Final report summary

COVID-19 and National Immunisation Programme research

Submitted by
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Project title
PROP-060 The role of digital contact tracing to support improved pandemic responses

Section 1   Contact information

1.1   Point of Contact for this report

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Section 2　Reporting

2.1　Overview

Contact tracing is a key public health response to control infectious diseases, including SARS-CoV-2 (that causes COVID-19). In Aotearoa New Zealand (AoNZ), COVID-19 required transformational change of the contact tracing system, including the introduction of digital contact tracing (DCT) tools. These DCT tools included: 1) the New Zealand Covid Tracer App (NZCTA) with QR-code location; 2) an associated Bluetooth proximity feature; and 3) an online self-service DCT survey. The primary aim of the current project was to evaluate the public and contact tracer uptake of these DCT tools.

AoNZ had one of the highest rates of voluntary public adoption of a DCT app in the published literature (>60% compared to <30% which is more typical).[1,2] However, contact tracers rarely provided cases with the opportunity to upload their data. Consequently, the effective participating population was estimated at <1% until responsibility for contact tracing shifted from Public Health Units (PHU) to the National Case Investigation Service (NCIS). PHU contact tracers (clinically trained individuals guided by recommendations from the Ministry of Health (MoH)) had a clear preference for the QR-code location system (18.7% of cases provided opportunity to upload their data) over the Bluetooth system (1.3% of cases). In contrast, NCIS staff (generally non-clinically trained individuals in a call centre following a script) provided 45.5% (QR-code location) and 31.4% (Bluetooth) of cases the opportunity to upload their data. The NCIS data suggests there was potentially higher uptake of the QR-code location system than the Bluetooth feature by the public. The positive predictive value of the QR-code system was estimated at <0.1%, while the Bluetooth system was likely in line with international estimates of ~30-50%. It was not possible to estimate the sensitivity of the two systems. The primary driver of inequities in the uptake of DCT data by ethnicity was contact tracing organisation allocation, with contact tracers at PHUs being more likely to manage Māori and Pacific cases than NCIS but less likely to ask them about QR-code or Bluetooth data.

In total, 66% of eligible cases completed the self-service DCT survey. The median survey completion time was 1.8 (IQR 0.2, 17.2) hours, while 95% of all cases completed this survey within 48 hours of case identification. Around 13% of all survey completers also uploaded their Bluetooth data, which resulted in an average of 663 cases per day notifying 4.5 contacts per case. If the Bluetooth upload rate matched the NCIS rate (e.g. 31%), the number of cases handled by the Bluetooth self-service system would have increased to ~1200 cases per day with ~4.5 contacts per case, within 48 hours, with at least half of these (~600 cases) being completed within two hours.

Qualitative focus groups with contact tracers (total n=19) revealed varied perspectives on NZCTA's effectiveness, particularly the Bluetooth system. MoH staff expressed frustration over limited Bluetooth usage by PHU contact tracers who generally perceived it to be minimally useful. In qualitative interviews and focus groups with priority communities (total n=34), participants expressed a willingness to use the NZCTA, but discussed adoption barriers including trust, accessibility, and usability issues.

The NZCTA was developed under emergency conditions, but the key philosophical basis was the Western (and individual or personal) concepts of privacy rather than considering Māori/Indigenous (and collective) principles. A Māori Data Governance (MDG) Audit tool was developed to assess NZCTA alignment with MDG principles. The items that were not met in this assessment fall into three broad categories: technical (storage), standards (use of Māori/Indigenous developed data standards), and systemic issues. Systemic issues are more often resolved when Māori are included in the design and implementation of interventions.

Appended to this report are the draft or submitted manuscripts outlining the key results from this work. These include manuscripts on: 1) the QR-code location function of NZCTA; 2) the Bluetooth function of NZCTA; 3) the self-service DCT system; 4) a Māori Data Governance audit of the NZCTA; 5) qualitative perspectives on NZCTA from health officials and priority groups; 6) qualitative insights into barriers to adoption of NZCTA from priority groups.

This study received ethics approval from the University of Otago Ethics Committee (applications HD22/080; HD20/010).

2.2 What is the problem or issue that your research investigated?

During the COVID-19 pandemic, traditional contact tracing could be effective when used as a part of a package of non-pharmaceutical interventions (NPI) such as stay at home orders (lockdowns), mask wearing, gathering restrictions, testing and travel restrictions at different stages.[3] In particular, contact tracing was very effective at the start of an outbreak, when case numbers were low and the marginal cost of every missed case was high (e.g. to sustain an elimination strategy).[4,5] However, as case numbers increased and virus characteristics changed (e.g. increased transmissibility and shorter incubation times) the limitations of manual contact tracing became clearer. For example, in several multi-country analyses, contact tracing was not statistically associated with a decrease in adverse health outcomes at a population-level, when accounting for other NPI.[6-9] The main analysis of the manual contact tracing system in AoNZ comes from an investigation of the August 2020 outbreak (cases = 179).[10] The results showed that only 31% of contacts were being notified within 48 hours, while being contacted within four days was more likely for Other (82%), New Zealand European(61%) and Māori (58%) compared to Pacific Peoples (31%). The proportion of days the manual system met its performance metric of contacting 80% of close contacts within 48 hours was 67% pre-Delta and 49% during the Delta wave.

There have been assessments of the effectiveness of national DCT technologies in many countries with varying results.[11-17] For example, one evaluation in England and Wales estimated the app alone averted 1 million cases (sensitivity analysis 450,000-1,400,000), 44,000 hospitalisations and 9,600 deaths in its first year.[14] In contrast, over a six-month period, it was estimated Australia's COVIDSafe app only contributed a <0.1% increase in the identification of previously unidentified clinically-relevant close contacts.[12] However, limited research has focused on public health sector adoption of these tools internationally,[1] which is a strong determinant of the potential efficacy of these tools. Thus, our primary research aim was to assess the nature and extent of the population and contact tracer uptake of DCT tools throughout the pandemic.

2.3 What are the practical solutions and implementation options that you recommend?

1. DCT tools should be considered in the context of the infectious disease strategy and the characteristics of the disease.[18] DCT tools may be particularly useful where the cost of each false positive contact notification is marginal (e.g. the community is already in lockdown) or the cost of each missed case is large (e.g. while maintaining an elimination strategy) or the manual system has reached capacity. Further, certain DCT tools may be useful for diseases where traditional contact tracing has not been practical (e.g. influenza, with shorter incubation times) as evidenced by the self-service survey response times.

2. Development and implementation of DCT tools needs to more effectively work with priority communities (Māori, Pacific, Disability). Greater collaboration with priority communities would improve alignment with MDG principles, uphold Te Tiriti o Waitangi and improve accessibility and participation in DCT tools. Future work should carry out a MDG assessment at the same time as the Privacy Impact Assessment. Such assessments should become standard practice.

4. Any future use of DCT tools requires high buy-in from contact tracers. Failure to convince contact tracers of the utility of DCT substantially reduced any potential impact of NZCTA. Buy-in could be improved from greater engagement in the development and implementation of DCT tools. In addition, mandated standard operating procedures (SOP) should be considered. NCIS compliance rates demonstrate the effectiveness of a SOP which is strictly followed.

5. Future DCT tools should be implemented with as few manual processes as possible. The introduction of manual steps, particularly with the QR-code system, increased: 1) workloads for contact tracers; 2) likelihood of data being under-utilised; and 3) delays in notifying contacts. For example, the median time to notify a contact after a location was uploaded to NCTS was 23.8 (IQR 16.8-42.7) hours. In comparison, the median time for self-service survey completion was 1.8 (IQR 0.2, 17.2).

6. DCT tools need to be developed and successfully used for managing selected current infectious diseases during non-pandemic periods so that the systems and technology can be scaled-up when needed. Tracing and managing contacts is a feature of managing a range of current IDs, including meningococcal and group A streptococcal infections and STIs (though there are major sensitivities that might not support their use here without considerable development).[19] DCT tools could also be tested using planned pandemic exercises.

Section 3   References

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