Briefing

Response to request for advice on the use of a 'test to release' option for COVID-19 self-isolation

Date due to MO:	28 April 2023, 1pm	**Action required by:**	NA
Security level:	IN CONFIDENCE	**Health Report number:**	H2023023924
To:	Hon Dr Ayesha Verrall, Minister of Health		
Copy to:	Rt Hon Chris Hipkins, Prime Minister		
Consulted:	Health New Zealand: ☐ Māori Health Authority: ☐		

Contact for telephone discussion

Name	Position	Telephone
Dr Andrew Old	Deputy Director-General, Public Health Agency	s 9(2)(a)
Dr Nicholas Jones	Director of Public Health, Public Health Agency	s 9(2)(a)

Minister's office to complete:

☐ Approved	☐ Decline	☐ Noted
☐ Needs change	☐ Seen	☐ Overtaken by events
☐ See Minister's Notes	☐ Withdrawn	

Comment:

Response to request for advice on the use of a 'test to release' option for COVID-19 self-isolation

Security level:	IN CONFIDENCE	**Date:**	28 April 2023
To:	Hon Dr Ayesha Verrall, Minister of Health		

Purpose of report

1. Following a request from the Prime Minister on 17 April 2022, you have requested further advice on a test to release scheme that allows people who have tested positive for COVID-19 to end their isolation early following testing negative on a rapid antigen test (RAT). You have requested that this advice include:
   a. public health advice on test to release
   b. options for test to release settings, including different release days
   c. a timeline for possible implementation dates, taking a phased approach over time.
2. This report discloses all relevant information and implications.

Summary

Public health advice on test to release

3. Test to release schemes provide a way for COVID-19 cases to be released from isolation following one or more negative rapid antigen tests (RATs). The key potential benefit is enabling individuals who are less likely to be infectious (based on a negative RAT) to be released earlier than they would otherwise have been.
4. In New Zealand, test to return (a variation on test to release) has been used as part of the healthcare worker return to work programme since March 2022. This has allowed healthcare workers to return to work from day 5 if they are asymptomatic, feel well and have had two negative RATs. Internationally, test to release models are currently used in Taiwan, Italy, and California.
5. Current public health advice is that 7-day mandatory isolation remains the preferred option.

Options for test-to-release

6. Test to release policies entail a number of parameters that can be varied in terms of what is required to exit isolation. The most common parameters are the number of negative RATs that are required; the minimum and/or maximum number of days of isolation that

the person must complete; and whether the person is also required to be asymptomatic on release.

A timeline for possible implementation dates, taking a phrased approach over time

7. s 9(2)(h) [redacted]

8. s 9(2)(h) [redacted]

9. This planning is currently underway in relation to potential changes to the remaining public health measures enabled by orders, with the timing for any such changes to be considered as part of the next public health risk assessment (PHRA) on 15 May 2023.

We recommend an update to this briefing is provided in the week beginning 8 May 2023

10. Due to timeframes, it has not been possible to include two key elements in this briefing:

    a. Updated modelling from COVID-19 Modelling Aotearoa (CMA) has been commissioned but is not yet available to support this briefing.

    b. On receiving the updated modelling, Te Whatu Ora would then be able to assess the impacts for each scenario by ethnicity and region.

11. Further information will also be provided following consideration as part of the next PHRA.

Next steps

12. This report provides preliminary advice on options for test-to-release from COVID-19 isolation.

13. More detailed advice will be provided in an updated briefing in the week beginning 8 May, and again in early June as part of the Cabinet paper following the next Public Health Risk Assessment (PHRA) scheduled for 15 May 2023.

Recommendations

We recommend you:

a)	**Note** that the key benefits of a test-to-release or test-to-return policy are that they potentially enable people who are less likely to be infectious to leave isolation earlier than they otherwise would have	**Noted**
b)	**Note** that following the last PHRA on 16 March 2023, the recommendation from the Director-General of Health was that COVID-19 cases continue to be required to isolate for 7 days	**Noted**
c)	s 9(2)(h) [redacted]	**Noted**
d)	**Note** that planning for a scenario where mandates are removed has commenced in relation to both remaining COVID-19 mandates	**Noted**
e)	**Note** that officials will provide an updated version of this report the week beginning 8 May 2023	**Noted**

f) **Note** that the next Public Health Risk Assessment will be held on 15 May 2023, followed by development of a Cabinet paper to be considered by SWC on 7 June 2023 and by Cabinet on 12 June 2023. **Noted**

Dr Diana Sarfati
Director-General of Health
Te Tumu Whakarae mō te Hauora
Date: 28 April 2023

Hon Dr Ayesha Verrall
Minister of Health
Date:

Dr Andrew Old
Deputy Director-General
Public Health Agency
Date: 27/04/23

Response to request for advice on the use of a 'test-to-release' option for COVID-19 isolation

Background

14. Under section 8 of the Act, COVID-19 orders may be made while there is an epidemic notice in force, a state emergency or transition period in relation to COVID-19 is in force, or if the Prime Minister, by notice in the *gazette*, after being satisfied that there is risk of an outbreak or the spread of COVID-19 has authorised the use of COVID-19 orders (either generally or specifically). s 9(2)(h) [redacted]

15. On 27 February 2023 the Prime Minister authorised the use of orders in relation to self-isolation and mask use for visitors to health service settings for the period 28 February to 28 April 2023. On14 April 2023 the Prime Minister agreed to sign a renewal of the authorisation from 28 April 2023 to 30 June 2023 [H2023022067 refers].

16. s 9(2)(h) [redacted]

17. On 11 April 2023 Cabinet agreed to retain the current settings in relation to both mandated self-isolation for cases, and mandated mask use for visitors to health service settings.

18. Provided that one of the prerequisites outlined in section 8 of the Act are met, decisions in relation to orders sit with the Minister (provided the requirements in section 9 are met). As has been the case to date, your office has indicated that you have a preference and intention to use Cabinet as a mechanism to consult with your colleagues (as permitted under section 9(1)(c)(ii)) prior to making decisions in relation to COVID-19 orders.

Context

Current setting

19. Under the COVID-19 Public Health Response (Self-isolation Requirements) Order 2022, people who test positive for COVID-19 are required to isolate for 7 days from the earlier of the date their symptoms began, or the date they tested positive.

20. Isolation requirements have been reduced over the course of the pandemic from an initial 14 days, to 10 days and then to the current 7 day requirement. The Director-General has previously provided advice that 7 days is considered the minimum threshold for self-isolation of symptomatic cases to remain an effective intervention. 5-day isolation is considered less effective, as many people who are symptomatic may still be infectious on release at day 5.

How do 'test to release' and 'test to return' work?

21. Test to release and test to return are mechanisms that enable a person isolating with COVID-19 to exit isolation (test to release) or return to work or study (test to return) upon testing negative on a rapid antigen test (RAT).

22. Under either mechanism, there are further possible variations in terms of what is required to exit isolation. The most common parameters are:

    a. whether the person is required to test negative once or twice

    b. whether there is a minimum number of days the person must complete in isolation before being able to test to exit

    c. whether there is a maximum number of days a person is required to isolate for

    d. whether the person is required to be asymptomatic on release.

When and where have these approaches been used?

New Zealand

23. In New Zealand, test to return has been used as part of the healthcare worker return to work programme since March 2022. This has allowed healthcare workers to return to work from day 5 if they are asymptomatic, feel well and have had two negative RATs.

24. A test to return pathway has been used by District Health Boards since March 2022, although it did not result in many staff members returning to work prior to completing a 7-day isolation period. For example, at Canterbury DHB so few healthcare workers were both asymptomatic and tested negative (estimated to be 1 in 15 or 20 healthcare workers) that they stopped trying to utilise an early release pathway.

25. Extensive guidance was developed to ensure this pathway was well understood and to protect the wellbeing of affected staff members.[1]

Other jurisdictions

26. In other jurisdictions, these models have been used in different ways over the course of the pandemic – as legally required national mandates, as requirements from employers as part of responding to their health and safety responsibilities (and to reduce legal risk), and as national guidance.

27. Currently several jurisdictions use some form of test to release (for example, Taiwan, Italy and California). Appendix 1 provides further details of the setting used in these countries.

28. Typically, 'test to release' tends to be associated with national isolation mandates or guidance, and 'test to return' tends to be more commonly associated as a requirement that employers or educational facilities place on their employees or students.

What is the rationale for continuing to require case isolation?

29. Appendix 2 provides further background information on impacts of COVID-19.

[1] https://www.tewhatuora.govt.nz/for-the-health-sector/covid-19-information-for-health-professionals/covid-19-information-for-all-health-professionals/guidance-for-critical-health-services-during-an-omicron-outbreak/

Public health advice on test-to-release

What is the rationale for using either a test to release or test to return model?

30. The core rationale behind test to release or test to return is to enable people who are less likely to be infectious to exit isolation, and/or return to work or education.

31. Requiring a negative RAT to exit greatly reduces the likelihood that the person will be infectious on release. Based on modelling published by COVID-19 Modelling Aotearoa (CMA) in 2022:

    a. approximately 15% of people are likely to be infectious on release under the current policy of mandatory isolation for 7 days

    b. if the policy changed to allow people to leave isolation after 5 days and a negative RAT, this proportion was modelled to increase to an estimated 21% (a 42% increase from the status quo)

    c. if mandatory isolation was reduced to 5 days with no test to release, approximately 30% of people would likely still be infectious on release (a 103% increase from the status quo).

32. An update to this modelling has been commissioned, and this will be included in the update to this report due to be provided in the week beginning 8 May 2023.

33. A negative RAT towards the end of an infection is a reasonable predictor that the person is unlikely to be infectious:

    a. while use of RATs early in an infection may miss some cases, RATs are a good predictor of infectiousness for people towards the end of their infectious stage (days 5-10)

    b. by contrast, as PCR testing is neither a practical not effective way to identify if someone is infectious – a person may test positive on a PCR for weeks or months after their infection, but historical cases such as these are unlikely to be infectious.

34. Being asymptomatic is not a good predictor of infectiousness on its own:

    a. on completion of 5 days of isolation, approximately 30% of people are likely to still be infectious

    b. although studies have tended to support greater transmission from symptomatic cases, the results are mixed and asymptomatic transmission is well documented.[2]

35. As outlined above, RATs are useful predictors of infectiousness, but if an individual is actively symptomatic (eg coughing and sneezing), this is likely to increase the likelihood of transmission, and therefore the potential risk. For this reason, test to release policies typically include a requirement that the individual is both asymptomatic on release, in addition to having a negative RAT.

36. If test to release was considered in Aotearoa New Zealand, our advice is that it should include requirements for both a negative RAT and an absence of symptoms.

[2] https://www.gov.uk/government/publications/covid-19-omicron-variant-infectious-period-and-asymptomatic-and-symptomatic-transmission

37. Appendix 3 contains further details on the scientific evidence in relation to test-to-release.

Why is test-to-release not currently recommended?

38. Throughout the COVID-19 response, requirements in relation to COVID-19 mandated measures have balanced a desire to adequately manage risk, with a desire to ensure that measures are able to be easily communicated, understood, and acted upon by the public.

39. This tension is not unique to COVID-19. However, the requirement to isolate is somewhat unique in that it places a limit on rights protected in the Bill of Rights Act 1990. Under section 9(1)(ba), the Minister must be satisfied that any limit on those rights is justified.

40. While there may be some benefits of test to release from a theoretical perspective in terms of reduced time in isolation, the approach is not currently recommended as the potential benefits are modest (an average reduction of time in isolation of 1.4 days), and the implementation challenges significant in terms of the required legislative framework and the development of communication materials and guidance for the public. Further, the misinterpretation of any changes could increase transmission risk beyond that modelled offsetting any desired benefit.

41. Specifically, there are concerns that:

    a. a partial change creates uncertainty for the public on when to isolate and many might view the isolation period as just 5 days creating additional transmission risk

    b. test-to-release adds complexity to public messaging – when the model was used for healthcare workers, very extensive guidance was required to be developed to explain the change

    c. the approach may only result in marginal gain – based on data from Canterbury healthcare workers, approximately 1 in 15-20 workers were both asymptomatic and had a negative RAT a day 5

    d. while the relaxing of settings may reduce the time spent in isolation it will increase the number of infectious people in the community, seeding further cases so the net effect will be lessened

    e. in the context of winter and an expected increase in cases, any actions that increase transmission will likely place further burden on the system.

Options for test-to-release settings, including different release days

42. As outlined in paragraph 22 there are a number of options in terms of the parameters of test-to-release (from isolation) or test to return (to work or school). These parameters include:

    a. whether the person is required to test negative once or twice

    b. whether there is a minimum number of days the person must or is recommended to complete in isolation before being able to test to exit

    c. whether there is a maximum number of days a person is recommended or required to isolate for

    d. whether the person is required to be asymptomatic on release.

43. As shown by modelling previously provided by CMA, different variations in the model result in different levels of people who are infectious on release, and different average time spent in isolation. The assumptions used in modelling are based on studies available at the time the modelling is commissioned.

44. COVID-19 Modelling Aotearoa has been commissioned to provide updated modelling on settings including test-to-release. This information was not available in time to be included in this report, but will be included in an update to be provided in the week beginning 8 May 2022.

Timeline for possible implementation dates, taking a phased approach over time

45. Under the current legislative framework:

a. The health advice provided by the Director-General of Health covers the legislative requirements as outlined in section 9(1)(a) of the Act: the risks of the outbreak or spread of COVID-19, and the nature and extent of measures (whether voluntary or enforceable) that are appropriate to address those risks

b. Under section 9(1)(a) of the Act, the Minister is not required to follow this advice, but must have regard to it.

c. The ability to revoke or revise mandated measures is built into the current legislative framework in several ways:

i. The Minister must ensure that provisions required in section 9 of the Act are met

ii. s 9(2)(h) [redacted]

46. The indicative timetable for the above process for the remainder of 2023 is provided in Table 1 below.

Table 1: Indicative timeframes for review of COVID-19 measures for the remainder of 2023

Review	Activity	Date
May/June review	PHRA	15 May 2023
	Director-General to provide advice to Minister of Health	23 May 2023
	SWC	7 June 2023
	Cabinet	12 June 2023
	Expiry of section 8(c)	28 June 2023
	Pre-election period begins	14 July 2023
July/Aug review	PHRA	14 July 2023
	Director-General to provide advice to Minister of Health	21 July 2023
	SWC	2 August 2023
	Cabinet	7 August 2023
	Expiry of section 8(c)	28 August 2023
Sept/Oct review	PHRA	11 August 2023
	Director-General to provide advice to Minister of Health	18 August 2023
	SWC	30 August 2023
	Cabinet	4 September 2023
	Expiry of section 8(c)	28 October 2023
	General Election	14 October 2023
Nov/Dec review	PHRA	15 November 2023
	Director-General to provide advice to Minister of Health	[TBC]

	SWC	[TBC]
	Cabinet	[TBC]
	Expiry of section 8(c)	[TBC]

Impact of pre-election period

47. As the general election will be held on 14 October, the pre-election period begins on 14 July.

48. s 9(2)(h) [redacted]

49. s 9(2)(h) [redacted]

Given the current legal framework, it is challenging to describe a phased approach to step-down over time

50. The Prime Minister has signalled that he expects that by the end of winter, isolation for COVID-19 cases may no longer be legally mandated.[4]

51. s 9(2)(h) [redacted]

52. s 9(2)(h) [redacted]

Indicative planning for a scenario where the isolation mandate is no longer in place

53. As requested, advice is currently being developed on a pathway for the removal of remaining restrictions. This advice will be considered as part of the forthcoming PHRA and will form advice to Cabinet when the existing COVID-19 settings are considered again in June 2023.

54. This section provides preliminary indication on how a test to release approach might be considered within in a future context.

55. Table 2 below provides a high-level summary of the main options were test to release to be considered.

[3] https://www.dpmc.govt.nz/our-business-units/cabinet-office/supporting-work-cabinet/cabinet-manual/6-elections-transitions-1#para-6.9

[4] https://www.beehive.govt.nz/sites/default/files/2023-04/Press%20Conference%2011%20April%202023.pdf

Table 2: Summary of options for isolation guidance if mandates were to be no longer available

Recommendation	Summary (risks/benefits/suitability) (*Note: percentages infectious on release relate to a mandate scenario, and will be updated in modelling to come from CMA)*
5 days isolation	• 30% of people are estimated to be infectious on release • Based on three transmission studies reported in a rapid review by UKHSA, 80-100% of transmission occurs around symptom onset up to 5 days
7 days isolation	• Would be a continuation of the status quo, resulting in an estimated 15% of people infectious on release
Minimum 5 days isolation, followed by test to release to a maximum of 7 days isolation	• 21% of people would still be infectious on release • May help to 'set a bar' that people may socially feel less willing to break than the requirement to isolate for 7 days – as the rationale is clear and intuitive • Would require funding to support the infrastructure to support supply to public through distribution channels[5]

56. The options above have been simplified, but there could be a more nuanced approach to isolation if it is no longer mandated. For example, a likely minimum period recommended and potentially a test to release advice for the general public, and discretion for a medical officer of health to manage high risk settings such as aged residential care (ARC) facilities differently (for example, test to release up to 10 days which would allow for longer periods of separation of infected residents from uninfected residents).

57. The Director-General of Health has provided advice recommending that mandatory isolation be retained, and advice on measures if the requirement is removed (for example, if the test in section 8(c) of the COVID-19 Public Health Response Act 2020 cannot be met). These recommended measures include:

    a. Provide clear guidance that cases should isolate for 7 days.

    b. Maintain guidance and functionality to report COVID-19 test results – this information (even if not capturing all cases), still provides important information on case trends to assist health service planning and is also the main mechanism for identifying and connecting people with support and/or those who are eligible for antivirals.

    c. Establish a mechanism to ensure cases are aware of the recommended isolation period including advice that they may be directed to isolate by a Medical Officer of Health should a failure to isolate place vulnerable persons at risk (under the Health Act 1956).

    d. Continue to provide financial support to people who are unable to access sick leave from their employer – building on the success of the Leave Support Scheme (LSS) –

[5] Funding for some COVID-19 measures post 30 June 2023, including the provision of RATs, is not yet agreed. Any implementation of test-to-release would require specific funding consideration.

potentially in a more targeted form as has been used in other jurisdictions.6 This would support people who might otherwise find it difficult to isolate to do so.

e. Strengthen effective public health measures that do not involve limitations on individual rights – for example, systemic improvements to ventilation in high-risk settings.

f. Review eligibility for antivirals.

Operational considerations and implications

58. Further information on operational implications includes:

a. Te Whatu Ora holds approximately 45 million RATs for the remaining 8 months through to the end of January, enough for an average of 5.5 million a month. This is more than double the existing distribution rate (currently 2.7 million). This should be sufficient to continue to supply until January 2024.

b. There has been stability in isolation requirements since phase 3 of the Omicron response. A change to the isolation requirements to implement a Test to Release policy would be a large operational change to manage. Once clarity has been achieved on the parameters of the change and the secondary impacts to initiatives, e.g. whether proactive follow up of cases is required under a TTR policy, changes would need to be made across technology platforms, training for telehealth providers, and updates to guidance documents for the public and the health and disability sector. We estimate that a lead-time of at least 4-6 weeks is required at a minimum.

c. When changes are made to initiatives across COVID-19, broader and targeted communications efforts are required alongside guidance to support the public and the health and disability sector. For context, the communication campaigns in support of the introduction of bivalent vaccines and winter preparedness cost approximately $4 million.

d. Operationally there is substantive work to ensure the changes are well-understood by the sector and that services (primary care, ARC, and telehealth) are equipped to provide advice. Clarity is required on the expectations on the health system for a case in a TTR model, and whether proactive follow up for priority cases is still expected alongside any change. We currently follow up with priority cases, which also supports access to antivirals for those who are eligible. As an example, Te Whatu Ora does not expect to support the provision of advice and guidance to the business sector and employers & manufacturers or education agencies.

e. Te Whatu Ora anticipates increased demand on Public Health Services, with them likely needing to be more involved with some cases.

f. The COVID-19 infrastructure is absorbing as much of the pressure as is within tolerances and remit. Te Whatu Ora would likely see higher requests for supports and information through National Telehealth Services and Care in the Community alongside the potential for Employers seeking confirmation of "fit for work"

[6] For example, in Australia the High-Risk Settings Pandemic Payment is a lump sum paid directly to people who test positive for COVID-19 who work in aged care, home care, disability care, Aboriginal healthcare, hospital care, ambulance and patient transport. The person is only eligible if they are a casual employee or have no appropriate paid leave available.

certification – which is not a costed model in primary care COVID-19. Consideration of the Health and Safety in the Workplace requirements is required. It is something the system wouldn't be able to sustain so a mechanism for verifying a negative result as well as a clinical certification may need to be explored. Colleagues across Te Whatu Ora will need to provide formal information on this.

g. As part of funding working, Te Whatu Ora has signalled further wind down of some testing sites and RAT collection sites with a lead-time of 8 weeks-3 months, however this may require further consideration alongside TTR.

Health sector population agency views

Te Aka Whai Ora

59. Te Aka Whai Ora understands that the possibility of introducing a five-day test-to-release arrangement has been considered previously as part of regular reviews of public health settings relating to COVID-19, and that there were concerns expressed about the limited benefits of introducing such a system, as well as the potential risks. In particular, Te Aka Whai Ora would be concerned about the risk of Māori – who are disproportionately represented in low-paid and precarious employment – being pressured to return to work earlier as a result of the change in requirements, which would have consequences for communities as a whole if this affected the rate of transmission of COVID-19 among Māori.

60. Te Aka Whai Ora will provide further, more substantial, advice to Ministers in the week commencing 8 May 2023, which we understand is when Manatū Hauora expects to provide advice relating to the modelling of possibly impacts of these changes by ethnicity. advice by Friday 5 May, which could be provided to Ministers alongside other advice from Manatū Hauora including modelling of the impact of the potential changes by ethnicity.

Whaikaha

61. From Whaikaha's perspective, based on feedback from the disability community and the data below, which indicates the additional risks for disabled people who contract Covid, there is the need to maintain a cautious approach on "Test to Release" practices.

62. The cautious approach is based on the disproportionate risk experienced by some disabled people if the "Test to Release" settings were relaxed too quickly.

63. The preferred approach would be that before a change to the "Test to Release" settings are made, there should be further data collation(s) (matching infection rates, hospitalisation rates and mortality rates to the DSS population) to demonstrate the trend to lower risk or otherwise for disabled people.

Table 3: COVID-19 outcomes for DSS clients compared to the rest of the New Zealand population over the period 1 January – 16 November 2022

	COVID-19 positive	Admitted to hospital with COVID-19[7]	Died of or with COVID-19
All DSS Clients (approx. 43,000)	9% less likely (13,879 people)	4.2 times more likely (409 people)	13 times more likely (27 people)
Non-residential support	16% less likely (10,818 people)	3.5 times more likely (281 people)	7 times more likely (11 people)
Residential support	19% more likely (3,061 people)	8 times more likely (128 people)	47 times more likely (16 people)

Equity

64. COVID-19 continues to affect some population groups significantly more than others. Specifically, older people, Māori, Pacific Peoples, and disabled people are at higher risk of severe outcomes.

65. The Crown's obligations to Māori under Te Tiriti o Waitangi requires a commitment to partnership that includes good faith engagement with and appropriate knowledge of the views of iwi and Māori communities. The active protection principle obliges the Crown to take all steps practicable to protect Māori health and wellbeing, and to support and resource Māori to protect their own health and wellbeing. This includes efforts to counteract inequitable health outcomes and prevent the impact of COVID-19 from falling disproportionately on Māori. In assessing proportionality, it is important to recognise that due to Te Tiriti o Waitangi more restrictive measures may be required to achieve these objectives.

66. This obligation has been affirmed by the Waitangi Tribunal in its 2021 report Haumaru: the COVID-19 Priority Report. In particular, the Tribunal:

    a. found that the Crown was not collecting sufficient data to accurately and equitably inform key decisions relating to the pandemic response for Māori; and

    b. recommended that the Crown "strengthen its monitoring regime to enable it to identify, in as close to real time as possible, whether or not its policy settings in relation to Māori are working as expected, so as to enable the Crown to change those settings to achieve the desired and intended results, and remain accountable to its Treaty partner".

67. In this context, retaining the mandatory requirements for cases to isolate and for visitors to health service settings to wear masks remains necessary – in addition to non-mandatory measures – to continue to suppress transmission, to protect people at

[7] To be included as a COVID-19 hospitalisation, COVID-19 must have been a contributing reason for their hospital stay. A hospitalisation must also have been for a period of at least three hours to be counted.

greater risk of serious illness, and to protect the health system. These measures continue to play a critical role to help keep the COVID-19 outbreak manageable.

Next steps

68. We will update this briefing in the week beginning 8 May 2023, when updated modelling is available from CMA. This update will also include a breakdown of scenarios by ethnicity and region.

69. The next PHRA is scheduled to be held in mid-May. This will be followed by development of a Cabinet paper providing further details on scenario planning for a situation where mandates were no longer in place. The paper will be considered by SWC on 7 June 2023, and by Cabinet on 12 June 2023.

Appendix 1: Guidance or mandates in relation to isolation for COVID-19 cases in other jurisdictions

Table 4: Summary of isolation policies in other jurisdictions

Country	Mandate/guidance	Model	Other key elements
Jurisdictions with isolation mandates			
Taiwan	Mandate	TTR	10 day isolation or a negative RAT or a PCR with Ct values≧30
Italy	Mandate	TTR	5 day mandatory isolation with release before the 5th day with a negative test.
USA – California	Mandate	TTR	10 day isolation, but can finish isolation after 5 days with a negative test and improving symptoms
Jurisdictions with isolation guidance (not a comprehensive list)			
Australia – VIC	Guidance	Voluntary	Isolate for 5 days or until asymptomatic. Wear a mask if you need to leave home in an emergency
Australia – NSW	Guidance	Voluntary	Isolate till acute symptoms are gone. Avoid high risk settings for at least 7 days Wear mask on public transport
Australia – Queensland	Guidance	Voluntary	Isolate for 7 days and until you are asymptomatic
Australia – South Australia	Guidance	Voluntary	Isolate till asymptomatic
Australia – Western Australia	Guidance	Voluntary	Isolate till asymptomatic
Australia - Tasmania	Guidance	Voluntary	Advises you can leave the house but to wear a mask and avoid high risk settings
United Kingdom	Guidance	Voluntary	Isolate for 3 days if under 18 Isolate for 5 days if over 18 Avoid vulnerable people for 10 days
France	Guidance	Voluntary	Isolate till asymptomatic
Singapore	Guidance	Voluntary	Avoid vulnerable populations after a positive test.

Table 5: Detailed description of isolation settings as outlined on government websites

Country	Full text from govt website

Australia – VIC[8]	If you test positive on a rapid antigen test, you should:
	• report your result online or call the Coronavirus Hotline at 1800 675 398 as soon as you can:
	  ○ after you report, you will receive text messages from the Department of Health
	  ○ your information will stay private. It is the same information that would be obtained if you tested positive on a PCR test
	• isolate for at least 5 days or until you don't have symptoms anymore.
	• ring your doctor and tell them you have COVID-19. They may prescribe medicine to help prevent you from getting so sick that you end up in hospital.
	• follow your Checklist for COVID cases
	  ○ tell people and places you have been in contact with that you have COVID-19.
	  ○ most people with COVID-19 will experience mild to moderate symptoms. Learn how to manage COVID-19 at home
	  ○ people who need extra support and care will be contacted by the Department of Health via the COVID Positive Pathways Program.
	• wear a face mask if you need to leave home in an emergency.

Australia – NSW[9]	You may be infectious for up to 10 days. You are most infectious in the 2 days before your symptoms start and while you have acute symptoms (such as a runny nose, sore throat, fever, cough). Some people with COVID-19 do not develop symptoms at all but are still able to infect others. • To reduce the risk to others NSW Health recommends you: • Stay home until your acute symptoms have gone. If you are at higher risk of severe illness, speak with your doctor as soon as you test positive. You may be eligible for antiviral medicines or other treatments for COVID-19. Antiviral medicines work best when used as soon as symptoms start. • Don't visit people at high risk of severe illness, anyone in hospital or an aged or disability care facility for at least 7 days. • Wear a mask when indoors and on public transport, if you must leave your home. • Avoid large gatherings and indoor crowded places, especially where you will be in contact with groups of people you don't live with. • Talk to your employer about when you should return to the workplace. • You should talk to your workplace about working from home, where possible. If you work in a high-risk setting such as health, disability and aged care, it is recommended that you stay away from the workplace for at least 7 days and until you have no symptoms to help protect other staff, patients, residents, and clients. If your employer needs you to return to the workplace before this time, they may ask you to take additional steps to protect others, subject to their work, health and safety assessment.

[8] https://www.coronavirus.vic.gov.au/report-your-rapid-antigen-test-result
[9] https://www.nsw.gov.au/covid-19/testing-managing/advice-for-confirmed#toc-what-should-i-do-if-i-test-positive

	• Tell people that you live with, or spend a lot of time with, that you have COVID-19. • People you live with or spend a lot of time indoors with are at greatest risk of catching COVID-19 from you. You should tell them you have tested positive and try to separate from them as much as possible. They should test regularly and monitor for symptoms. If they get sick, they should get tested and stay home. They should follow the Information for people exposed to COVID-19 fact sheet. • Register your positive rapid antigen test result with Service NSW. • If you or someone in your family can't register online, please call Service NSW on 13 77 88. Registering your result helps you access medical support from NSW Health, including antiviral medicines if you are eligible, and also assists NSW Health respond to the ongoing COVID-19 pandemic. This keeps you, your loved ones and the community safe. If you tested positive on a PCR test, you do not need to register your result.
Australia – Queensland[10]	**When to isolate** If you: • test positive to COVID-19 within the previous 7 days, or • have any symptoms of acute respiratory infection Queensland Health strongly recommends that you stay at home and isolate, until: • you no longer have acute respiratory symptoms • you've gone for at least 24 hours without a fever, without using fever-reducing painkillers such as paracetamol or ibuprofen. In addition: • for at least 7 days after receiving a positive COVID-19 test result or • while you have any symptoms of acute respiratory infection you should: • avoid entering hospitals, residential aged care facilities and disability accommodation services • wear a face mask covering your mouth whenever you are in an indoor setting outside the home • avoid contact with people who are a higher risk of severe disease • wash your hands regularly • practice good respiratory hygiene (such as covering your cough) **How to isolate** Stay away from other people in your home or accommodation as much as possible to reduce their exposure to COVID-19. This may include: • keeping 1.5 metres away from them and avoiding close contact, including touching, kissing, hugging and other intimate contact • sleeping in a separate room where possible • using a separate bathroom where possible • avoiding shared areas where possible

[10] https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/health-advice/i-have-covid/first-steps-if-you-have-covid

	• wearing a mask when you must use shared areas. You should not allow anyone to visit your home or accommodation, unless it's for: • emergency care • medical care • other essential care. If you live with an elderly person or someone with a compromised immune system (immunocompromised), you or they may need to stay elsewhere. If you or they are not able to stay elsewhere, stay away from them as much as possible and wear a mask in any shared areas. They are at greater risk of being more unwell if they get COVID-19. **Practice good hygiene** Always cover your nose and mouth when you sneeze or cough, preferably with a tissue or your sleeve when you don't have a tissue. Throw out any used tissues straight away in a rubbish bin. Wash your hands regularly with soap and running water for at least 20 seconds regularly, and especially after you cough, sneeze, blow your nose or take off gloves and masks. You can use alcohol-based hand sanitiser if your hands are not visibly dirty. Clean your hands after putting on your mask, before going into any shared household areas. **Do not share household items** Do not share cups, glasses, plates, utensils, towels or bedding with others in your home. These items should not be used by others until they are cleaned thoroughly with detergent and water or in a dishwasher or washing machine. **Wear a mask** If you have COVID-19, you should avoid being in the same room with others, but if you do need to be in the same room, always wear a face mask covering your nose and mouth. **Keep your house open** Open doors and windows as much as you can to have good airflow, particularly in shared areas. **Keep things clean** Clean frequently touched surfaces every day with a normal household cleaning product. This includes tabletops, doorknobs, taps, sinks, phones, keyboards, remote controls, light switches and bedside tables. Pay particular attention to the kitchen, laundry and bathroom. **Monitor your symptoms** Read about managing your symptoms at home and what to do if you get sicker. **Tell your social, work and education contacts to get tested if they have symptoms** It's likely you will have been in contact with other people while you were infectious. It's possible you have spread the virus to others (without knowing) in the 2 days before you had symptoms or found out you have COVID-19. If you have been in contact with anyone during that period, you need to tell them you have COVID-19 so they can monitor their own health and get tested if they feel unwell.

	This might include your workplace or the place you study, or if you have children, the school or childcare they go to. **Restrictions on entering high-risk settings** Except in an exceptional circumstance or where medical treatment is required, if you have: • tested positive to COVID-19 within the previous 7 days or • have any symptoms of acute respiratory infection you should not enter any high-risk settings such as: • a hospital • a residential aged care facility • a disability services accommodation centre until • at least 7 days have passed since you received a positive COVID-19 test result, and • you no longer have any symptoms. The operators of high-risk settings may choose to impose restrictions or conditions on people who have recently tested positive to COVID-19 or had any symptoms of acute respiratory infection, such as: • isolation processes for patients and residents • conditions or restrictions for staff returning to work • visitors attending the high-risk setting. If you who have tested positive to COVID-19 within the previous 7 days or have any symptoms of acute respiratory infection and there are extenuating compassionate reasons for visiting a high-risk setting (e.g., end-of-life), you should contact the facility to discuss if this can be safely arranged. There are no restrictions or limitations if you are seeking to enter a high-risk facility if you require medical care, aged care or disability services. However, where possible you should advise the facility that you are a diagnosed person or have acute respiratory symptoms and comply with any conditions to manage the risk to staff, patients, residents, clients and visitors to the facility.
Australia – South Australia[11]	To protect others in our community, anyone with symptoms is encouraged to take steps to stop the spread of disease by continuing to get tested and stay at home until symptoms have cleared (usually five to seven days). If you test positive using a RAT, there is still a requirement for South Australians to report their result online. PCR testing remains available across the state while a transition is underway with general practice to move to GP referred COVID testing. If you are COVID-19 positive and you must leave the house, it is strongly recommended you: • Wear a mask especially when indoors or on public transport. • Not attend large gatherings and crowded indoor places.

[11]https://www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/about+us/news+and+media/all+media+releases/covid+isolation+requirements+come+to+an+end#:~:text=To%20protect%20others%20in%20our,usually%20five%20to%20seven%20days).

	• For at least seven days, avoid people at high risk of severe illness, or anyone in a hospital, aged or disability care facility. Businesses and employers should consider their own polices in response to these changes in terms of their own work health and safety obligations. People testing positive for COVID-19 and close contacts should advise their employer and discuss return-to-work plans. Those working in sensitive settings such as health, disability and aged care will need to have a longer period away from the workplace to protect other staff, patients, residents, and clients. Masks will still be required to be worn in hospitals and many general practices as well as other primary health care sites including Aboriginal Controlled Health services.
Australia – Western Australia[12]	If you have COVID-19, please stay home if you have COVID-19 until your symptoms have resolved to protect our community. This could take up to 10 days or more and a minimum of 5 day is a good guide. You can recover from COVID-19 at home if your symptoms are mild. Contact a GP or GP Respiratory Clinic if you start to feel worse. You can also call Healthdirect on 1800 022 222. If your symptoms become severe, call 000 immediately. 1. Manage your symptoms with rest and pain relief. Remember to check with your doctor if you are eligible for antiviral treatment. 2. Stay at home until your symptoms resolve. This could take up to 10 days or more. A minimum of 5 days is a good guide. 3. Don't forget to tell anyone you have had close contact with that you have COVID. You're most infectious 2 days before symptoms start. 4. If you tested positive with a RAT, register your result with the Department of Health. To protect those most at risk from COVID-19, for 7 days after testing positive for COVID-19 you should not visit or work in high-risk settings including hospitals, disability, mental health and aged care residential facilities and other healthcare settings (e.g., ambulance services, GP clinics, physiotherapy). You can still attend public hospitals and high-risk settings for urgent medical care or treatment, but you should contact the facility to let them know you have tested positive for COVID-19.
Australia - Tasmania[13]	If you have COVID-19 or other respiratory viruses like the flu, you can infect others. Follow the behaviours we have learnt during the COVID-19 pandemic to protect your family and friends. If you test positive for COVID-19 you may be infectious for up to 10 days. You are most infectious: • just before your symptoms start, and

[12] https://www.wa.gov.au/government/covid-19-coronavirus/covid-19-coronavirus-managing-covid-19-wa#:~:text=To%20protect%20those%20most%20at,%2C%20GP%20clinics%2C%20physiotherapy).
[13] https://www.health.tas.gov.au/health-topics/coronavirus-covid-19/what-do-if-you-test-positive/tested-positive
https://www.health.tas.gov.au/health-topics/coronavirus-covid-19/what-do-if-you-test-positive/tested-positive

	• while you have acute symptoms (runny nose, sore throat, cough and fever). To reduce the risk to others you should stay home until your symptoms have resolved. And for at least seven days Public Health recommends: • wearing a face mask in indoor spaces, on Public Transport, and when visiting people who may be at risk of severe illness • avoid visiting high-risk settings including a hospital, or a residential aged care facility or disability residential setting • avoid large gatherings and indoor crowded places.
USA – California[14]	**If you were exposed but have no symptoms** Regardless of your vaccination status: • Get tested immediately and 3-5 days after last exposure* • Wear a mask when around others for 10 days after exposure, even at home if other people are present • If you test positive, isolate *If you had COVID-19 within the last 30 days: • You don't need to test after exposure unless symptoms start • If symptoms start, isolate and get tested **If you test positive, whether you have symptoms or not** Regardless of your vaccination status or infection history: • **Isolate** for at least 5 days ○ Sleep and stay in a separate room from those not infected ○ Use a separate bathroom if you can ○ Wear a mask around others, even at home • You can end isolation early, after Day 5, if: ○ You have no fever for 24 hours without taking fever-reducing medication, AND ○ Your other symptoms are gone or improving • If you still have a fever, continue to isolate until the fever is gone for at least 24 hours • If other symptoms are not improving, continue to isolate through Day 10 • After you end isolation: ○ Wear a mask around others for 10 full days after start of symptoms. If you had no symptoms, wear a mask for 10 full days after your positive test. ○ You may remove your mask sooner than Day 10 if you have two negative tests in a row, at least one day apart. For children who test positive: • Children under 2 years can end isolation after Day 5 • Children 2 years and older should follow the steps above for ending isolation

[14] https://covid19.ca.gov/quarantine-and-isolation/ https://covid19.ca.gov/quarantine-and-isolation/

United Kingdom[15]	You may be able to look after yourself at home if you have COVID-19 or symptoms of COVID-19. Try to stay at home and avoid contact with other people if you or your child have symptoms and either: • have a high temperature • do not feel well enough to go to work, school, childcare, or do your normal activities You can go back to your normal activities when you feel better or do not have a high temperature. If your child has mild symptoms such as a runny nose, sore throat or mild cough, and they feel well enough, they can go to school or childcare. You are no longer required to do a COVID-19 rapid lateral flow test if you have symptoms. But if you or your child have tested positive for COVID-19: • try to stay at home and avoid contact with other people for a further 3 days after your positive test if you are under 18 years • try to stay at home and avoid contact with other people for a further 5 days after your positive test if you are 18 or over • avoid meeting people who are more likely to get seriously ill from viruses, such as people with a weakened immune system, for a further 10 days after your positive test
France[16]	**People who test positive** If you are positive for COVID-19, you are no longer required to self-isolate but you must: • **Respect barrier gestures**: wearing a mask, physical distancing, hand hygiene; • **Avoiding contact with the frail;** • **Notify your surroundings**: it remains important to notify others (family, friends, colleagues) and people you see within 48 hours before the onset of COVID-19 symptoms (or within 7 days before testing if no symptoms are present); • **Contact your doctor and monitor your health**: as soon as you know the positive result of the test, you should consult your doctor, in person or by teleconsultation. They will monitor you throughout your illness and may prescribe a work stoppage if your health condition does not allow you to work. Indeed, from 1er February 2023, the derogatory compensation scheme for work stoppages is abolished, you can no longer request a Covid work stoppage without a waiting day on the declare.ameli.fr online service. Only your doctor can tell you to stop working. • **encourage teleworking.**

[15] https://www.nhs.uk/conditions/covid-19/covid-19-symptoms-and-what-to-do/#:~:text=under%2018%20years-,try%20to%20stay%20at%20home%20and%20avoid%20contact%20with%20other,days%20after%20your%20positive%20test

[16] https://www.service-public.fr/particuliers/actualites/A15610?lang=en#:~:text=Isolation%20is%20no%20longer%20required,to%20do%20the%20right%20thing.

	Recovery usually occurs within a few days with rest. To monitor your health, you are advised to take your temperature twice a day. Do not hesitate to contact your treating doctor in case of worsening symptoms or unusual symptoms. If you have difficulty breathing, call 15 or 114 immediately for the deaf or hard of hearing.
Singapore[17]	**What should I do if I have COVID-19?** Medically vulnerable persons (i.e. seniors and those with chronic medical conditions) that have ARI symptoms, as well as persons with severe, prolonged or worsening ARI symptoms, should see a doctor. The updated advisory for persons who are at increased risk of severe COVID-19 can be found at this link. Persons with mild ARI symptoms should stay at home until symptoms resolve. If there is a need to go out while symptomatic, or if asymptomatic but tested positive for COVID-19, we should exercise social responsibility – minimise social interactions, wear a mask, avoid crowded places, do not visit vulnerable settings such as hospitals and nursing homes, and do not have contact with vulnerable persons, such as the elderly.
Taiwan[18]	On April 7, the Central Epidemic Command Center (CECC) announced that it will revise the current criteria for release from isolation for confirmed COVID-19 cases (with complications) to satisfy the practical needs of clinical operations. The revised criteria are listed below. Confirmed cases (with complications) who are hospitalized for treatment can be released from isolation and go home if their symptoms have abated and they no longer require hospitalization after evaluation by doctors. Those who continue to require hospitalization for medical care for other illnesses can be released from isolation if the clinical (fever has dissipated for at least one day and symptoms have abated) and testing (negative rapid/PCR test results or Ct values≧30 by PCR) conditions are met or ten days have elapsed since the day of symptom onset/specimen collection and after doctors determine they have met the criteria.

[17] https://www.moh.gov.sg/covid-19
[18] https://www.cdc.gov.tw/En/Bulletin/Detail/TU_VQZ7j8fGjLC8ZG4u54Q?typeid=158

Appendix 2: What is the rationale for continuing to require COVID-19 cases to isolate?

Health impacts

COVID-19 poses a public health risk that is different from other respiratory and communicable diseases

70. COVID-19 can have a wide variety of impacts on individuals. The majority of people infected will not need to go to hospital and will recover fully. However, a subset of people will have more significant health impacts – either in the acute or post-acute phrases of the infection.

    a. **Acute phase:** in reported cases to 23 April 2023, there have been 2,313,064 cases of COVID-19, of whom 27,918 (1.2%) were hospitalised, of whom 781 (2.8%) have required ICU care. There have been 2,736 deaths.

    b. **Post-acute phase:** each new infection (or reinfection) effectively 'rolls the dice' for one or more post-acute sequelae. The rate and severity of post-acute sequelae, in combination with an expectation of multiple waves a year with the potential for reinfection make the impact more significant than other post-viral conditions. Post-acute sequelae include:

        i. Increased risk factors for a range of other health conditions: eg. cardiovascular disease[1], neurologic and psychiatric disorders[2], changes in brain structure[3], immune dysfunction[4], and diabetes.[5]

        ii. Long COVID[6]: based on evidence from overseas, 3-10% of cases are likely to develop long COVID, of whom 20% will have ongoing significant disability.[7] While these figures may appear low, in the context of multiple waves each year, each with the possibility of reinfection, the longer-term disability and productivity impacts will accumulate over time.

Health impacts in the acute and post-acute phases create additional costs for individual, whanau, communities, employers, the economy

71. Long COVID and other post-acute sequelae have personal costs, costs to government (welfare and health), but also broader impacts on society[8], such as reduced workforce participation[9] [10] and productivity.

Vaccination and therapeutics reduce risk of severe disease, and less so, infection

72. Currently available vaccinations are protective against risk of severe disease (hospitalisation or death). Vaccination also decreases the risk of infection and overall transmission within the community for a short period following vaccination. The short duration of protection against transmission is due to both ongoing genetic variation of the virus and waning of immunity.[11]

73. Antivirals also reduce the likelihood of progression to severe disease, particularly for people at higher risk.[12] However, access to antivirals is currently limited, they must be taken within the first five days of symptoms, and they are contraindicated for people taking certain other medications.[13] Recent provisional analysis by the Public Health Agency has suggested that antivirals may only have a modest impact on the risk of hospitalisation.

Mortality rates for COVID-19 are likely to remain high relative to other causes of death

74. While vaccination and the use of antivirals reduce the risk of severe disease in the acute phase of illness, the number of people affected by severe disease remains high relative to other causes. For example, in 2022 there were 2,319 deaths attributable to COVID-19 in New Zealand. This is approximately six times more than the number of people killed on the roads that year (378).

75. Based on deaths reported for the period from 1 January to 19 March 2023, if the number of deaths attributable to COVID-19 (186) continues at the current rate, this would result in 845 annual deaths, which is comparable to the annual number of deaths due to prostate cancer (709 in 2020), or breast cancer and melanoma combined (936 in 2020).

76. A study that used regression modelling to estimate influenza-associated mortality in New Zealand over the period 1990–2008 found that seasonal influenza was associated with an average of 401 medical deaths annually, which was 17 times greater than recorded influenza deaths.[19] During the period 2010-2018, the annual number of deaths recorded as being due to influenza ranged from 16 to 121.[20]

Some population groups are disproportionately affected by severe disease

77. Older people have substantially higher hospitalisation rates and, within each age group, Māori and Pacific communities, and people with disabilities also have higher hospitalisation rates.[14]

There is growing evidence of the longer term impacts of COVID on all groups

78. The prevalence and burden of long COVID in New Zealand is unknown. Estimates vary depending on the definition and vaccination status, among many other factors. Based on evidence from overseas, 3-10% of cases may develop long COVID, of whom 20% may have ongoing significant disability.

79. In January 2023, the Ngā Kawekawe o Mate Korona study found similar incidence rates of long COVID for New Zealand, although it is unknown how many individuals have subsequently had their symptoms resolve.

80. Based on the international and domestic research, it is estimated that between 70,000 and 300,000 people may be living with or have previously experienced long COVID (symptoms >12 weeks duration) in New Zealand.[15, 16] The higher incidence of infections and serious illness among Māori, Pacific peoples, disabled people, and other population groups more vulnerable to COVID-19 means that the long-term impact of COVID-19 will be greater on these communities.

[19] Kessaram T, Stanley J, Baker MG. Estimating influenza-associated mortality in New Zealand from 1990 to 2008. Influenza Other Respir Viruses. 2015 Jan;9(1):14-9. doi: 10.1111/irv.12292. Epub 2014 Oct 24. PMID: 25346370; PMCID: PMC4280813.

[20] Data provided by Te Whatu Ora. After the close of a calendar year, there is a 12-18 month process to assign cause of death codes to the majority of deaths in that year. Te Whatu Ora's clinical coding team reviews the death certificate and health history of the deceased, to assign cause of death codes. Approximately 10% of deaths are referred to the Coroner each year to determine cause. Deaths which requires a coronial inquiry can take 2-3 or more years for cause of death to be assigned. We do not make mortality data available publicly until the majority of deaths have been assigned a cause of death, so that the data we release is complete and accurate. The Chief Coroner has noted delays in the time it is taking them to assign cause of death codes.

Appendix 3: Efficacy of test to release

81. The purpose of this Appendix is to provide evidence for the efficacy of Rapid Antigen Tests (RATs) in a "Test to Release" schedule.

82. The current period of isolation is a fixed period of 7 days from the date of onset of symptoms, or diagnosis, whichever is earlier. A test to release schedule uses a combination of a lower and upper fixed period of time for isolation combined with release form isolation if an individual tests negative between these dates. The rationale is that RATs are able to predict infectiousness with sufficient accuracy to ensure infectious individuals are isolated, while non-infectious individuals are released from isolation.

83. The ability of RATs to identify infectious individuals in a "Test to Release Schedule" does not need to be 100% accurate for this method to be used to determine the period of isolation. Instead, the evidence should provide sufficient basis to conclude that a "Test to Release Schedule" is superior to a "Fixed Isolation Period" of 7 (or some other number of) days. In this setting, superiority would be inferred, if there was evidence that a "Test to Release" schedule resulted in fewer infectious individuals being released into the community without a significant increase in non-infectious individuals being isolated or a similar proportion of individuals being released with a significantly deceased period of isolation in non-infectious individuals.

Summary

84. The performance of test to release strategy primarily depends upon the ability of rapid antigen tests to differentiate between those who are infectious and those who are not infectious. As the cohort of individuals isolating have already been diagnosed using RATs, the subsequent test performance is expected to be high, as those who have a false negative RAT will not be captured by either strategy.

85. Infectiousness is not directly measurable. The current most reliable measure of infectiousness is the ability to culture live virus. Culture of virus is not possible to use in a clinical setting as the tests are too expensive and time consuming to use on a large scale. An individual who is "culture negative" is very unlikely to be infectious. An individual who is "culture positive" is potentially infectious.

86. It is well recognised that infectiousness is not evenly distributed throughout those individuals who test positive. Both biological and behavioural factors will influence this variation in infectiousness. Some individuals are substantially more infectious than others. It has been estimated that the majority of transmission occurs from a minority of individuals. This observation indicates that individuals who are highly infectious are also highly likely to return a positive RAT test.

87. It is well recognised that infectiousness varies markedly over time. As RATs measure viral antigens, not intact virions, it is likely that the relationship between a positive RAT and infectiousness will also decrease over time.

88. The current evidence would support the assumption that within the first week of infection, a positive RAT is strongly correlated with culturable virus and that the individual is infectious. However, a negative RAT early in the course of disease (before day 5) does not guarantee an individual will not be infectious.

89. The current evidence would support the assumption that after the first week of infection, a negative RAT is strongly correlated with non-culturable virus and that

the individual is unlikely to be infectious. A positive RAT is correlated with infectiousness, but not as strongly as within the first week. At more than 14 days either a positive RAT or culturable virus are uncommon.

90. The transmissibility of Omicron variant is markedly increased compared to the original Wuhan or later Delta variants. Much of this is due to immune evasion, but there is also an element of increased infectiousness. Data regarding the rates or risks of infectiousness from previous variants must be interpreted with caution for the current outbreak.

The relationship between PCR Ct value and culture positivity

91. There is a clear relationship between the Ct value and Culture positivity. Culture positivity decreases as the Ct value rises, which is assumed to be due to a decreasing viral load. Virus is almost always culturable at a Ct value of 25 or less, decreasing to less than 10% at a Ct value of 35 or more (Figs 1&2) (1) (2). However, there is a stronger relationship between culture positivity and time since the beginning of infection, indicating that the relationship between CT value and culture positivity will vary over the course of an infection.

Fig 1. Relationship between RT-PCR Ct value time since infection and culture positivity.

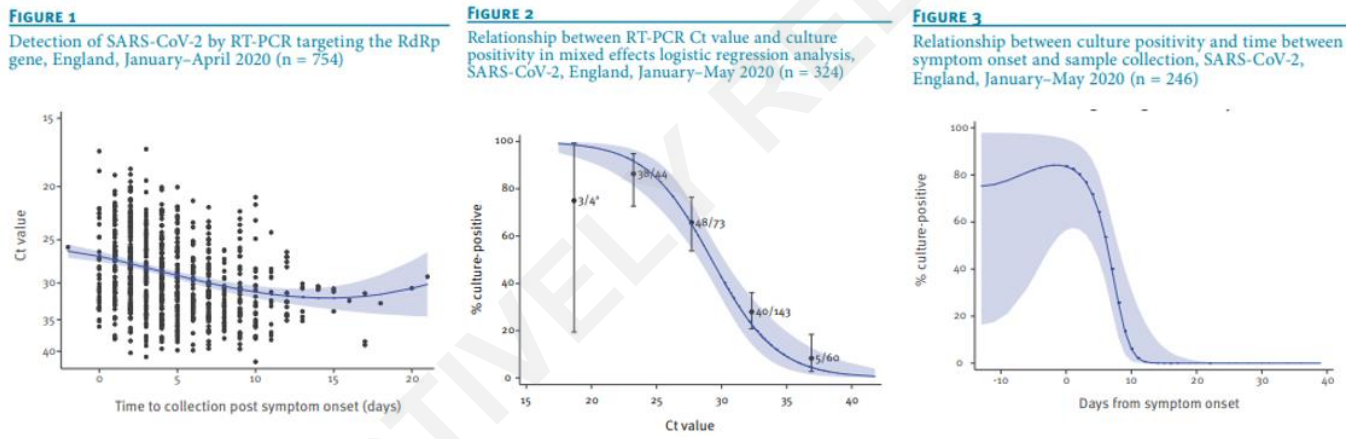


Fig 2 Relationship between culture and PCR Ct values

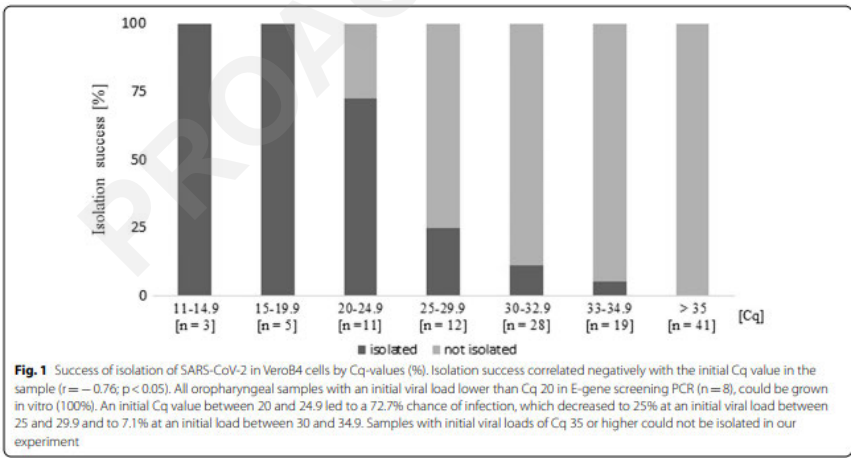
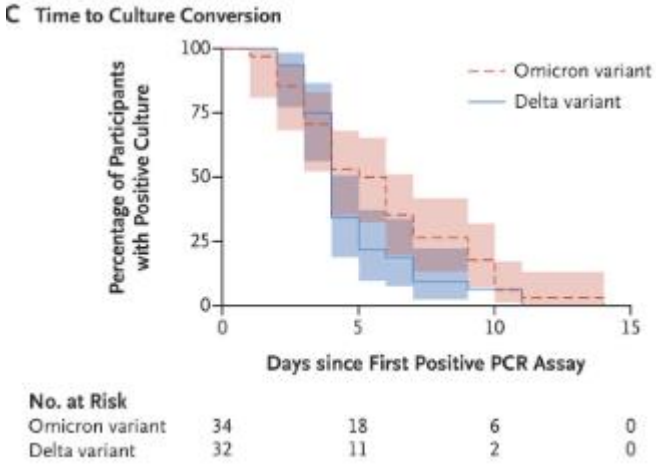


Fig. 1 Success of isolation of SARS-CoV-2 in VeroB4 cells by Cq-values (%). Isolation success correlated negatively with the initial Cq value in the sample ($r = -0.76$; $p < 0.05$). All oropharyngeal samples with an initial viral load lower than Cq 20 in E-gene screening PCR (n = 8), could be grown in vitro (100%). An initial Cq value between 20 and 24.9 led to a 72.7% chance of infection, which decreased to 25% at an initial viral load between 25 and 29.9 and to 7.1% at an initial load between 30 and 34.9. Samples with initial viral loads of Cq 35 or higher could not be isolated in our experiment

Omicron

92. A study analysing differences in the duration of shedding of the Omicron and Delta variants reported that the time to culture conversion was greater for Omicron than Delta

(3). For Omicron, the proportion that are still shedding culturable virus at day 10 was 25%, while for Delta, the proportion was 6%. Culturable virus was not recovered after day 14.



93. A rapid review undertaken by the United Kingdom Health Security Agency (UKHSA) found that of 53 studies measuring time to viral clearance, there were substantial differences in viral clearance times between cases and populations. The majority of studies in the general population estimated viral clearance to take around 7 to 11 days, and most studies of hospitalised, immunodeficient, and other high-risk cases estimated viral clearance to take around 10 to 15 days. Whilst detectable viral load does not provide direct evidence on the risk of transmission, it does indicate potential infectivity.[17]

94. In the same UKHSA rapid review, of the three studies that evaluated when transmission events occurred, an estimated 80-100% of transmission occurred around symptom onset up to 5 days. Testing positive is likely longer than the period when transmission events occur as this is a 'higher bar' than testing positive.

95. Studies that observed when one person infected another during their infectious period are arguably the most valuable, because they observe transmission events which are of interest per se, ie. They do not require proxies for transmission of infection such as live viral load or total viral load. In general, transmission studies, by observing actual transmission events (usually using detailed contact tracing data), they tend to incorporate all the varying factors that are required before one person can transmit to another

96. However, there are weaknesses to transmission studies. For example, it can be unclear when the transmission event occurred in any contact tracing system. However, these studies included only the transmission events from index to secondary cases that could be attributed to the index case, and then estimated the likely transmission date.

97. Transmission studies can be triangulated with laboratory-based studies, such as those used to evaluate the duration of live virus, and total viral load (less relevant for infectiousness but easier to study than transmission or duration of live virus).

98. All together the data suggest:

    a. Transmission is much more likely to occur early on in an infection. In the transmission studies, 80-100% of transmission events occurred between 0-5 days [based on 3 studies]

b. The peak for live viral load occurs about 2 days after infection (median) with a mean of 5 days, given that infectiousness metrics have a 'long tail' (based on 10 studies).

c. The data from the transmission studies are consistent with the laboratory data on the duration of live virus: people are most infectious early in their infection. The duration of test positivity – whether that is RAT, PCR or live viral load -- is longer than the period when transmission events occur as 'achieving' a transmission event is a 'higher bar' than testing positive

The relationship between RATs, PCR Ct and positive cultures

99. The Human Challenge Trial assessed the relationship between infection and culturable virus and reported that the RAT sensitivity for culturable virus exceeded 80%, once a positive PCR test had been obtained. The study also reported that a negative RAT was a reliable indicator of a negative viral culture (4).

100. A study undertaken in unvaccinated individuals prior to the Omicron wave in the United States reported a median [interquartile range] time from COVID-19 symptom onset to first negative test result was 9 [5] days, 13 [6] days, 11 [4] days, and >19 days for S antigen, N antigen, viral culture growth, and viral RNA by RT-PCR, respectively. Beyond two weeks, viral cultures and N antigen titres were rarely positive (5).

101. A systematic review of the performance of Rapid Antigen Tests (RATs) reported that assays shown to meet appropriate criteria, such as WHO's priority target product profiles for COVID-19 diagnostics ('acceptable' sensitivity ≥ 80% and specificity ≥ 97%), can be considered as a replacement for laboratory-based RT-PCR when immediate decisions about patient care must be made, or where RT-PCR cannot be delivered in a timely manner (6). However, this review also states that "Test accuracy studies cannot adequately assess the ability of antigen tests to differentiate those who are infectious and require isolation from those who pose no risk, as there is no reference standard for infectiousness". A review of the performance of 14 RATs reported substantial variability in the limit of detection measured against the Ct value of paired samples, from 26.8 to 34.7. This encompasses the range of results which occur for many individuals over the entire course of an illness. However, the most effective RATs demonstrated a true positive rate compared to paired samples from PCR for values of 99.1% for a Ct value of ≤30 and 90.9% for a Ct value of ≤33 (7).

102. All RATs used in New Zealand have undergone a rigorous assessment to ensure that the test has a sensitivity of at least 80% overall and >90% for CT values <25. RATs are also assessed for usability which has been uniformly high.

103. Similar results have been reported by other studies (3, 8, 9).

The relationship between Culture and Infectiousness

104. The ability to culture virus does not automatically indicate infectiousness. The minimum infectious dose for Omicron, or any other variant is still unknown, but the higher the viral load of intact virus, the greater the risk of infection. The relationship between dose and infection will be sigmoid, with a very low rate of infection at low doses, rising to a very high rate of infection as the dose increases. It has been estimated that a sample with 108 RNA copies per ml, a positive culture rate of approximately 50% will be achieved (10).

105. Therefore, it is clear that not all individuals from whom culturable virus can be obtained will produce enough virus to infect other in the majority of exposure events. Indeed an argument can be made that as the majority of infections are caused by a minority of highly infectious individuals. Two epidemiological parameters often characterise the transmissibility of infectious diseases: the basic reproductive number (R0) and the dispersion parameter (k). R0 describes, on average, how many individuals in a susceptible population will be infected by someone with that disease, and k details the variation in individual infectiousness. The smaller the k value, the greater the variation. That is, fewer cases cause the majority of infections, and a greater proportion of infections tend to be linked to large clusters via superspreading events. (11) During the COVID-19 pandemic, transmission of SARS-CoV-2 has been highly overdispersed, as 60–75% of cases infect no one and, propelled by superspreading events, 10–20% of cases cause 80% of secondary infections (12-14)

106. Modelling studies have reported that the number of super-emitters of SARS-CoV-2 has increased progressively so that for the WT, one in 1,000 infected persons was a super-emitter; for Delta one in 30; and for Omicron one in 20 or one in 10, depending on the viral load estimate used 18 . The infectivity-strengthening mutations N440K, T478K, and N501Y enhance infectiousness. Among them, T478K is one of two RBD mutations in the Delta variant, while N501Y is presented on many prevailing variants (15).

107. The conclusion is that it is not necessary to identify all of the individuals who are infectious to have an impact on the rate of transmission, but to identify those who are superspreaders, who are most likely to have the highest viral load and be RAT positive.

The relationship between culturable virus and symptoms

108. The UKHSA rapid review referred to earlier found:

   a. *"Three studies compared household secondary attack rates (SAR) of asymptomatic and symptomatic index cases, with 2 studies suggesting more transmission from symptomatic than asymptomatic index cases, and one study suggesting no clear difference.*

   b. *Five studies compared viral loads (usually using Ct values) between asymptomatic and symptomatic cases, with 3 studies suggesting similar viral loads, and 2 studies suggesting higher viral loads in symptomatic compared with asymptomatic cases.*

   c. *Overall, the evidence on differences in transmission from people with asymptomatic compared with symptomatic COVID-19 Omicron variant was mixed, with some studies suggesting that symptomatic cases were more likely to transmit infection than asymptomatic."*[19]

Real world studies of test to release

109. Although several countries or States have implemented test to release policies, there is no reliable analysis of the success of these policies. Changes in regulations have often comprised a package of alterations to interventions, which, in addition to the natural variation in case numbers, results in difficulty in ascribing a causal relationship to changes in the duration of isolation.

Modelling studies of test to release

110. Modelling of test to release have been published. Two of the key components of the model include the sensitivity of the RAT test in predicting infectiousness and the distribution of infectious cases over time (3). For a RAT sensitivity of between 0.7 and 0.8 and a model which predicts a 16% risk of infectiousness at day 7, an isolation schedule of at least 7 days would result in 15.8% of released individuals being infectious for a mean excess isolation per person of 76.8 hours. A test to release schedule would reduce the proportion of infectious cases released to 9.2% for no significant change in the mean excess isolation per person of 79.2 hours.

111. A model assessing the ability of two consecutive day negative RATs reported that the number of infectious days in the community can be reduced to almost zero (16). The model was based on data relating viral load to test positivity over time so maybe less dependent on assumptions about test performance at different points in time. Testing was just as efficient if commenced on day 3 or day 5. This model assumed that the infection kinetics for Omicron are similar to those for pre-Omicron variants.

Conclusion

112. The aim of isolation is to decrease the risk of individuals who are infectious, being released from isolation. However, infectiousness is not a binary (yes or no) state and there is ample evidence to support the observations that individuals who are highly infectious, are the primary drivers of community spread. Therefore the identification of infectiousness does not need to be perfect but to identify those who are the most infectious. These individuals are likely to within the cohort identified by a positive RAT and to remain positive until the viral load has substantially reduced. This time will be variable and for the most infectious likely to be more than 7 days. RATs may be unreliable at less than 5 days after infection, and be unnecessary more than 10 days after diagnosis or symptom onset.

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