National COVID-19 Health and Research Advisory Committee

Date of report: 15 June 2020

Reducing length of quarantine by utilising new technologies as they emerge

Focus

The focus of this report is on:

- identifying the current evidence to be used for modelling of options (including through the use of new technologies) to reduce the 14 day quarantine period adopted in Australia to reduce onward transmission of infection
- the limitations of available evidence and data
- the circumstances where a reduction in the length of the quarantine period would be beneficial to reduce the health, social and economic impacts of quarantine on the community and individuals and evidence of risk/benefits
- strategies to mitigate the risks of a reduction in the quarantine period, including through the use of new technologies.

Limitations

The advice in this report is point in time. Because of the paucity of current evidence, modelling based on the Australian quarantine data and on the best available international data is required.

This report was developed by the NCHRAC Quarantine Working Group (see membership at **Attachment 1**).

Conclusions.

NCHRAC conclusion 1: The current 14-day quarantine period in Australia for people who may have been exposed to COVID-19, has been effective in minimising the risk of transmission of the disease and is based on currently available evidence (international epidemiological data and modelling).

Key epidemiological factors for determining the maximum duration of quarantine include the incubation period, infectious period and latent period (see glossary in **Attachment 2**).

The 14-day quarantine period is based on the upper range of the incubation period for SARS-CoV-2, which is estimated to range from 0–14 days (median 5–6 days) and the estimate that 1 in 100 people who are exposed to SARS-CoV-2 will develop disease after the 14-day period. A summary of the evidence for a 14-day quarantine period for people exposed to or potentially exposed to someone with COVID-19 is provided in **Attachment 3**).

The 14-day quarantine period in Australia accords with the World Health Organisation's guidelines[15] and with the quarantine period adopted by other countries for international travellers.

The infectious period of COVID-19 is still being determined. The infectious period of SARS-CoV-2 in symptomatic individuals may begin around 2 days before the onset of symptoms, and persists for about 7–10 days after the onset of symptoms. Active viral replication drops quickly after the first week, and viable virus was not found after the second week of illness despite the persistence of PCR detection of RNA.[1]

The asymptomatic or pre-symptomatic infectious period is also a key factor for determining the quarantine period as any individual who develops symptoms will automatically go into a period of isolation. Robust data are lacking for the infectiousness of asymptomatic and pre-symptomatic individuals and how much asymptomatic infection drives transmission.[1] There are multiple studies suggesting that pre-symptomatic, and possibly asymptomatic, transmission occurs.[2,3]

NCHRAC conclusion 2: Scenarios where a reduction in the length of quarantine could be reduced should be identified following a risk assessment of the broader health, social and economic consequences and of 14 day quarantine on individuals and the Australian community.

Quarantine measures can have negative health, social and economic impacts on the community and individuals. Impacts include the restriction of personal liberties, impacts on mental health and wellbeing, stigmatisation, financial burdens on individuals, businesses and/or governments, implementation expenses, interruption of financial and trade markets.[4] The mental health impacts of quarantine and self-isolation are outlined in the NCHRAC Advice 4.[5] Notwithstanding the overriding principle to protect public health, there are some circumstances where the potential damage of the quarantine requirements outweigh the benefits. Examples of specific scenarios where a reduction in the quarantine period would have important health, social or economic benefits include:

- international students
- tourists (international and domestic) from countries or regions where the transmission rates for SARS-CoV-2 are low
- surge health workforce for Indigenous remote communities
- people from overseas for key workforce areas (e.g. international medical graduates)
- travellers (international and domestic) where 14 hotel quarantine is not appropriate for a range of reasons, such as mental health issues, for people who find quarantine in hotels extremely challenging, or where a traveller is required to provide care for another person
- groups or individuals where there is a high risk of non-compliance with quarantine requirements.

NCHRAC conclusion 3: A case could be made to reduce the length of quarantine in some circumstances using a risk-based approach and a combination of risk mitigation strategies.

NCHRAC Conclusion 4: The risks of shortening the duration of the quarantine period, and mitigation strategies to address these risks, be identified based on international and national literature and modelling.

The principal risk of a reduction in the period of quarantine is that a person released from quarantine is infected with SAR-CoV-2 which results in community transmission of the virus. Strategies to mitigate this risk that should be considered include:

- combination of a mandatory period of strict quarantine (7 days) followed by a mandatory period of monitoring (7 days)
- multiple viral RNA testing of persons in quarantine, with timing of these tests to be based on the outcomes from modelling
- follow-up monitoring such as multiple testing (e.g. viral DNA tests, serological point-of-care tests); enhancing tracing of individuals and contacts (e.g. via technologies such as COVIDSafe app)
- limiting movements and community 'mixing'; wearing a mask; environmental cleaning.

Mitigation strategies should also include approaches to foster motivation to comply with quarantine requirements. The probability of an individual complying with quarantine measures may be correlated with the burden that quarantine posed to that individual (e.g. personal, economic, social). Behavioural and situational factors influencing compliance also include an individual's understanding of the quarantine measures, their level of agreement with the measures imposed and their capacity to comply with those measures. Approaches to foster motivation to comply with quarantine requirements include prior screening to identify vulnerable people, selection of appropriate venues and facilities for quarantine, provision of buddy systems, effective and regular communication, outreach and a proactive and humanistic approach to assertive support from day one of quarantine.

Effective, relatable communication of risks is critical. Communications should be clear, concise, contextualised based on real-life examples (e.g. comparison with risk of being struck by lightning) and include information about the risk of an uncontrolled outbreak as well as individual and family risk.

NCHRAC conclusion 5: Existing and new technologies that have been used on other countries may be considered to support and enable a reduction in the 14-day quarantine period.

Digital epidemiological tools have been combined with traditional methods of managing quarantine measures in some countries (e.g. Taiwan, South Korea, Singapore, China and Israel).[6,7,8,9,10,11,12] Existing and new technologies that may be considered to support and enable a reduction in the 14-day quarantine period, a choice of quarantine in the home rather than in designated accommodation such as a hotel, and tracking of people from entry into Australia to their new location are outlined in **Attachment 4** and include:

- QR Code installed on smartphone to report travel and health history for the last 14 days
- location data (e.g. smartphone)
- digital proximity tracking (e.g. COVIDSafe app)

- smartphone app for entry to business and service venues (e.g. SafeEntry)
- symptom tracking (e.g. biometric bracelets)
- geofencing using GPS-enabled smartphone app
- home quarantine app
- integration of health and immigration and customs data to provide real-time alerts based on travel history and clinical symptoms when a person visits health care services
- nation-wide integrated systems to enable better registration and contact tracing of international travellers (e.g. modifications to the Schengen Information System (SIS II)[13] that may be considered by the European Union).

Implementation of some technologies should be voluntary and informed, and should include addressing issues around access, transparency, and the protection and use of personal data.

NCHRAC conclusion 6: Further modelling is required to quantify the risk in circumstances where the quarantine period is reduced and mitigation strategies are applied and trials in the Australian context should be undertaken.

The residual risks of shortening the duration of the quarantine period can be estimated and modelled, and adjusted for different populations and for individual factors such as:

- population and risk of being infected (pre-test probability); e.g. domestic vs international travellers[14]; emergency responders
- the mitigation strategies applied to determine when an individual can be released from quarantine; e.g. clinical symptoms, testing undertaken such as viral detection (specimen taken, PCR) or antibody detection, noting the performance and timing of such tests in groups with low and high prevalence of COVID-19
- the feasibility and quality of measures applied to mitigate residual risks of people after they are released from quarantine if before the maximum incubation period.

Based on the outcomes from this modelling, it would be possible to determine how potential approaches should be trialled in Australia, noting that such trials might be difficult given the current low number of cases in Australia.

NCHRAC conclusion 7: Data on the monitoring, testing and outcomes for people quarantined in Australia should be assessed to inform specific recommendations about the length of the quarantine period in the Australian context.

Australian data on quarantine from the jurisdictions should be gathered and made available to NCHRAC to assist with the quantification of risk modelling. Data should include, if available:

- number of people entering quarantine
- specific reason for quarantine of each person (including country of origin for travellers)
- number of positive cases during quarantine
- the day(s) during quarantine when testing was performed and the nature of the test

- the day during the quarantine period when symptoms or a positive test were detected
- compliance estimates
- number of people who developed symptoms or tested positive after the 14-day quarantine period
- for cases where people developed symptoms or tested positive after the 14-day quarantine period
  - the time to developing symptoms or testing positive after the 14-day quarantine period
  - number of subsequent contacts who developed symptoms or tested positive
  - the time to detection of subsequent contacts who developed symptoms or tested positive.

NCHRAC conclusion 8: Further research and analysis is required to establish the parameters for acceptable risk and risk-stratification

Further research is required to identify:

- how the risk (%) of people exiting quarantine who have undetected COVID-19 is affected by the ability to trace contacts to stop further transmission and cost (financial, health, social)
- the factors that determine this risk assessment.

NCHRAC conclusion 9: A watching brief should be maintained to evaluate emerging technologies for their usefulness in mitigation of risks associated with a reduction in the quarantine period for specific scenarios.

This watching brief should include ongoing evidence review to assess new data on transmission risk and new mitigation strategies, and ongoing modelling to determine risk and costs of potential mitigation strategies and scenarios that can be linked to an economic model.

Background

Public health measures are necessary to prevent the introduction of the COVID-19 disease to new areas or to reduce human-to-human transmission in areas where the virus that causes COVID-19 (SARS-CoV-2) is already circulating.[15] Such measures include quarantine, which is the restriction of activities of or the separation of persons who are not ill but who may have been exposed to the virus, with the objective of monitoring their symptoms and ensuring the early detection of cases.[15] A person who experiences symptoms or tests positive during quarantine then begins a period of isolation, and anyone who was a close contact within the place of quarantine must then enter into quarantine.

Quarantine is different from isolation, which is the separation of ill or infected persons from others to prevent the spread of infection or contamination.[15]

From 28 March 2020, only Australian citizens, residents and immediate family members were permitted to travel to Australia. All incoming travellers entering Australia were

quarantined for 14 days at their port of arrival in a designated hotel or accommodation as determined by state and territory governments. Exemptions were granted for specific groups (including non-cruise maritime crew, aviation crew, unaccompanied minors, transit passengers, compassionate or medical grounds and diplomats) provided they adhere to specified mitigation strategies.[16]

A quarantine period of 14 days also currently applies for people who:

- have been in contact with someone who has confirmed or is likely to have COVID-19
- are entering certain remote areas in Queensland, South Australia, Western Australia and Northern Territory (unless exempt)
- are entering a state that has a required quarantine period.[17,18,19]

As at 15 June 2020, the current situation in Australia[20] indicates the success of the public health measures, including quarantine:

- total cases 7,320
- total cases received: 6,838
- total deaths: 102.

Depending on the situation, quarantine may be at a person's place of residence, a hotel, or Government provided accommodation and/or health facility.

Monitoring and testing regimes during quarantine varies between jurisdictions. The states and territories also have different quarantine restrictions for interstate travellers entering the jurisdiction.[17] As at 1 June 2020, Northern Territory, Queensland, South Australia, Tasmania and Western Australia require 14-day quarantine under certain conditions. A person entering Australia from overseas and travelling within Australia following the 14-day mandatory quarantine period may be subject to a second 14-day quarantine period if travelling to a state or territory with quarantine arrangements in place for interstate travel.

Attachments

Attachment 1: NCHRAC Quarantine Working Group

Attachment 2: Glossary

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Attachment 1

Australian Government
National Health and Medical Research Council

NHMRC

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Attachment 2

Australian Government
National Health and Medical Research Council

NHMRC

Glossary

Term	Meaning as applies to the advice provided by the NCHRAC
COVID-19	The coronavirus disease caused by the virus SARS-CoV-2.[1]
Incubation period	Time from exposure to symptom onset in an individual.[2]
Infectious period	The period of time that an individual with disease can spread the disease to others encompassing both a pre-symptomatic infectious period and the symptomatic infectious period.[2]
Latent period	Time from infection to the onset of being infectious in an individual.[2]
Pre-symptomatic	People who have no symptoms when testing positive for COVID-19, but later develop symptoms.[2]
Quarantine	The restriction of activities of, or the separation of, persons who are not ill but who may have been exposed to an infectious agent or disease, with the objective of monitoring their symptoms and ensuring the early detection of cases.[3]
Isolation	The separation of ill or infected persons from others to prevent the spread of infection or contamination. [3]
SARS-CoV-2	Severe acute respiratory symptom coronavirus 2. The formal name of the coronavirus that causes COVID-19.[4]
Contact tracing	The process of identifying, assessing, and managing people who have been exposed to a disease to prevent onward transmission.[5]
Proximity tracking	Measures signal strength to determine whether two devices (e.g. smartphones) were close enough together for their users to spread the virus from an infected individual to an uninfected person. Proximity tracking is a new technique for aiding contact tracing.[5]

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