping and operation of seaports remains vital for exporting and importing of goods.

Therefore, to maximise the chances of sustained success with COVID-19 elimination it is necessary to ensure that the risks of future outbreaks are as low as possible. Indeed, there have been a number of recent cross-border incursions that are cause for concern (five occasions since 1 August, including the large Auckland outbreak, see Appendix). This blog details a framework for a systematic risk reduction approach and attempts to identify the components that are associated with some potential risk. We also suggest potential specific steps for further risk reduction that health authorities could consider.

Table 1: Framework for systematic risk reduction for COVID-19 outbreaks in New Zealand as a result of border control failures

Risk component	Details and comment on risk reduction options
Consider suspending travel from high COVID-19 incidence countries	NZ could prohibit all incoming travellers from countries with high levels of uncontrolled spread (eg, US, UK, India) until the prevalence of infection in travellers is low. This was the approach taken by NZ in February 2020 – albeit not applying to NZ passport holders. The simplest action legally might be to prohibit, where possible, any flights that originated from these countries. Alternatively, legislation could empower the government to constrain the rights of NZ passport holders to return to NZ in pandemic circumstances.
Consider pre-travel quarantine and testing of incoming travellers from high COVID-19 incidence countries	The issue of pre-flight quarantine and testing (PCR test or potentially a rapid antigen test) is one option to reduce the influx of infected individuals to NZ. It could be applied to countries with poorly controlled pandemics and which were the source of large number of cases being detected in MIQ facilities in NZ. This measure would also reduce the risk of outbreaks on incoming aircraft. The experience of jurisdictions already using pre-travel testing approach could be rapidly evaluated (eg, it is used for travel into Cyprus, Bahamas, Bermuda, Hawaii, Hong Kong and Italy ⁶⁷). Alternatively, NZ could start with this requirement for one high risk country with a pilot programme and then potentially expand the system. Travellers already now need to apply for a voucher for an MIQ place prior to travel. This system could help to manage these additional requirements for travellers from specified countries.
Enhance mask use on flights by incoming travellers	On long flights optimal mask use is constrained by the need for people to eat and drink. To minimise transmission risk, rules could be considered around not talking when masks are removed for eating or drinking on long haul flights. Enhanced provision for hand hygiene and revisions to how meals/drinks are distributed could also contribute to risk reduction.
Review domestic transport of incoming travellers to MIQ facilities	This area could be reviewed, especially with regard to bus trips and domestic flights to managed isolation and quarantine (MIQ) facilities outside of Auckland.

Risk component	Details and comment on risk reduction options
Consider specialised MIQ facilities	As previously suggested, there is a case for a careful cost-benefit analysis concerning a shift from using hotels for MIQ (since these are not designed for quarantine purposes) to dedicated facilities (eg, at Ōhakea air base). ⁸ Another option would be to at least evaluate only having MIQ facilities outside of Auckland (given the risk of another August 2020 outbreak in Auckland). The ongoing security issues with MIQ facilities, ⁸ could also be reviewed eg, in terms of facility security and use of electronic bracelets or other digital tracking technology, such as that used in Taiwan (see below). Further consideration could also be given to workers in high-risk border-associated occupations eg, should they observe some restrictions (such as large indoor event attendance) for a certain number of days after each work shift?
Review mechanisms of viral spread in MIQ facilities	MIQ facilities by their nature are settings in which a significant proportion of occupants are infectious during their stay, with a consequent risk of high environmental contamination. There needs to be regular review of the evidence base for prevention of transmission in the built environment, eg, optimising ventilation and filtration to minimise risk of airborne transmission. ⁹
Review optimal time in MIQ facilities	The latest scientific evidence for viral excretion should be reviewed to re-evaluate the optimal time in these facilities. The current 14-day period could then potentially be reduced for those who are willing to have some home quarantine with appropriate safeguards (see below).
Review home quarantine/monitoring after MIQ facilities	Depending on the review (as per directly above), another week in home quarantine after leaving MIQ facilities could be considered. This period could also involve digital technologies to ensure adherence as used in some Asian jurisdictions. For example, Taiwan is able to closely monitor individuals quarantined at home through personal phones or government-provided phones. ¹⁰ Taiwanese authorities also have the mandate to conduct in-home checks on quarantined individuals. Those found breaching the home quarantine rules are placed into a quarantine institution and face substantial fines.
Review risk management of international air crew	An updated review on the risks associated with this group could be conducted. We note previous NZ work suggesting the risk was relatively low compared to that from passengers. ¹¹ Nevertheless, there is likely to be scope for further risk reduction (including use of digital technologies discussed elsewhere in this table).

Risk component	Details and comment on risk reduction options
Review risk management of international shipping crew	The risk from this source could also be reviewed. We note some NZ-specific work, ¹² but this may need to be upgraded to account for any new patterns that may emerge (eg, PCR testing on the first port of arrival, followed by shore leave at the next NZ port). NZ is currently allowing replacement overseas shipping crew to fly into the country and transit directly onto ships visiting our ports without going through the usual quarantine and testing required for people coming into NZ. This practice may expose NZ port workers to added risk, as could have been the case with the recent maritime worker outbreak (see Appendix). This current practice may also allow these arrivals to infect the crew already on these ships with COVID-19 with potential negative effects on their health.
Review role of imported cargo	The latest scientific evidence for potential virus survival on imports to NZ could be reviewed, in particular considering whether there is a likely infection risk from chilled or frozen products. Animal studies (eg, conducted overseas) could inform the real-world infectivity of any such potential fomite sources. This hypothesis is one of three that have been explored using genomic data to investigate sources for the Auckland August Outbreak. ¹³
Early detection of border failures	
Review routine testing of border workers / MIQ facility workers	This area could be improved upon with the use of rapid antigen tests (when these are deemed of adequate reliability). Potentially some of these personnel could be tested more frequently (even daily with rapid point of care tests). There may also be scope for digital detection of emerging symptoms/signs in these personnel (eg, the NZ-designed <i>elarm</i> app). ¹⁴ Similarly for use of detector dogs (as per promising initial work ¹⁵). Of note is the routine use of detector dogs by the NZ Customs Service in various settings, including airports.
Review health monitoring of close contacts of those in high-risk border-associated occupations	Given the substantial risk of a community outbreak precipitated by an asymptomatic index case, close contacts of high-risk workers could be required to report their health status weekly, with a lower threshold for testing compared with the general population.
Implement wastewater surveillance for the pandemic virus in cities	NZ has made progress in this domain with work by ESR, ¹⁶ but it still seems relatively slow compared to work in Australia where this surveillance system is already in use. ¹⁷ Potentially the barriers to any such delays could be identified and ameliorated.
Enhance year-round respiratory disease surveillance in the community	General practice-based influenza-like illness (ILI) sentinel surveillance (which ceased on 27 September 2020) could be continued through the summer months in selected practices. These GP practices could include both randomly distributed ones and additional ones in cities with MIQ facilities/international airports.

Risk component	Details and comment on risk reduction options
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Rapid control of outbreaks	
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Implement improved digital technologies to supplement manual contact tracing	
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	There is ongoing NZ Government funded evaluation work around the CovidCard (a Bluetooth enabled card that can be worn around the neck) and other digital options. However, NZ has been slow in comparison to some other countries eg, Singapore has already rolled out a CovidCard equivalent in the form of a Bluetooth-enabled “dongle”. ¹⁸ Other places are utilising smartphone apps with the Apple/Google platform (eg, Ireland). South Korea and Taiwan use other digital technologies which could be considered by NZ (as recently argued for by Canterbury University law professor, John Hopkins ¹⁹). These digital technologies could be used routinely with MIQ workers and other high risk workers (eg, aircrew, port workers). But they could also be promoted for wider public use if evaluation work shows this is feasible and cost-effective.
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Revise the Alert Level system	
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	Revisions to the Alert Level system may facilitate more rapid control of outbreaks while minimising social and economic impacts. For example, at a new “Alert Level 1.5” there could be mandatory mask use in all indoor public settings. Settings with a relatively high transmission risk (eg, bars, night clubs, gyms, churches) could have restrictions in terms of numbers of people indoors, ventilation requirements, and various opening hours.
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Transparent reporting of cross-border incursions	
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Rapidly publish reports of border incursions/failures and breaches of MIQ	
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	Border incursions/failures, outbreaks/clusters, and breaches of MIQ facilities all require detailed reporting along with recommended corrective actions. Such information is essential to inform system improvements. Reports should be published rapidly on the Ministry of Health website to encourage sector and public awareness of the issues involved. Routine reporting is not the case at present with media having to use OIA requests to obtain such information.
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Image by Luke Pilkinton-Ching, University of Otago Wellington.

Given time constraints, government authorities might wish to use expert judgement and rapid reviews of international experience around evaluating particular additional interventions (eg, pre-flight testing which is already in use in some settings). Ultimately however, the best approach would be to commission modelling studies that attempted to determine which interventions (and which intervention packages) are the most effective and the most cost-effective in reducing risk.

In addition to reviewing these interventions, there is also the need for an overall official inquiry into the overall response to COVID-19 (as argued for elsewhere²⁰). This inquiry could have a short-term report back period of initial recommendations (eg, within 3 months) and then a longer report back period for the full report (potentially 6-12 months).

In summary, there appear to be many ways by which further risk reduction of COVID-19 outbreaks in NZ would seem possible. Given the potential costs of failure (eg, the probably high wellbeing and economic costs of the recent August Auckland outbreak), it would seem prudent for the NZ Government to thoroughly evaluate all these options.

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Appendix

Table A1: List of cross-border incursions of the SARS-CoV-2 pandemic virus reported for New Zealand since 1 August 2020 (up to 27 October 2020)

Event	Additional details
Auckland August outbreak	This outbreak of SARS-CoV-2 infection involved 179 cases and 3 deaths. It predominantly impacted Pacific peoples (61% of cases), Māori (22%) and younger people aged <20 years (34%), (details here: https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-data-and-statistics/covid-19-significant-clusters). The source has never been officially identified and transmission via imported frozen food (associated with the workplace of the first identified case) was ruled out by officials. The most likely source was probably a border control failure in a MIQ facility, though failures via international air crew or via international ship crew are also possible. There were probably large social and economic impacts from this outbreak as Auckland had to move to Alert Level 3 for a time, and the rest of the country to Alert Level 2. No investigation report has yet been published.
MIQ facility maintenance worker infected (August)	This maintenance worker appears to have been a solitary community case who infected no other individuals. A shared lift environment in the MIQ facility was the source suspected by officials (https://www.health.govt.nz/news-media/media-releases/6-new-cases-covid-19-4). The genomic sequencing indicated the same virus infecting the worker as per a recent returnee in the same facility (https://www.health.govt.nz/news-media/media-releases/results-covid-19-positive-cases-under-investigation-returned). No investigation report has yet been published, other than some details on the genomic testing. ¹³
MIQ facility nurse infected (September)	A nurse working at a MIQ facility became infected (https://www.health.govt.nz/news-media/media-releases/2-new-cases-covid-19-18). This case was linked via genomic sequencing to cases within the facility (https://www.health.govt.nz/news-media/media-releases/1-new-case-covid-19-18). No investigation report has yet been published.
Returnee who had been in a Christchurch MIQ facility (September)	This person may have been infected within a MIQ facility before then moving into the community, according to the Ministry of Health (https://www.health.govt.nz/news-media/media-releases/no-new-cases-covid-19-50). This person appears to have then infected another person (the Ministry suggest this may have occurred on a charter flight after leaving the MIQ facility). A household contact was also reported as becoming infected (https://www.health.govt.nz/news-media/media-releases/2-new-cases-covid-19-21). No investigation report has yet been published.
Marine employee cluster (October)	This cluster began with a worker who was probably infected via his work on an international cargo ship (potentially via interactions with replacement international crew which had recently arrived on board without quarantine and testing within NZ). Two of his workplace contacts also became infected (https://www.health.govt.nz/news-media/media-releases/25-new-cases-covid-19) and also a household contact (https://www.health.govt.nz/news-media/media-releases/9-new-cases-covid-19-5). Further investigations are proceeding.

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