

Unite against COVID-19

PHU Contact Tracing “Deep Dive”

Public Health South – Rapid Report

4 May 2020



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1. BACKGROUND AND INTRODUCTION

1.1. COVID-19 and Contact Tracing

- Contact tracing is one of the most critical components of New Zealand’s response to the COVID-19 pandemic, alongside testing and public health risk communication.
- Contact tracing is the process of identifying individuals who have been in contact with a confirmed or probable case of COVID-19, communicating with them and directing them to self-quarantine for a period of 14 days from their last date of exposure to the case. It also involves the appropriate follow-up of contacts who may become symptomatic and require testing. Linking these cases together is key to undertaking cluster management.
- Public Health Units (PHUs) undertake contact tracing as part of their core business to manage communicable diseases. In light of the significant increase in contact tracing workload caused by the COVID-19 pandemic, the Ministry of Health (the Ministry) set up the National Close Contact Service (NCCS) on 24 March 2020 to provide surge capacity for PHUs.
- The effectiveness of New Zealand’s pandemic response is therefore reliant on the ability of PHUs to conduct rapid and comprehensive close and casual contact tracing. This includes their ability to make use of the NCCS when appropriate.

1.2. Scope

- The Ministry contracted *Allen + Clarke* to provide assurance through an independent assessment of how well PHUs are positioned for successful rapid contact tracing and to review the operating models used in different PHUs to determine national consistency.
- The review is driven by:
 - the identification of issues associated with the transfer of information in both directions between PHUs and the NCCS;
 - the inability of the Ministry to obtain a consistent national picture with key performance indicators of the contact tracing being conducted;
 - the inconsistent reporting from PHUs with regards to confirmed or probable cases and their management;
 - the continued difficulty by PHUs and the NCCS in finding some contacts; and
 - the need to identify how an equity lens is applied over the contact tracing process.
- The Ministry identified three PHUs for “deep dive” reviews that represent diversity in population characteristics and have dealt with a cluster of cases:
 - Auckland Regional Public Health Service (ARPHS), which covers a large urban area;
 - Public Health South (PHS), which covers a large rural and remote area; and
 - Hawke’s Bay District Health Board (HBDHB), which has a high percentage of Māori residents.

1.3. Approach

- *Allen + Clarke's* approach is guided by assurance review and audit processes. Through engagement with each of the PHUs, we sought to identify links from policy to practice and outcomes through document review and stakeholder interview.
- The review involved a blended team from *Allen + Clarke* and the Ministry (the review team), who visited each of the PHUs during the week of 20 April 2020. Visits, each lasting approximately eight hours in total, were undertaken to:
 - Public Health South on 21 April 2020;
 - Auckland Regional Public Health Service on 22 and 23 April 2020; and
 - Hawke's Bay District Health Board on 24 April 2020.
- While the approach aims to ensure "line of sight" from evidence to practice, the approach is also guided by the rapid nature and continued complex operational response environment in which this review is taking place.

1.4. Report

- The information collected during the review is presented in a series of three PHU-specific "Rapid Reports", together with a summative "Rapid Report" presenting findings across the PHUs and including recommendations.
- This "Rapid Report" presents the findings of the Public Health South review.

2. OPERATING MODEL

2.1. Overview

- Public Health South's (PHS) COVID-19 response is part of the Southern District Health Board's (SDHB) emergency management protocols set out in the *Southern DHB Health Emergency Management Plan*.
- Although there were no recorded cases in the region at the time, the SDHB established the Emerging Infectious Diseases Coordinating Committee (EIDCC) in late January 2020, when it commenced meeting daily, monitoring the COVID-19 local and global situation.
- The EIDCC was established to carry out readiness development of the health sector within the district and coordinate the COVID-19 response for the whole of the DHB/health system. This included liaising with the Ministry, and the World Health Organization via the Ministry, to provide SDHB staff, primary care and the community with up-to-date information regularly.
- In parallel, an Emerging Infectious Disease Technical Advisory Group (TAG) was set up to assist the EIDCC in carrying out readiness response through the provision of technical expertise and advice. The TAG works through operational risk, needs and challenges.
- As the COVID-19 pandemic evolved, different trigger points also saw the stand-up of the Emergency Coordination Centre (ECC). The COVID-19 ECC was established at Wakari Hospital (Dunedin) and it acts as a link between National Health Coordination Centre (NHCC), civil defence, emergency services and health agencies, and is the point of contact for other regions' ECCs around the country. It has a district-wide, strategic function that goes beyond the normal business as usual responsibilities of the SDHB.
- PHS also established an Emergency Operations Centre (EOC) for the COVID-19 emergency.
- PHS is using a distributed operating model. That is, it has staff operating both centrally from within Wakari Hospital, and in distributed locations across the region, as well as staff operating remotely from home throughout the region. Working remotely generally worked well and was seen as desirable as a way of preventing cross-infection within teams should a contact tracer develop COVID-19. However, there were difficulties accessing the DHB computer system for some workers, which saw a degree of emailing spreadsheets back and forth.
- During the early phases of the pandemic, PHS resources (notably Health Protection Officers [HPOs]) were deployed to the airports (2) to support the border response. When the borders were closed, this valuable resource was able to be recalled and redeployed to contact tracing and other important COVID-19 related work. Concern was expressed that it may be better to have other staff deployed to the border if required in the future, particularly if time-demanding exit screening was required.
- The PHS operating model has evolved to respond to the nature of the pandemic. Initially, PHS leveraged existing communicable disease protocols previously deployed in events like the recent (2019) measles outbreak. The operating protocols subsequently evolved to reflect the learnings available from other PHUs with early experiences of COVID-19

cases, PHS's own research and experiences, and guidance provided and published by the Ministry.

- As at 21 April 2020, when the review team met with PHS staff, the emergency management structures as described above were operational.

2.2. Approach to Equity

- PHS did not develop additional formal responses or approaches into its COVID-19 operating model to address cultural and equity issues. Instead, it leveraged its existing cultural arrangements and protocols, and trusted management and staff to act in accordance with those protocols and exercise sound judgement.
- Where there are welfare or cultural issues, PHS has developed an escalation protocol. If welfare needs are identified, this is escalated through to the ECC psychosocial support team or the appropriate responsible function within PHS or the DHB.
- During the pandemic, PHS has dealt with non-English speaking contingents. In these instances, interpreter services were utilised to enable effective communications.
- PHS has established connections with Civil Defence Emergency Management (CDEM) to enable relocation of cases or close contacts and provide access to alternative accommodation.
- PHS also confirmed instances of dealing with members of the Māori community, where existing awareness of cultural issues, identities and local Māori communities enabled matters to be navigated with appropriate levels of cultural sensitivity.
- PHS has introduced case monitoring protocols for when cases are identified as 'vulnerable'. That is, where the case is over 65 years of age and/or has pre-existing health conditions. The operating protocols ensure these cases are called every day by the Case Monitor for symptom checking and are not contacted via email. This allows a more thorough and tailored checking process.

2.3. Capacity

- The activation of the emergency response by PHS has resulted in a number of PHS staff taking up emergency specific roles. In addition to resourcing the COVID-19 response with the existing staff, such as Communicable Disease Nurses (CDN), the team was scaled rapidly to also include staff from a range of backgrounds including health promotion staff, Public Health Nurses (PNHs), Environmental Health Officers (EHOs) and trained Health Care Workers such as the quality team and oral health team.
- PHS was initially offered support from external sources, including retired medical staff, but this has not come to fruition. Much of that offered resource came with caveats, making deployment difficult. PHS has however made use of trainee interns (6th year medical students) for intelligence gathering and analysis. In addition, PHS was able to secure the services of a recently retired MOH.
- PHS has established a team for Case Management and a team for Contact Tracing as follows:

- The MOH has overall responsibility for Case Management, including contact tracing and monitoring.
 - The Case Support and Surveillance Coordinators allocate cases and are the key liaison between the Case Managers and the Medical Officer.
 - The Case Managers conduct the initial interview with a case, confirming the result, providing the appropriate advice and instruction to the case and obtaining the necessary contact information.
 - The Case Monitor Lead allocates all cases to Case Monitors who contact the case each day to check for symptoms.
 - The Case Coordinator coordinates the assignment of cases to the Contact Trace Leads.
 - The Contact Trace Leads assign contacts to each of the Contact Tracers in their teams. Contact Tracers contact each of their assigned close contacts daily to check for symptoms.
- To ensure staff were capable of performing the tasks in accordance with the required standards, the PHS developed an agile training package and set of supports. The training package included documents that set out roles and responsibilities and instructional guides. Training packages were delivered face-to-face, via Zoom and on YouTube. The support provided also included the adoption of a 'champion system' through which support to less experienced staff members is provided. Our review team heard how this was valued by new staff.
 - In total, contact tracing training was given to 135 staff. This included PHNs (primarily), dental staff, EHOs from the council and health promoters. Only 100 of the staff were required to be deployed. Of the 100 deployed, 15 were HPOs. PHS noted that it was important to not just consider capacity, but also capability. Not all staff had the skills or aptitude for contact tracing. This meant that some of the 100 staff did less contact tracing than others, with a relatively few of the 100 carrying out a large proportion of the tracing.
 - PHS briefly used the services of the NCCS in mid-late March. However, due to a lack of visibility/feedback on the progress of the cases and contacts transferred to NCCS and the application of different processes by NCCS (which generated calls from the public to PHS), PHS staff have stopped using NCCS.
 - It would appear that there was a lack of clarity and some disconnect around what services the NCCS were offering and whether that included case management, close contact tracing or casual contact tracing, or all of these things.
 - PHS indicated that it could see the value of national support and surge capacity, but would be reluctant to use the NCCS unless issues of concern were resolved. A model where there was a team(s) within the NCCS that was there to support PHS (specifically) might be supported. The new integrated national IT system with visibility of cases and contacts by the local PHU may enable national support to be used as surge capacity. The importance of collaboration and knowledge of local circumstances were emphasised as crucial. For this reason, PHS argued that clusters need to be managed locally.
 - PHS estimates that it has capacity to handle the case management and contact tracing of 10-15 cases per day. PHS estimates that at a stretch they could possibly complete 20

cases per day (max), depending on case complexity. This level may not be sustainable for more than 20 cases and relies being able to access additional staff from public health nursing to assist with case management and contact tracing. These may not be as readily available as the alert levels fall and some business as usual resumes.

2.4. Managing Surge and Scale

- PHS has been focussed on building capability, implementing new protocols, training staff and responding to significant and pressing demands of COVID-19. At the time of the review interviews, case numbers and the corresponding workload had only recently started to drop to levels that present an opportunity for PHS to consolidate operations and consider its future needs. PHS indicated that its planning for the future had only recently commenced and was ongoing.
- PHS has commenced a review process to take stock of the lessons learned to date and to aid consolidation efforts. The review has commenced with a staff survey focused on learning and improvements, which was still underway at the time of the interviews. A management review of the lessons was also due to commence at the time of the review team's visit.
- PHS is still considering what scenarios it will model but will primarily model on a reduction of the COVID Alert Level to level 2. PHS assumes this will entail reopening of business and a large-scale return to work as well as the re-opening of schools. However, it assumes the borders will remain closed. Early guidance on the likely conditions of Alert Level 2 will aid PHS's modelling.
- PHS is aware that it will face some challenges, including:
 - PHS indicated that the model it has operationalised is robust and works. PHS has a workforce who have performed well. However, the need to surge has been managed by pulling from other occupational groups whose work had stopped. As the Alert Levels are lowered and there is increased pressure to return to BAU service delivery (for example, to meet contract requirements around Before School Checks and HPV vaccination), PHS needs to consider how it will retain access to this resource. There was also considerable work pressure on a few roles (e.g. case managers who worked 16-hour days at the peak), without obvious other candidates to step into these roles, comprising a potential point of failure.
 - PHS also advised that it needs to consider how it will maintain access to staff trained for the COVID-19 response, ensuring the competency that has been developed is safeguarded.
 - There are flow-on impacts of diverting staff from BAU roles because it means achieving certain BAU targets will be at risk, which in some cases can determine funding for that activity in future budgets.
 - The sustainability of the operations model and maintaining the operations also raised questions about the need for ongoing support from stakeholders, such as the unions, that had effectively made moving to a 7-day roster possible.
- PHS noted that there is occasionally talk about PHUs drawing on support from each other. However, PHS's experience has been there is an inherent reluctance from other

PHUs to assist due to their own contract delivery concerns, or fear that they might possibly need their own resource in the future.

- There was a broad view expressed by PHS that technology could significantly increase its operational efficiency. In principle, PHS recognised the value of a single national system. Key beneficial elements PHS identified as desirable included:
 - Access to fit-for-purpose case management functionality rather than just surveillance functionality;
 - Improved visibility of case and contact data. Transparency across contact tracing was regarded as essential at a national level given the potential movement of people across regions and links to cases in other regions;
 - Single repository of data, enabling stakeholders to access the data to develop their own reports, reducing the administrative burden in PHS which is significant; and
 - Web-based and readily accessible by a remote and distributed workforce.

3. CASE MANAGEMENT AND CONTACT TRACING

3.1. Standard Operating Procedures

- *Covid-19 Case Management Roles and Responsibilities EOC, Version 18042020* is the primary protocol document for case management and contact tracing for PHS. The document contains:
 - An overview of the daily operating structure;
 - Descriptions of the responsibilities of each of the roles involved in case management and contact tracing, including the role of the EOC members;
 - A diagram of the Case Management and Contact Tracing operational structure;
 - A series of key SOPs, including handover protocols and the internal escalation procedure; and
 - Key internal and external contact lists.
- The *Covid-19 Case Management Roles and Responsibilities EOC, Version 18042020* was originally based on the communicable disease protocol used for measles (2019). As Auckland and Christchurch began to experience cases of COVID-19, PHS was able to learn from those experiences and adopt or incorporate aspects from protocols used by those PHUs into their own. As events have continued to unfold, definitions have changed and new Ministry guidance has been issued, PHS has updated the protocol.
- The protocols rely heavily on the Ministry guidance. Changes to the protocols have been made frequently by PHS to keep pace with the numerous changes in guidance, including the definitions. PHS has engaged with the Ministry to confirm definitions and interpretation of the guidance throughout the pandemic. Version control information at the front of the document provides a change summary over time, though the date of the original document is unknown.
- To support and guide staff, PHS developed a series (4) of scripts. These serve as prompts for staff to convey the necessary messages to cases and contacts and to also ensure that the data and information required is collected consistently. The scripts were based on the scripts developed by the Canterbury PHU and then adapted to PHS requirements. The scripts supported the deployment of the larger team from diverse backgrounds, providing increased operational flexibility for contact tracing.

3.2. Process Description

- The case management and contact tracing process utilised by PHS is set out as follows:
 1. The Southern Community Lab sends email notification of positive cases to the MOsH. Tests conducted in Dunedin are completed within 24 hours, however swabs from the regions (e.g. Queenstown) can take longer. Notifications are received by the MOsH in batches at 6:00am and 3:00pm daily.

2. At the daily 08:30am meeting, each case is allocated to a Case Manager. Following the meeting (by 09:30am), the Case Manager then contact their cases and conduct the initial scoping interview in which they:¹
 - a. Inform the case of the positive result;
 - b. Follow the Case Summary Template for gathering initial information;
 - c. Fill in the Case Contacts List form;
 - d. Create the case on EpiSurv; and
 - e. If applicable, utilise the outbreak and contacts functions of EpiSurv to link cases.
3. At the daily 11:00am meeting the Case Manager presents their findings to the MOH and group (Case Managers, Case Monitor Lead and the Case Coordinator), using the standardised reporting format. Probable cases for each case are identified and discussed and a determination reached by the MOH.
4. A case summary is prepared by the Case Manager and saved in the network drive for both the Case Monitors and the Contact Trace Leads.
5. The Case Monitor Lead assigns the case to a Case Monitor who calls the case to gather information and set the case up on REDCap. The Case Monitor establishes the best way to communicate with each case such as phone or email for daily contact and symptom monitoring. They maintain an individual spreadsheet of cases that are being followed up.
6. In accordance with Ministry guidelines and the PHS protocols, the case is monitored for the requisite period. The Case Monitor discusses with the Case Surveillance and Support Coordinators when the case is better (per the Ministry guidelines) and whether the Case Recovery Process can be started.
7. Following the 11:00am Case Management meeting, the Case Coordinator will coordinate the handover of the case (contacts) to the Contact Trace Lead. The Contact Trace Lead will assign a list of contacts to each Contact Tracer in their team.
8. If assigned a cluster, the Contact Trace Lead is responsible for oversight of all aspects of the cluster, including casual contacts, venues, relevant associated supply chains etc.
9. The Contact Tracer calls their assigned contacts to gather information and establish the best way to communicate with each contact such as a daily telephone call or email. If daily contact is to be by email, they set up REDCap to generate the daily contact.
10. The Contact Tracer continues to conduct daily monitoring of close contacts (non-household contacts) for 14 days after last exposure to the case and conducts daily monitoring of all household close contacts (family and non-family) for 14 days after case has been symptom free for 48 hours.

¹ PHS acknowledges that the amount and quality of the information collected during the interview is critical to the success of the contact tracing.

- Tests were initially being conducted in Christchurch, causing some delays. The establishment of the laboratory in Dunedin has improved the speed of the process but there are still timing issues in completing the process for tests.
- PHS has escalation criteria in place where cases or contacts that develop symptoms are notified and the corresponding protocols activated.
- PHS referred a small number of close contacts to the NCCS. There is no process set out in the SOPs to transfer cases to NCCS. The SOPs do refer to the use of NCCS for tracing contacts that cannot be found but not for general tracing.

3.3. Defining Close and Casual Contacts

- PHS uses the Ministry guidelines to define close and casual contacts. In respect of the 2 metres and 15 minutes guideline where cases are uncertain, PHS has erred on the side of caution. PHS also indicated that in some interviews, cases are not always clear about who they have been in contact with. Again, PHS erred on the side of caution, keeping possible contacts in the mix so it could communicate relevant information to them and record their [contact] details.
- Each case is assessed in terms of risk by the MOH and this is discussed further and on an ongoing basis with the Case Manager. The method of daily contact for cases is tailored to reflect the individual's preference as well as their age and their underlying health. Case notes are added into EpiSurv accordingly.
- PHS is confident that it is capturing all close contacts, but acknowledges it is less certain for all casual contacts. Regardless, PHS is calling all close and casual contacts.

3.4. Cluster Identification

- The identification of clusters requires staff to make connections between cases and contacts. This process is currently manual and as a result it relies on staff to make connections between cases, contacts, organisations and locations/events. PHS advised that staff, particularly those in senior roles with good overviews of the cases, will often recognise names and locations.
- PHS used spreadsheets as tools to support analysis and the identification of potential clusters (e.g. searching for names). This approach does not have significant scalability. An automated solution that leverages digital intelligence to conduct cross referencing of data would potentially offer benefit.
- The cluster management process is dynamic. For instance, in circumstances where contacts become cases, they can provide early indicators of a possible cluster. However, PHS indicated that where contacts move between regions or their details are passed to NCCS for contact tracing and monitoring, it is critical that the PHU can maintain visibility of that contact, particularly where that contact then becomes a confirmed case.
- PHS believes all contacts on a cluster should be kept together and managed by the relevant PHU because of their complexity, the ongoing dynamic nature of clusters and because of the need to build and maintain continuity of knowledge of the cluster background and specifics.

- Clusters are considered and discussed at the daily 11:00am meeting. These discussions include cluster identification and linkages.

3.5. Closing off cases and clusters

- Case closure is considered by the Case Surveillance and Support Coordinators. The Case Monitor continues to conduct daily monitoring of the case until they have been symptom free for more than 48 hours and escalates the case to the Case Surveillance and Support Coordinators for consideration at this point. The Case Surveillance and Support Coordinators determine if the Case Recovery Process can be initiated.
- In respect of contacts, all household close contacts (family and non-family) are monitored for 14 days after the case has been symptom free for 48 hours.
- There is a separate process for closing a cluster. Clusters are technically closed when two incubation periods (2 x 14 days = 28 days) have elapsed since the last case in the cluster is closed. As all cases have been isolated under Alert level 4 and 3, the 28-day period has been calculated since the onset date of symptoms of the last case in the cluster.

4. INFORMATION MANAGEMENT AND DATA COLLECTION

4.1. Information Management

- EpiSurv and REDCap are the primary information management platforms. PHS also has a number of spreadsheets that it uses for case management and contact tracing.
- PHS has had little access to the National Contact Tracing Technology Solution (NCTS) system to date. Data from five cases that were referred to NCCS was returned by PDF. Some of that data was able to be used. The Contact Tracing information was good but there were some gaps.

4.2. Data Collection

- Data is primarily collected using paper-based forms that are then transcribed into either EpiSurv or REDCap. General case information is kept on a master spreadsheet for case and contact tracing management
- Each team also has a number of spreadsheets that they use for management and tracking purposes.

4.3. Performance Indicators

- **Time from PHU notification of case to case interview:** PHS is currently able to generate this metric based on the data that it collects. However, this has not always been the case, and a full historical analysis is therefore not possible.
 - *Time and date of notification:* As PHS receives notification in batches at 6:00am and 3:00pm, this data is readily available to be matched to cases. Alternatively, the timestamp from EpiSurv could be used as PHS receives Direct Laboratory Notifications (DLNs) shortly after the email notification.
 - *Time and date of case interview:* Initially this data was not captured by PHS. As of the latest SOP update, dated 18 April 2020, the case reporting format for Case Managers now includes a field for date and time of first contact with case. Because the data collected by PHS is not stored within a single system, PHS would need to match data between EpiSurv extracts and the Master Spreadsheet to compute it.

However, based on the process established by PHS, the aim is for any case assigned at the daily 8:30am meeting to have been contacted before the 11:00am meeting, where case managers are expected to present their case. Assuming this is achieved, it can be inferred that notifications received in the morning batch are contacted within 3.5 hours and those received in the afternoon batch are contacted within maximum 20 hours, except if the case is an essential worker, in which case a case manager will contact the individual immediately upon receipt of the notification. There were few positive cases ever reported in the 3.00pm laboratory notification.

- **Time from case interview to quarantine of close contacts:** As with the indicator above, this is possible only for more recent cases since PHS started recording date and time of case interview. The process of setting up contacts on REDCap would need to be confirmed with PHS as the process documentation states that both the Case Monitor and

Contact Tracer gather details of contacts and set them up on REDCap during their call with the case or contact respectively. Subject to that confirmation, PHS would be able to compute this indicator by merging data from REDCap and other sources.

Anecdotal descriptions from PHS are that household contacts are contacted within 24 hours. During Alert Level 4, household contacts are spoken with immediately following the initial interview, often as part of the same call. Close contacts (non-household) and Casual Contacts are allocated to Contact Tracers in volumes of 5-10 per day, depending on the volume of contacts requiring tracing.

- **Number and distribution of close contacts:** Assuming all contacts are managed in REDCap, this data would be available through a simple REDCap extract.
- **Proportion of contacts who have been traced:** PHS are not tracking this indicator internally as it has not had issues tracing close contacts. REDCap cannot be used to track this indicator as only contacts that are traced are set up in REDCap. An alternative tracking system through comparison on data collected on contacts and numbers set up in REDCap would need to be established.

PHS confirmed that it has contacted every close contact that was managed by its contact tracing team. There was an instance where five casual contacts were not able to be traced and a decision was made in discussion with the MOH and Case Managers to cease tracing.

There are however concerns about the ability to rely on cases transferred to NCCS for tracing as there is no feedback loop. PHS mentioned instances where new cases they were notified of had been contacts of previous cases who tracing had transferred to the NCCS but who had not been contacted prior to becoming a case and being contacted by PHS. The review team is unable to corroborate this.

5. ADDITIONAL FUNDING FROM THE MINISTRY

- PHS has not provided a detailed breakdown of how the additional funding from the Ministry has been used.
- However, PHS commented that the funding would primarily be used to cover the additional staff costs incurred both by PHS staff for overtime and other staff that were brought into the response.

6. DOCUMENTS SIGHTED

Public Health South (PHS). 18 April 2020. Case Management and Contact Tracing – Roles & Responsibilities – April 2020

PHS. Undated. Contact Tracing Team Information and training pack

PHS. Undated. Copy of contact tracing spreadsheet.

PHS. 17 March 2020. COVID-19 Contact Tracing Training Presentation

PHS. 20 March 2020. Instructions for using REDCap.

PHS. 15 April 2020. Handover process.

PHS. March 2020. Script 01: First call to close contact of confirmed case.

PHS. March 2020. Script 02: Daily contact monitoring.

PHS. March 2020. Script 03: Call to casual contact.

PHS. March 2020. Script 04: Handover of contact to other Public Health Unit.

PHS. Undated. Advice for a Close Contact template letter.

PHS. Undated. Advice for a Casual Contact.

PHS. Undated. Data analysis spreadsheets with extracts from EpiSurv, REDCap and Master Spreadhseet

PHS. 22 April 2020. Evaluation of M3 performance and variation when workloads changed.

Southern District Health Board (SDHB). 2014. Health Emergency Plan

SDHB. 2019. Code of Conduct and Integrity

SDHB. 2020. SDHB Protocol for 2019-nCoV infection.

Ministry of Health (MoH). 2020. Updated Advice for Health Professionals: Novel Coronavirus (COVID-19)

MoH. 12 March 2020. Risk Assessment Framework for Managing Ill Travellers with Suspected Symptoms of Novel Coronavirus COVID-19 and Contacts Arriving in New Zealand: Guidelines for DHB Public Health Units.