

# Briefing

## Airborne transmission of SARS-CoV-2, and ventilation systems in managed isolation and quarantine facilities

<b>Date due to MO:</b>	22 January 2021	<b>Action required by:</b>	N/A
<b>Security level:</b>	IN CONFIDENCE	<b>Health Report number:</b>	20210071
<b>To:</b>	Hon Chris Hipkins, Minister for COVID-19 Response		
<b>Copy to:</b>	Hon Dr Ayesha Verrall, Associate Minister for Health		

### Contact for telephone discussion

Name	Position	Telephone
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### Minister's office to complete:

- |   |                                    |  |
|---|------------------------------------|--|
| <input type="checkbox"/> Approved             | <input type="checkbox"/> Decline   | <input type="checkbox"/> Noted               |
| <input type="checkbox"/> Needs change         | <input type="checkbox"/> Seen      | <input type="checkbox"/> Overtaken by events |
| <input type="checkbox"/> See Minister's Notes | <input type="checkbox"/> Withdrawn |  |

Comment:

# Airborne transmission of SARS-CoV-2, and ventilation systems in managed isolation and quarantine facilities

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**Security level:** IN CONFIDENCE      **Date:** 21 January 2021

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**To:** Hon Chris Hipkins, Minister for COVID-19 Response

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## Purpose of report

1. In HR20202280, titled "*Progress on 11 Managed Isolation and Quarantine Facility Workstreams*", we indicated we would provide a briefing on ventilation systems in managed isolation and quarantine facilities (MIQFs). This report provides an update on the Ministry of Health's (the Ministry's) position on:
  - Airborne transmission of SARS-CoV-2;
  - The role of ventilation systems in mitigating potential airborne transmission of the virus in MIQFs; and
  - The Ministry's programme of work to further reduce the risk of airborne transmission within MIQFs through ventilation mitigations.

## Summary

2. Current international evidence suggests that airborne transmission of SARS-CoV-2 is possible, but dependent on a range of factors summarised in paragraph 9. Note that there is currently no evidence to suggest that the new UK B.1.1.7 SARS-CoV-2 variant (referred to as 'the new variant') is more likely to be aerosolised or transmitted via the airborne route. The evidence on new and emerging variants is regularly reviewed.
3. The two key approaches to reduce the risk of airborne transmission in MIQFs are:
  - Personal protective equipment (PPE) that protects the wearer from inhaling airborne viral particles (e.g. N95/P2 particulate respirators); and
  - Ventilation mitigations that filter the virus from the air, improve air flow, and/or dilute airborne viral particles.
4. In December 2020, we updated the PPE guidance in the MIQF Infection Prevention and Control (IPC) Standard Operating Procedures (SOP) to require the use of N95/P2 particulate respirators by MIQF workers when interacting with confirmed (or probable) cases of COVID-19. There is currently no evidence to support further changes to existing PPE guidance and you were provided with advice on this in HR20210019, '*Progress on Border & Managed Isolation and Quarantine Facility Infection Prevention and Control Workstreams*'.

5. There are three workstreams underway to reduce the risk of airborne transmission of SARS-CoV-2 in MIQFs (see Appendix 1 for a summary table):
- **Workstream 1:** Installing air filtration units;
  - **Workstream 2:** Completing off-site ventilation system assessments for all MIQFs; and
  - **Workstream 3:** Ongoing reviews of PPE guidance in response to any new evidence.
6. We will keep you informed of the progress of these workstreams via your weekly report.

## Recommendations

We recommend you:

- a) **Note** the Ministry's position regarding airborne transmission of SARS-CoV-2, including the evidence surrounding airborne transmission of the new UK B.1.1.7 SARS-CoV-2 variant. **Yes/No**
- b) **Note** that the use of N95/P2 particulate respirators by MIQF workers interacting with confirmed (or probable) cases of COVID-19 is already in place, providing an important layer protection for the wearer against exposure to airborne SARS-CoV-2. **Yes/No**
- c) **Agree** to our approach to further reduce the risk of airborne transmission of SARS-CoV-2 in MIQFs through the three workstreams detailed in this report: **Yes/No**
- **Workstream 1:** Installation and monitoring of air filtration units in five priority quarantine and dual-use facilities, to commence within 6 weeks provided ongoing supply of consumables are secured;
  - **Workstream 2:** Off-site ventilation system assessments of all MIQFs, with assessments of priority quarantine and dual-use facilities completed in early February, and the remaining facilities completed in early March; and
  - **Workstream 3:** Ongoing reviews and updates to PPE guidance in response to any new and emerging evidence.
- This needs to be progressed with urgency I've subsequently been advised this work is progressing faster.



Sue Gordon  
Deputy Chief Executive  
**COVID-19 Health System Response**  
Date: 21/01/2021



Hon Chris Hipkins  
**Minister for COVID-19 Response**  
Date: 26/1/2021

# Airborne transmission of SARS-CoV-2, and ventilation systems in managed isolation and quarantine facilities

## Background / context

7. HR20202280 detailed the range of actions we would take to review the ventilation systems in MIQFs.
8. 'Airborne transmission' is defined by the Ministry as the transmission of viruses from one person to another by means of suspended airborne particles, in the absence of close physical proximity between two individuals.
9. Current international evidence suggests that airborne transmission of SARS-CoV-2 is possible, however, the exact risk of airborne transmission has not yet been quantified. The evidence also suggests that in addition to proximity of individuals and the use of face coverings, airborne transmission of the virus is dependent on a range of environmental factors, including:
  - The viral load (the number of viral particles suspended in the air);
  - The size of the room;
  - Air circulation and exchange of air; and
  - The length of time an individual is exposed to the virus.
10. There is currently no evidence to suggest that the new variant is more likely to be aerosolised or transmitted via the airborne route. However, the failure of the recent lockdown in the UK to decrease the spread of the new variant, while the previous variant was suppressed, could be interpreted as a change in the mode of transmission.
11. Additionally, there is currently no evidence to suggest that the new variant has a different incubation period or increased disease severity, hospitalisation rate, mortality rate, or length of infectious period.
12. Current evidence suggests that one reason for the increased transmissibility of the new variant is that people infected with the new variant carry – and therefore expel – a higher viral load (the amount of measurable viral particles). With respect to the risk of airborne transmission, this could mean that there is a greater number of airborne viral particles in the rooms of returnees infected with the new variant.
13. The two key approaches to reduce the risk of airborne transmission in MIQFs involve PPE that protect the wearer from inhaling airborne viral particles (e.g. well-fitting N95/P2 particulate respirators), and ventilation mitigations that filter the virus from the air, improve air flow, and/or dilute airborne viral particles. Physical distancing is a less effective method of preventing airborne transmission.
14. We will continue to review progress regarding the ventilation mitigations implemented in comparable border facilities, such as in Australia, to inform our approach to reducing the risk of airborne transmission in our own MIQFs.

*PPE mitigations to reduce the risk of airborne transmission*

15. IPC measures that reduce physical proximity to infected persons, or prevent contact with infectious droplets, do not necessarily address the risk of infection associated with airborne transmission. In terms of PPE, reducing the risk of airborne transmission requires PPE that protects the wearer from airborne viral particles (e.g. well-fitted N95/P2 particulate respirators).
16. Note that in December 2020, we updated our PPE guidance in the MIQF IPC SOP to require the use of N95/P2 particulate respirators by all MIQF workers when interacting with confirmed (or probable) cases of COVID-19.
17. Given the primary driver of the increased transmissibility of the new variant is believed to be the high viral load carried by infected persons, there is currently no evidence to support further amendments to our existing PPE guidance (HR20210019 refers). Ensuring stringent adherence to IPC measures, including adherence to PPE guidance, remains critical to preventing the spread of the new variant.

*Ventilation mitigations to reduce to risk of airborne transmission*

18. The ventilation systems in our MIQFs are not designed to manage people with infectious airborne respiratory illnesses – the ventilation systems were designed to meet the building code standards and to satisfy the requirements of a hotel. Therefore, the MIQF ventilation systems meet a different ventilation standard than hospitals and are unlikely to meet the ventilation standard required in hospitals for the purposes of airborne infection control.
19. Following the October 2020 Sudima International Mariners and Healthcare Workers infections, the Ministry funded ventilation assessments of all six Christchurch MIQFs. This involved off-site assessments by a ventilation engineer using a range of hotel site and ventilation plans and documentation. The assessment report was finalised in December 2020.
20. A range of actions were taken to improve ventilation in the quarantine zones of the Christchurch dual-use MIQFs as a result of these assessments, including:
  - Opening windows where possible (using strict protocols) to introduce fresh air and dilute the concentration of airborne particles in the room; and
  - Achieving negative air pressure in the hotel rooms relative to the corridor temporarily prior to daily health checks through the adjustment of ventilation settings (where possible).
21. Additionally, the quarantine zones (zones containing rooms designated for confirmed or probable cases) of three Christchurch dual-use facilities – the Crowne Plaza, Distinction, and Novotel Airport Hotels – were de-commissioned because the ventilation in these facilities was unable to be appropriately augmented through any available mitigations.
22. To ensure adequate quarantine zone capacity in Christchurch is maintained, additional quarantine rooms have been set aside in the remaining three dual-use facilities in Christchurch. There are now a greater number of quarantine rooms available in Christchurch MIQFs than there were prior to the de-commissioning of the three quarantine zones.

23. With respect to the wider MIQ system, ventilation mitigations cannot be applied identically at all MIQFs due to the highly variable layout and environmental conditions at each site (and occasionally within the same site), which present different levels of infection risk. The current advice, supported by the engineers undertaking the assessment of the MIQFs in Christchurch, is that upgrading the ventilation systems at MIQFs to hospital level protection is not feasible.

### **Reducing the risk of airborne transmission within MIQFs**

24. The risk of airborne transmission, whilst undefined, cannot be ignored in the setting of an elimination strategy. There are three workstreams (detailed below) that we will progress in parallel to further reduce the risk of airborne transmission of SARS-CoV-2 within MIQFs.
25. Initially, workstreams 1 and 2 will focus on the following five quarantine and dual-use MIQFs, given their 'higher-risk' status as designated facilities for accommodating confirmed (or probable) cases of COVID-19 (note that workstream 3 'ongoing reviews and updates to PPE guidance' applies to all MIQFs):
- Jet Park (Quarantine Facility, Auckland);
  - Grand Mercure (Dual-use MIQF, Wellington);
  - The Commodore Hotel (Dual-use MIQF, Christchurch);
  - Chateau on the Park (Dual-use MIQF, Christchurch); and
  - The Sudima (Dual-use MIQF, Christchurch).
26. Further work to implement workstream 1 (installing air filtration units) in the remaining 27 managed isolation facilities (MIFs) could be undertaken following the outcomes of the research on the effectiveness of filtration units at the 5 priority MIQFs listed above. Workstream 2 (off-site ventilation system assessments) will be expanded to the remaining 27 MIFs following completion of the ventilation assessments of priority MIQFs.
27. At present, the remaining 27 MIFs are considered lower priority as confirmed (or probable) cases identified in these facilities are transferred to one of the five facilities listed above. This process has recently been further strengthened through the introduction of pre-departure testing, day 0/1 testing, and day 7 testing for close contacts, all of which support even earlier identification (and therefore transfer) of cases to appropriate facilities.
28. Note that a \$35m business case to improve oxygen supply and air control systems in selected District Health Boards (DHBs) was jointly approved by the Health and Finance Ministers. This programme is now well established and work on ventilation systems in MIQFs can leverage off the work in DHBs (and vice versa).

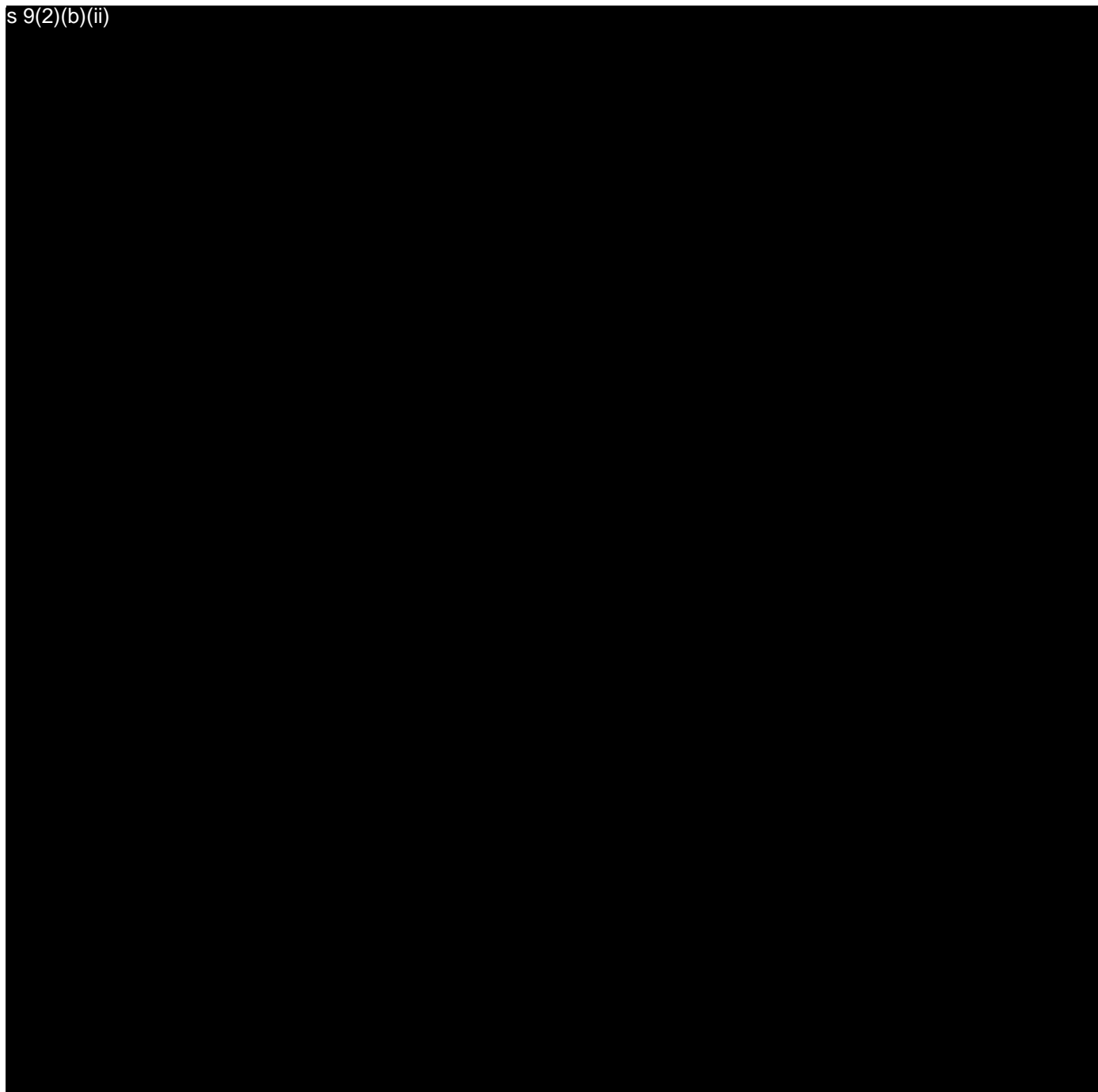
### **Workstreams to reduce the risk of airborne transmission in MIQFs**

#### **Workstream 1: Installing air filtration units**

29. Air filtration units are used to reduce contaminants the air by capturing small air particles – including viral particles – in their filters. Hospitals use high efficiency particulate air (HEPA) filtration units for air quality management and infection control in

isolation facilities. Standalone HEPA-based filtration units are also currently used in some hospitals and other settings where in-built ventilation systems are not sufficiently equipped to filter air to the required level.

30. Air filtration units will be installed throughout Jet Park Auckland, and in the quarantine zones of the four dual-use MIQFs (see paragraph 25). Prior to the procurement and installation of the filtration units, an assessment of air flow at the five facilities will be carried out to determine the number of filtration units required and the most appropriate location for the units within the facilities (i.e. in hotel rooms versus corridors).
31. Research teams from the University of Otago, Massey University, and the University of Canterbury will conduct on-site air quality testing to collect baseline data of airborne particles prior to the installation of filtration units. This is expected to commence within 4 weeks. Once the filtration units are installed, ongoing air quality monitoring will then measure the effectiveness of the units in reducing the number of airborne particles present.
32. Operationally, this workstream will also require the development of:
  - A set of protocols to determine the ongoing servicing and maintenance of the filtration units, including staff training for the safe replacement of filters using appropriate IPC protocols;
  - Treatments to minimise the risk of other unintended consequences (e.g. ensuring the placement of the filtration units do not impede egress in the event of fire);
  - Communications and signage for returnees explaining the purpose of the filtration units and instructing returnees not to turn off or move the units; and
  - A wider communications plan given the public interest that is likely to be generated in this area, particularly due to the recent media attention regarding the potential role of ventilation systems in spreading the virus in New South Wales border isolation facilities.
33. The two New Zealand suppliers of air filtration units that the Ministry has been working with as part of the DHB-based oxygen supply and air control system programme (refer to paragraph 28) have confirmed that filtration units can be supplied for use in MIQFs and supported for the foreseeable future.
34. Note that there are projections of a global supply shortage of consumables (namely HEPA filters), in addition to the ongoing congestion at the ports and pressure on air freight capacity, which are presenting additional logistical challenges.
35. We are rapidly assessing sourcing options for consumables and with a view to confirm a secure supply by the end of January 2021. Provided we are able to secure an ongoing and sustainable supply of consumables, we anticipate that it should be possible to start installing units in the five priority MIQFs within 5-6 weeks. If further challenges arise in securing a supply of consumables, we will provide you with a further update.
36. We anticipate that the procurement and installation of air filtration units in the five priority MIQFs will cost the Ministry around \$0.5m.



### Workstream 3: Ongoing reviews and updates to PPE guidance

43. While the ventilation mitigations outlined in workstreams 1 and 2 are expected to reduce the risk of airborne transmission in MIQFs, other IPC measures – including the safe and appropriate use of N95/P2 particulate respirators – remain a core component of our approach to preventing potential staff exposure to airborne SARS-CoV-2 within MIQFs.
44. When assessed against the available international evidence, our current PPE advice is appropriate in the context of reducing the risk of airborne exposure (refer to paragraphs 15 – 17 and HR20210019). We will continue to monitor the emerging evidence regarding airborne transmission of SARS-CoV-2 and will amend the PPE guidance in the MIQF IPC SOP as appropriate.



## Next steps

45. We will report back on our progress in Workstreams 1, 2, and 3 in our regular weekly updates.

ENDS.

PROACTIVELY RELEASED

# Appendix 1: Summary of workstreams

Workstream	Description	Timeframe
<p>Workstream 1: Installing air filtration units</p>	<p>Installing air filtration units that reduce the risk of airborne transmission by 'cleaning' the air. These will be installed in the five priority facilities that are designated to accommodate confirmed (or probable) cases of COVID-19.</p>	<ul style="list-style-type: none"> <li>• Rapid assessment to confirm a secure and ongoing supply of consumables to be complete by end of January 2021.</li> <li>• Provided this supply can be secured, installation of filtration units in the five priority facilities is expected to begin within 5 – 6 weeks.</li> <li>• Baseline air quality measurements to commence within 4 weeks.</li> </ul>
<p>s 9(2)(b)(ii)</p>		
<p>Workstream 3: Ongoing reviews and updates to PPE guidance</p>	<p>Ongoing reviews of emerging evidence regarding airborne transmission of SARS-CoV-2, and adjustment of PPE guidance as appropriate.</p>	<p>Ongoing</p>