



**Health
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An tÚdarás Um Fhaisnéis
agus Cáilíocht Sláinte

Advice to the National Public Health Emergency Team: Potential impact of different testing scenarios to reduce the duration of restriction of movement for close contacts of a COVID-19 case

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About the Health Information and Quality Authority

The Health Information and Quality Authority (HIQA) is an independent statutory authority established to promote safety and quality in the provision of health and social care services for the benefit of the health and welfare of the public.

HIQA's mandate to date extends across a wide range of public, private and voluntary sector services. Reporting to the Minister for Health and engaging with the Minister for Children and Youth Affairs, HIQA has responsibility for the following:

- **Setting standards for health and social care services** — Developing person-centred standards and guidance, based on evidence and international best practice, for health and social care services in Ireland.
- **Regulating social care services** — The Chief Inspector within HIQA is responsible for registering and inspecting residential services for older people and people with a disability, and children's special care units.
- **Regulating health services** — Regulating medical exposure to ionising radiation.
- **Monitoring services** — Monitoring the safety and quality of health services and children's social services, and investigating as necessary serious concerns about the health and welfare of people who use these services.
- **Health technology assessment** — Evaluating the clinical and cost-effectiveness of health programmes, policies, medicines, medical equipment, diagnostic and surgical techniques, health promotion and protection activities, and providing advice to enable the best use of resources and the best outcomes for people who use our health service.
- **Health information** — Advising on the efficient and secure collection and sharing of health information, setting standards, evaluating information resources and publishing information on the delivery and performance of Ireland's health and social care services.
- **National Care Experience Programme** — Carrying out national service-user experience surveys across a range of health services, in conjunction with the Department of Health and the HSE.

Foreword

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a highly infectious virus which has caused tens of millions of cases of COVID-19 since its emergence in 2019, with a considerable level of associated mortality. In the context of the ongoing COVID-19 pandemic, SARS-CoV-2 constitutes a significant public health concern due to its high basic reproduction rate, the absence of immunity in the human population, and the current lack of an effective vaccination or treatment approaches.

The National Public Health Emergency Team (NPHE) oversees and provides national direction, guidance, support and expert advice on the development and implementation of strategies to contain COVID-19 in Ireland. Since March 2020, HIQA's COVID-19 Evidence Synthesis Team has provided research evidence to support the work of NPHE and associated groups and inform the development of national public health guidance. The COVID-19 Evidence Synthesis Team which is drawn from the Health Technology Assessment Directorate in HIQA, conducts evidence synthesis incorporating the scientific literature, international public health recommendations, and existing data sources as appropriate.

From September 2020, as part of the move towards a sustainable response to the public health emergency, HIQA provides evidence based advice in response to requests from NPHE. The advice provided to NPHE is informed by research evidence developed by HIQA's COVID-19 Evidence Synthesis Team and with expert input from HIQA's COVID-19 Expert Advisory Group (EAG). Topics for consideration are outlined and prioritised by NPHE. This process helps to ensure rapid access to the best available evidence relevant to the SARS-CoV-2 outbreak to inform decision-making at each stage of the pandemic.

The purpose of this report is to outline the advice provided to NPHE by HIQA regarding the potential impact of different testing scenarios to reduce the duration of restriction of movement for close contacts of a COVID-19 case. It takes consideration of a modelling exercise, international recommendations and input from the COVID-19 EAG.

HIQA would like to thank its COVID-19 Evidence Synthesis Team, the members of the COVID-19 EAG and all who contributed to the preparation of this report.

A handwritten signature in black ink, appearing to be 'M. G.', is located at the bottom left of the page.

Dr Máirín Ryan

Deputy CEO & Director of Health Technology Assessment

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Members of HIQA's Evidence Synthesis Team:

Susan Ahern, Natasha Broderick, Paula Byrne, Karen Cardwell, Paul Carty, Barbara Clyne, Laura Comber, Christopher Fawsitt, Patricia Harrington, Karen Jordan, Michael McCarthy, Kirsty O'Brien, Eamon O'Murchu, Michelle O'Neill, Sinead O'Neill, Máirín Ryan, Debra Spillane, Susan Spillane, Conor Teljeur, Barrie Tyner, Kieran Walsh.

The advice is developed by the HIQA Evidence Synthesis Team with support from the Expert Advisory Group. Not all members of the Expert Advisory Group and Evidence Synthesis Team are involved in the response to each research question. The findings set out in the advice represent the interpretation by HIQA of the available evidence and do not necessarily reflect the opinion of all members of the Expert Advisory Group.

Conflicts of Interest

None declared.

Advice to the National Public Health Advisory Team

The purpose of this evidence synthesis is to provide advice to the National Public Health Emergency Team (NPHE) on the following policy question:

"Is there a rationale upon which to reduce the current period of restricted movement for close contacts from 14 days? If so, how will any change in guidance intersect with the current testing protocol (that is, a PCR test on day zero and a PCR test on day seven)?"

The response to the policy question is informed by an evidence synthesis considering three elements:

1. a modelling exercise to estimate the residual risk of transmission associated with different testing scenarios that aim to shorten the duration of restriction of movements for close contacts of a COVID-19 case. The difference between scenarios was expressed in terms of four key outcomes, the estimated number of:
 - a. person-days in restricted movements
 - b. infectious person-days in the community
 - c. additional direct infections potentially arising within the community
 - d. number of tests that must be performed.
2. an update of a HIQA review of international recommendations for restriction of movements for individuals exposed, or potentially exposed, to SARS-CoV-2
3. input from the COVID-19 Expert Advisory Group.

The key points of this evidence synthesis, which informed HIQA's advice, are as follows:

- The impact of the SARS-CoV-2 virus is reflected in the continued growth of COVID-19 cases and associated mortality worldwide. Public health interventions aim to minimise the burden of COVID-19 by reducing the spread of SARS-CoV-2. Important interventions that may be associated with specific durations of time include 'restriction of movements' and 'self-isolation'.
 - 'Restriction of movements' (or quarantine) is defined as separating and restricting the movements of people who were exposed or potentially exposed to COVID-19. This is performed as a precautionary measure to prevent onward transmission should exposed individuals later become diagnosed.

- 'Self-isolation' (or isolation) is defined as separating those with symptoms of, or diagnosed with COVID-19, from people who are not infected, to prevent transmission to others while they are infectious.
- Currently in Ireland, the recommended duration of restricted movements is 14 days for individuals identified as close contacts of a COVID-19 case. Testing of close contacts (first test – 'Day Zero', day of identification; second test – 'Day Seven', seven days since last exposure) is for the purpose of contact tracing. Receipt of a negative test (that is virus 'not detected') does not impact the recommended duration of restricted movements.
- A report published by the European Centre for Disease Control and Prevention (ECDC) 24 September 2020 proposed that an individual may discontinue restriction of movements if a polymerase chain reaction (PCR) test taken on day 10 following exposure returns a virus 'not detected' result. The cited evidence underpinning this recommendation was based on an upper bound estimate of the incubation period of 12 days and detectability of the virus 1-3 days prior to symptom onset (that is, 12 days minus two days resulting in a day 10 recommendation). However, the ECDC highlighted that the residual risk of onward infection associated with a reduced duration may not be acceptable in certain contexts.
- HIQA advised NPHE on 30 September 2020 that, in the context of no change to the current testing strategy, the 14-day period of restriction of movements for individuals exposed to SARS-CoV-2 should be retained. This advice was informed by research evidence on the incubation period of SARS-CoV-2, international guidance, and input from the COVID-19 Expert Advisory Group.

Modelling potential impact

- A modelling exercise was undertaken to estimate the potential impact of a number of different testing scenarios in reducing the current duration of restricted movements from 14 days. Real-time reverse transcription PCR (rRT-PCR) based testing is the current standard practice in Ireland. However, rapid antigen detection tests (RADTs) may offer benefits over rRT-PCR based tests contingent on their meeting minimum performance criteria in clinical validation studies. Modelled scenarios therefore considered both testing options; however at present, those involving RADTs are purely hypothetical.
 - All scenarios use the terminology currently adopted by the HSE Test and Trace System:

- 'Day Zero' test: day of identification; this does not reflect time since exposure. Contacts are tested as soon as possible, preferably on the same day of identification for the purpose of source control.
 - 'Day Seven' test – seven days following last exposure to the case; it does not imply seven days after the first test
 - 'Day 10' test – ten days following last exposure to the case.
- Modelled scenarios included the use of different combinations of either an rRT-PCR based test or a RADT as a first test (currently 'Day Zero') and as a second test, with variation in timing of the second test ('Day Seven' or 'Day 10'), with end of restriction of movements on receipt of a 'not detected' test result from this second test.
 - Parameter estimates for the model were gathered from the recent literature, previous HIQA evidence summaries, and Irish data sources. The outcomes of interest from the model included estimates of potential benefits (reduced person-days in restricted movements), potential risks (increased infectious person-days in the community), and organisational implications (number of tests conducted).
 - On balance, relative to the current standard practice in Ireland, estimates from scenarios which included a condition of ending the period of restricted movements on receipt of a 'not detected' test result from 'Day 10' were considered to present the largest incremental benefit (in terms of reduced person-days in restricted movements) relative to the smallest incremental risk (in terms of infectious person-days in the community). For example, for a 1,000 close contacts, the use RT-PCR tests on 'Day Zero' and 'Day 10' with release on receipt of a 'not detected' result was associated with a reduction of 1,690 (95% CI: -2,340 to -929) person-days in restricted movement with an increase of two (95% CI: -12 to 11) infectious person-days in the community.
 - Scenarios which involved an end of restricted movements on receipt of a 'Day Seven' 'not detected' result were noted to have larger benefits, but a considerably higher risk overall. For example, for a 1,000 close contacts, the use RT-PCR tests on 'Day Zero' and 'Day seven' with release on receipt of a 'not detected' result was associated with a reduction of 2,512 (95% CI: -3,362 to -1690) person-days in restricted movement with an increase of 38 (95% CI: 21 to 59) infectious person-days in the community.

- The choice of test (rRT-PCR or RADT) further influenced results with an end of restricted movements on receipt of a 'Day 10' RADT possessing larger benefit (in terms of reduced person-days in restricted movement), but a marked additional risk (in terms of infectious person-days in the community), relative to ending on receipt of a 'Day 10' RT-PCR based test. These findings are due to the assumed earlier reporting of results with RADTs (immediate versus a median delay of two days for rRT-PCR) and the lower sensitivity of RADTs (higher risk of false negative results) relative to rRT-PCR.
- Scenarios that adopt a 'Day 10' test in lieu of the current 'Day Seven' test are associated with an increase in the total number of tests conducted (approximately 55 tests per 1,000 close contacts). This increase is due a higher proportion of individuals eligible for a second test because of the longer interval between it and the 'Day Zero' test.
- The model did not assess the impact of a change in testing scenario on the current Test and Trace processes in Ireland. Should close contacts of an index case test positive, in turn, their close contacts must be identified and tested. The use of a 'Day 10' test as opposed to a 'Day Seven' test could delay this process and potentially have negative implications for contact tracing. However, as the close contact should already be restricting their movements, the influence of this longer interval between tests may not be significant. Furthermore, estimates included within the model reflect the pandemic to date. There has recently been a change in the demographic profiles of infected individuals with a trend towards younger cases which could impact the overall estimates provided.
- Overall, the estimates presented from the model suggest that the use of RT-PCR tests on 'Day Zero' and 'Day 10' with end of restricted movements on receipt of a 'not detected' result from the second test would present the largest incremental benefit and lowest incremental risk relative to current standard practice in Ireland.
- A decision as to what constitutes an acceptable level of risk relative to current practice is a policy matter that must take account of the current and future disease trajectory as well as the impact that any change would have on the Test and Trace processes in Ireland.

International public health recommendations

- A review of international public health recommendations, from a predefined list of 22 countries and four agencies, regarding restriction of movements

(quarantine) was undertaken. The recommendations reported are limited to those pertaining to close contacts of confirmed or suspected COVID-19 cases; the issue of potential travel-related exposure is not considered. While subject to ongoing review and updates, recommendations listed here were current at the time of writing:

- The World Health Organization (WHO), US Centres for Disease Control and Prevention (CDC) and multiple countries recommend restriction of movements for 14 days.
- The recommended duration of restriction of movements is 10 days in Austria, Norway, Spain, Switzerland and the Netherlands.
- With the exception of Belgium and Iceland, none of the countries and organisations reviewed recommend reducing the duration of restriction of movements on the basis of negative (virus not detected) test results. Moreover, Australia, Austria, England and Northern Ireland state that receipt of a negative test does not reduce restriction of movements.
 - Belgium specifies that asymptomatic close contacts should be tested (PCR) five days following last exposure to the infected person. If the virus is not detected, quarantine (that is, restricted movements) may be ended after day seven. A 10-day quarantine (that is, restricted movements) continues to apply to those who do not attend for testing.
 - Iceland specify that restriction of movements can be shortened for asymptomatic individuals by undergoing a polymerase chain reaction (PCR) test seven days following last exposure to the infected individual. If the virus is not detected, restriction of movements can stop.

COVID-19 Expert Advisory Group

- A meeting of the COVID-19 Expert Advisory Group (EAG) was convened for clinical and technical interpretation of the evidence provided.
 - Based on the evidence presented, the COVID-19 EAG reasoned that, should a change to the current strategy be implemented, at a population-level the use of 'Day Zero' and 'Day 10' rRT-PCR tests may offer the most balanced alternative to the current testing regimen in terms of benefit and risk.

- The COVID-19 EAG identified additional factors which should be considered to inform both this policy question and potential further research and policy questions. These included:
 - the residual risk of infection due to an end of restricted movements based on receipt of a rRT-PCR 'not detected' test result from 'Day 10' may not be acceptable in certain circumstances such as in long term care facilities or other high-risk congregated settings, or for those caring for vulnerable populations.
 - for healthcare workers, where a shorter duration of restricted movements based on a 'not detected' test would result in a faster return to work, decisions may need to be considered at a local level taking account of public health and occupational health guidance and a risk assessment regarding the setting in which the individual is deployed.
 - the issue of adherence both to the duration of restricted movements and to testing was noted to be poorly understood at present, both internationally and within the Irish context; research into factors influencing adherence and methods to improve overall adherence is needed.
 - adherence to the second test in the current testing regimen was noted to be low. This may be due to the current requirement for a combined nasopharyngeal and oropharyngeal specimen. While recognised as being less sensitive, consideration should be given to use of less invasive sampling techniques, which may be associated with better adherence. In particular, consideration should be given to extending the use of deep nasal or mid-turbinate specimens beyond paediatric populations. The incentive of a shorter duration of restricted movements based on testing may also improve overall adherence.
 - clear communication is needed when considering any change to the current regimen. In particular, it was highlighted that communication of the rationale for the 'Day Zero' test (to inform contact tracing) is clearly differentiated from that for the second test (identification of infection for the individual in question). There was deep concern expressed in relation to perceived poor adherence to public health guidance arising from a possible lack of understanding of the purpose of different tests and the implications

of their findings. Irrespective of the strategy adopted, there is a need for a clear communication campaign that clarifies the rationale and implications of first and second tests and the importance of adherence to all aspects of COVID-19 public health guidance.

- relative to current practice, a reduction in the duration of restricted movements based on a 'not detected' test result would lead to an increased residual risk of infection and onward transmission. Therefore, if adopted, it should be accompanied by additional public health guidance including the requirement for ongoing physical distancing (and additional precautions in terms of contact with vulnerable populations), hand hygiene, and respiratory etiquette.
- to date, the diagnostic accuracy of identified RADTs in laboratory studies was noted to fall below the minimum acceptable performance parameters. As implementation of RADTs will require satisfactory completion of clinical validation studies, they currently do not represent a viable alternative to rRT-PCR tests.
- any planned change to the current regimen should take consideration of potential capacity constraints at each step of the Test and Trace process (including: referral; requirement for transportation to the testing hub, where appropriate; sample taking; and laboratory processing).

Advice

Arising from the findings above, HIQA's advice to the National Public Health Emergency Team is as follows:

- Should a change to the current strategy be implemented, of the options assessed, at a population level, the use of 'Day Zero' and 'Day 10' RT-PCR tests with the end of restricted movements on receipt of a 'not detected' result from the 'Day 10' test, would present the largest incremental benefit (in terms of reduced person-days in restricted movements) and lowest incremental risk (in terms of infectious person-days in the community) relative to current standard practice in Ireland.
 - Per 1,000 close contacts, this scenario infers a reduction of 1,690 (95% CI -2,340 to -929) person-days in restricted movement with an

increase of two (95% CI -12 to 11) infectious person-days in the community.

- In Ireland for the week of the 14 to 20 October there were 8,097 cases. Assuming an average of six close contacts per case, this would equate to a reduction of approximately 82,100 person-days in restricted movement and an increase of 97 infectious person-days in the community.
- Scenarios involving an end of restricted movements on receipt of a 'not detected' result from a 'Day Seven' RT-PCR test are associated with greater benefit, but with a marked increase in risk.
 - Per 1,000 close contacts, this scenario presents a reduction of 2,512 (95% CI -3,362 to -1690) person-days in restricted movement with an increase of 38 (95% CI 21 to 59) infectious person-days in the community.
 - In Ireland for the week of the 14 to 20 October there were 8,097 cases. Assuming an average of six close contacts per case, this would equate to a reduction of approximately 121,832 person-days in restricted movement and an increase of 1,846 infectious person-days in the community.
- Scenarios that adopt a 'Day 10' test in lieu of the current 'Day Seven' test are associated with an increase in the total number of tests conducted (approximately 55 tests per 1,000 close contacts). This increase is due a higher proportion of individuals eligible for a second test because of the longer interval between it and the 'Day Zero' test.
- Consideration should be given to what constitutes an acceptable level of risk relative to current practice in the context of the current and future disease trajectory, possible broader public and mental health considerations, and the capacity to resource essential services. Additionally, the impact that any change would have on the current Test and Trace processes in Ireland should be taken into account.
- When considering a reduction in duration of restricted movements based on testing, attention needs to be paid to the impact on certain groups such as vulnerable individuals or those in high-risk settings, in which the associated residual risk of onward infection may not be acceptable.

- These is an urgent need for a communication strategy that clarifies the rationale for the first and second tests, the implications of a 'not detected' first test result, and the importance of ongoing adherence to all aspects of COVID-19 public health guidance.
- Should a change in the current strategy be implemented, the duration of restricted movements would be contingent on completion of all testing requirements. That is, should an individual not present for testing, then they should continue to restrict their movements for the full 14-day duration.

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