COVID-19 Surveillance Plan

DRAFT 2.0

8 April 2020

Executive summary

Approach to surveillance

The approach to surveillance is based around:

1. Existing surveillance mechanisms for influenza-like-illness (ILI)
2. Existing surveillance mechanisms for notifiable disease operated by regional Public Health Units and ESR. This system is currently providing the case numbers and details that are being regularly reported.
3. Additional surveillance based on COVID-19 testing, based upon ensuring the best testing coverage of symptomatic patients, particularly in populations with high risk. This is being implemented through general practice, Community Based Assessment Centres (CBACs) and laboratories, which are joining up their systems to allow the data to be collected. All patients with respiratory symptoms in hospitals are also being tested.
4. Surveillance of prevalence in the population following the initial wave of infection. This will be likely to take the form of an immunology study of randomly sampled people in the population, but will not be available or useful until at least June.
5. An adjunct to the New Zealand Health Survey to assess anxiety and attitudes to the COVID-19 environment
6. Other novel forms of surveillance are being considered, such as the detection of virus genetic material in sewage. s9(2)(g)(i)

Elements of surveillance already in place

The immediate surveillance activity for COVID-19 is based upon the following elements:

- Existing ILI surveillance conducted by ESR on behalf of the MoH, including sentinel practices, patient reports of symptoms to Flu Tracker, and reports of symptoms to HealthLine. This is currently operational and functioning as usual.
- The core communicable disease surveillance system, operated at the front line by regional Public Health Units, who feed information on positive COVID-19 cases through to ESR and the Ministry of Health via the EpiSurv database. This is currently operational and functioning as usual, though accurate data entry is under some pressure arising from the high number of cases.
- Contact tracing data, providing information on cases and their contacts, including how these emerge as clusters. This is being collected in the National Contract Tracing Centre in a newly developed information system.

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- A regular survey, linked back to participants in the New Zealand Health Survey, has been developed and is in place for monitoring ongoing attitudes and mood relevant to COVID-19.
- ESR is conducting genetic surveillance of COVID-19 samples in order to understand which of the eight known strains are important in New Zealand.

Additional mechanisms being developed now

New COVID-19 surveillance mechanisms are being stood up rapidly. These are:

- A national dataset is being developed for COVID-19 lab tests so that both positive and negative test results can be accessed consistently across New Zealand and linked to information about the people being tested for COVID-19 symptoms. This will allow epidemiologists at the Ministry of Health to calculate rates and trends of disease, and what these look like at a fine grained geographic level, as well as in key populations including Maori and Pacific people, and those in areas of socioeconomic deprivation. It is expected that this database will be in place by 20th April.
- A national dataset is being developed for CBACs, so that the representativeness of the population being assessed and tested in health services can be monitored. Where there is an indication that key populations, particularly Maori, are not being tested in sufficient volume to support accurate monitoring of COVID-19, DHBs will be asked to extend their efforts to test symptomatic people in those populations. It is expected that this database will be in place by 10th April.

Medium term options

There will be value in measuring the level of COVID-19 prevalence in the community. This will allow an assessment of the prevailing level of immunity and the risks of infection spread from that point. Options for that prevalence testing include:

- Antibody testing from a random sample in the community. This would be oversampled for high risk groups in the population, such as Maori and Pacific people, in order to ensure that conclusions about immunity and future risk consider the particular risks faced by those populations.

s9(2)(f)(iv)

Surveillance reporting

The Ministry of Health is planning to complete its initial surveillance report, with independent replication of results and comment from the Technical Advisory Group, by 14th April to support advice to Government. This will be generated by a team of analysts and expert epidemiologists drawn from the Ministry of Health, ESR and other agencies. The analysis will be replicated by an independent group in order to provide quality assurance and to allow high confidence in the results and interpretation.

Surveillance reports will provide systematic information on the progress of the COVID-19 pandemic in New Zealand, including local and regional breakdowns of incidence and prevalence of the disease,

and analysis of any emerging clusters. This core information will be the basis for advice on the risk faced by the population at the current level of lockdown, and for estimates of how that might change under other population management options.

The standard notifiable disease surveillance system, operated by ESR, provides data back to Regional Public Health Units and to the National Contact Tracing Centre for managing cases when they are discovered.

Surveillance reports will be regularly generated and updated on a daily and weekly basis

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1 Surveillance

Surveillance is the collection, collation, and analysis of data and the dissemination to those who need to know so that an action can result. Surveillance is core to management and ultimate elimination of COVID-19.

Successful pandemic control and elimination rely on early and ongoing surveillance, including recognition and verification of sustained human-to-human transmission. This requires a system with the capacity for case and outbreak detection, rapid data collection, analysis, assessment and timely reporting to those who can take action.

Surveillance to support New Zealand's response to the COVID-19 pandemic will, as far as possible, build on existing routine surveillance systems but also requires the rapid development of ad hoc systems to meet additional data needs.

2 Objectives

The COVID-19 surveillance system will bring together information from a range of sources to understand the epidemiology and spread dynamics of COVID-19 in the New Zealand population and to provide specific information in a timely manner to support operational and policy decision making.

The surveillance system will provide regular reporting of key features of the epidemic in New Zealand, to inform public health action and also the interested public. It also needs to provide data to answer questions that are specific to particular stages of pandemic management. Some enhancement of aspects of the surveillance system may be necessary to answer particular questions. For example, surveillance system data may contribute to answering questions such as:

1. How many new cases are there in a particular population or sub-group in specific periods of time?
2. What proportion of a population or sub-group are immune to SARS-Cov-2?
3. What proportion of cases are/were asymptomatic?
4. What are New Zealanders' attitudes and behaviour towards the pandemic environment?

This information will support decisions that respond to the spread of disease, and will support models and decisions for changes to lockdown regimes in different regions.

3 Existing and newly developed surveillance mechanisms

The existing range of surveillance mechanisms include the notifiable disease surveillance system as operated via Public Health Units and reported through EpiSurv, and a range of data collection tools that are based on information from contact tracing. Syndromic surveillance systems are also in place to detect acute respiratory illnesses (Severe Acute Respiratory Infection (SARI) and influenza like illness (ILI) cases, and are being adapted for COVID-19.

The following streams of surveillance for influenza and COVID-19 which are in line with WHO guidance for surveillance in pandemic are in place and operating:

Surveillance objectives	Surveillance systems and components
- Detect cases and contacts - Detect cases and clusters early - Detect and monitor deaths - Monitor the level of illness activity in the community - Assess the effectiveness of interventions - Track the genetic characteristics of the virus	- EpiSurv notifiable disease COVID-19 surveillance established (informed by Health Act schedule 1 change, WHO reporting requirements, and case definition development) - Diagnostic testing capability established - National e-notification of positive test results established - REDCap contact tracing module developed, although separate systems introduced - Reporting of SARS-CoV-2 test results (positive/negative) from all SARS-CoV-2 testing laboratories commenced, co-ordinated by ESR via the NZMN to the MoH - Interseasonal acute respiratory illness surveillance including: - Sentinel ICU SARI - HealthLine ILI - HealthStat ILI - EpiSurv ILI outbreak surveillance - SARS-CoV-2 Whole Genome Sequencing capability development, in addition to ongoing development in nucleic acid testing, and other testing (e.g. serological)
- Identify and monitor international events of concern and related advice to inform action in New Zealand - Track the characteristics of the virus internationally, including information on incubation and infectious periods, severity, transmissibility, and antiviral sensitivity	Enhanced international surveillance, review of emerging scientific evidence and risk assessments

- All Keep it out phase objectives are applicable - Detect community transmission - Understand and monitor the disease epidemiology, including burden of disease in high risk populations, to inform the local and national responses	Further to all ongoing operational activities in the keep it out phase: *National level (combining community and secondary/tertiary level care data)* - EpiSurv - Ongoing epidemiological COVID-19 analyses includes assessments of the impact of case definition changes on surveillance system quality - Establishment of an intelligence dissemination tool: A web-based near real-time COVID-19 data visualisation dashboard and associated weekly epidemiological report accessible, to MoH and PHUs; and a web-based COVID-19 public data visualisation dashboard with daily updates. - Clinical data repository Collation and analysis of all COVID-19 testing in New Zealand includes assessments of the impact of case definition changes on surveillance system quality.
	- Whole genome sequencing - Case SARS-CoV-2 specimens are undergoing whole genome sequencing to further inform our understanding of transmission dynamics with prioritisation for sequencing informed by the national epidemiology

	National, community-focused
	- Enhanced Event Based Surveillance, including:
	  - ILI/acute respiratory illness outbreak surveillance including enhanced outbreak investigation, EpiSurv outbreak reporting, weekly outbreak zero reporting where appropriate
	  - Local area HealthLine ILI and HealthStat ILI activity (and voluntary GP sentinel ILI once commenced) assessments
	  - Targeted SARS-CoV-2 testing strategies
	  - Enhanced HealthStat ILI surveillance
	    - Extension of participating practices to increase local population coverage, representativeness and sensitivity to detect an increase in local ILI activity
	  - Flutracking

	National, Secondary care - Sentinel SARI influenza and COVID-19 surveillance in ADHB and CMDHB hospital respiratory wards - Testing of SARI patients across all DHBs has now been implemented, though data flows of negative tests are not yet complete.

4 Further enhanced community surveillance options

Options for further enhancing community-based surveillance include systematic virological surveillance in patients presenting with symptoms at sentinel sites, supported by targeted testing. In the context of disrupted community patient care flow and primary healthcare demands as a result of the COVID-19 response, the establishment of Community Based Assessment Centres (CBACs) provides the main mechanism to support this through a mix of widespread, sentinel and targeted strategies.

This will also be complemented by seroprevalence testing when that becomes viable and useful.

4.1 Testing strategy

A formal testing strategy is under development by the Ministry of Health. The current advice to DHBs and their CBACs is that testing should occur in all symptomatic cases in accordance with the case definition. However there is scope for testing to be expanded at various times for priority communities or priority populations as required .

4.2 Enhanced community surveillance using CBACs and designated practices

This stream of work covers testing surveillance of the symptomatic population.

CBACs are the responsibility of DHBs, and are operated by a mixture of DHBs and PHOs. The Ministry of Health has limited ability to dictate the location of any one CBAC. CBACs operate using testing criteria provided by the Ministry of Health, on the basis of the COVID-19 case definition.

There are now 118 active CBACs and designated practices across Aotearoa. On an initial inspection these largely appear to have a good geographic spread, including proximity to a number of known priority populations from the Māori and Pacific communities, including Porirua South Auckland and Tairawhiti, for example. At least one existing CBAC is mobile, and others are planned.

There will be close monitoring of the data on populations presenting to CBACs and designated practices. This will be compared with the population in local regions in order to assess on a continuous basis how representative CBAC data is of regional populations, and particularly of priority Māori, Pacific, very young and elderly populations. Where it is suspected that CBAC testing is not sufficiently representative, DHBs will be encouraged to target additional testing to these groups, via local networks, information campaigns, and mobile services. Advice will be sought from Māori health leaders on how to engage with these commnuities.

In conjunction with the core notifiable disease system based around EpiSurv, newly developed data sources are:

- Lab repository. This will receive COVID-19 test data into a central repository from disparate existing lab systems, and will be managed by ESR. This will include NHI where it is reported (nearly all tests), and will include both positive and negative swab test results. It will be running by the 20th of April, but interim extracts of data with NHI are available from today. Data without NHI will be "fuzzy"matched by the Ministry of Health on the basis of name and date of birth. These data will include the test result, but will have very limited information about the person who was tested.
- CBAC dataset. This new feed is being set up by the Ministry of Health National Collections team and provides, with NHI, data on CBAC location, patient demographics, usual general practice and whether a swab was taken, and what the mode of assessment was (face to face, video etc). We have the ability to request additional fields (such as essential worker yes/no), but data quality cannot be guaranteed for these. CBAC data is coming from a very

wide range of individual sources with different systems, some of which are quite manual. Most of it will be updated daily, though a small proportion may have a lag of a day or two. This dataset will be available from April 10th, and possibly earlier. It is unlikely that this data will be backloaded with information from before its date of stand-up.

NHI linkage can be used to identify for a given lab result which CBAC or designated general practice took the swab. By linking with the national PHO registers dataset, the location of the patient can be identified to meshblock level (where patients are registered with a general practice). The general NHI register has location data to CAU level for those not registered with general practice, but this may be less reliable. GIS analysis is therefore viable.

The availability of NHI on raw datasets will also facilitate linkage with other information that may allow more detailed analysis of risk and outcomes, such as assigning comorbidity indices, and data on previous health system utilisation. There is the potential to link to datasets outside health via the Statistics New Zealand IDI in order to assess the impact of other factors such as transience or need for housing support upon the incidence and outcomes of COVID-19.

Linkage will be completed by the Ministry of Health National Collections Team, which will then be able to provide linked information sets to analysts within the Ministry of Health. The usual data governance rules in force at the Ministry of Health on the management of identifiable datasets will be applied to COVID-19 surveillance datasets. Experience with other datasets suggests that where NHI is unavailable, it will be possible to assign an NHI from patient information in up to 90% of cases.

4.3   National contact tracing

The National Contact Tracing Solution is a new system that will be available within the next few days as part of the National Close Contact Service (NCCS). It will be able to provide a range of data to support surveillance, including: number of contacts; number of contacts per case; time from case identification until contact quarantine; and percentage of close contacts contacted within x hrs of test results. Regional Public Health Units will continue to enter contact tracing data into EpiSurv as usual.

5 Asymptomatic community surveillance

5.1 Seroprevalence testing

Cross-sectional serological surveys can provide an indication of the prevalence of exposure or immunity to SARS-CoV-2 at a national level but also in particular population subgroups. This can be used to estimate the New Zealand population's susceptibility to the disease to inform the response. While it is likely that there will be some lasting immunity, this is currently unknown.

The timeframe for the establishment of a lab based serological enzyme immunoassay (EIA) test in New Zealand to detect specific antibody mediated immunity to SARS-CoV-2 is 1 to 2 months. A cross-sectional survey would require co-ordinated, time-specific sampling of a sample of the New Zealand population, both geographically and demographically representative, with focus on high risk groups. Laboratory based sero-prevalence testing is likely to be useful later this year, but is unlikely to provide useful information for making decisions before mid 2020.

Point of care serological tests, based on a finger prick, are currently under evaluation overseas and would enable more rapid and more readily implemented cross-sectional serological surveys. However, these tests typically have poor performance. A widespread survey based upon point of care tests would carry a high risk of providing false reassurance both to the population and to decision makers. The consequent risk of making decisions based upon an artificially optimistic view of herd immunity would be significant. These tests may have a role as a comparator to other tests in seroprevalence studies, allowing an analysis of test performance across multiple tests, and an improved overall estimate.

5.2 Random and targeted PCR testing

Random testing of asymptomatic people in the community with swabs for PCR tests is not recommended due to likely low prevalence of infection and poor test performance. The majority of transmission is expected to occur during symptomatic infections. s9(2)(g)(i)

Testing asymptomatic people will only produce positive results if, by chance, the subject is in the middle of experiencing an asymptomatic bout of COVID-19. s 9(2)(g)(i)

Targeted community PCR testing for mildly symptomatic and potentially asymptomatic people should be based upon indicators of suspected community transmission such as:

- Close case contact from contact tracing
- Syndromic surveillance
- High risk occupations
- Any other circumstances in which there is high risk of exposure

6 Behavioural surveillance

The Ministry of Health has commissioned two surveys.

A short term COVID-19 Public Mood Tracking survey.

This was a brief survey that was completed twice in the past three weeks as an interim measure. It canvassed adult New Zealanders':

- Support for strategies for containment and management of COVID-19
- Confidence in containment measures
- Intended compliance with Level 4 Alert lockdown restrictions
- Support for the lockdown

The numbers covered in this survey are small, and the ability to examine results by priority population is limited.

COVID-19 Health and Wellbeing Survey

On 30 March the Ministry of Health, working with the provider of the New Zealand Health Survey, implemented a new public survey designed to monitor changing levels of anxiety and other issues related to COVID-19. This telephone based survey is designed to provide high level daily indicators which can be monitored to identify common issues or concerns faced by New Zealanders. We are intending to capture over 300 responses per day, and as we start gathering data we will be able to look at how anxiety (for example) varies by age, ethnicity or medical history.

The survey was designed with input from the Chief Science Advisor for the Ministry of Health, the University of Otago, and the Social Wellbeing Agency. While focussed on Health and Wellbeing, the design of the survey is intentionally flexible, allowing us to tailor the questions over time to capture information on the key issues of the day. While not completely defined yet, the current intent is to make reporting of the daily data available across relevant agencies within a week of data capture.

The sample consists of adults who took part in the New Zealand Health Survey in the last two years, and at the time agreed that we could contact them about other research in the future.

7   Non traditional forms of surveillance

A number of additional information systems have been set up by different agencies that may have some utility for surveillance. However there is risk in drawing upon information that is unvalidated or potentially misleading. These options will be assessed systematically by the Ministry of Health. They include:

1. Police have implemented a website for reporting people who are not compliant with lockdown requirements. This has some potential to indicate areas of risk for community transmission, if there are communities with particularly high levels of reported non compliance. However use of the website and the threshold for members of the community to report could be highly variable.

2. Overseas jurisdictions have used mobile phone apps for the purposes of contact tracing and monitoring compliance with movement restrictions. s9(2)(f)(iv), s9(2)(g)(i)

3. s9(2)(f)(iv), s9(2)(g)(i)

4.

These and other emerging novel approaches will be assessed as they arise by the Ministry of Health, in consultation with the Ministry's COVID-19 Technical Advisory Group.

8 Implementation

8.1 Supporting operational public health measures

COVID-19 has been designated as a notifiable disease, meaning that Aotearoa/New Zealand's standard notifiable disease system applies. Public Health Units have access via EpiSurv to contact and cluster outbreak data for their management of cases. While PHUs are under considerable pressure, surveillance information to support the public health response is not a limiting factor in the management of cases and clusters.
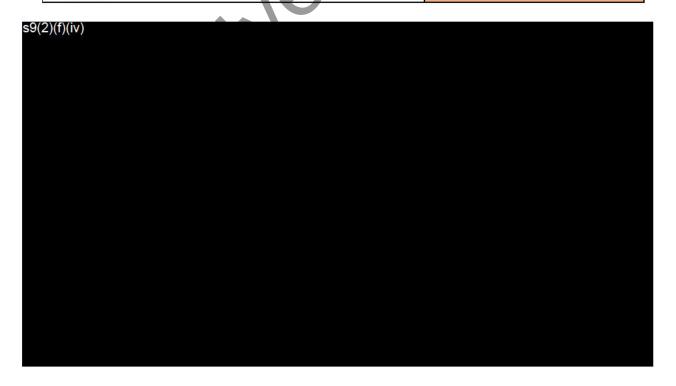
8.2 Supporting policy decisions on social distancing measures

Decisions on de-escalation from COVID-19 Alert Level 4 on a regional or national basis will be supported by our core notifiable disease system, in conjunction with the enhanced community surveillance of testing from CBAC and other community sources. This system has the capability to report cases and rates of cases in geographic and demographic detail.

8.3 In progress

The following streams of work are in progress:

Workstream	Date of completion
• National Clinical Data repository for lab data- implemented	20 April
• Enhanced HealthStat surveillance – completion of practice recruitment	2 weeks
• National epidemiological dashboards – continued staged implementation	Weekly (paper based reports have been implemented until comprehensive dashboard is live).
• Establishment of systematic CBAC data system	10 April
• Establishment of a validated serological test for SARS-CoV-2	1-2 months

s9(2)(f)(iv)

s9(2)(f)(iv)

8.5 Generating surveillance products

The Ministry of Health has the core role of providing surveillance information to support public health policy advice. It conducts this role with the support of ESR, which manages key elements of the surveillance system and produces surveillance epidemiology.

The National Health Coordination Centre (NHCC) is a structure within the Ministry of Health that is stood up in health emergency situations. The NHCC has a responsibility during this emergency for providing information and intelligence about the pandemic. This enables the rapid commissioning of additional resources to assist with collecting and analysing information. NHCC Intelligence will work with the Office of the Director of Public Health and ESR to set up two teams:

An analytical team, charged with receiving raw datasets such as CBAC data and conducting additional data manipulation as needed. This team will also ensure that ESR epidemiology products are regularly fed in to the process, and will consult with ESR on aspects of any additional or ad hoc analyses that may be needed in order to ensure the quality of the analysis. This team will be formed from analysts currently within the Ministry of Health and with additional analysts contracted for the purpose or seconded form other agencies, and is expected to include five staff. This will ensure that capability can be provided seven days a week.

An epidemiology team. This will include public health physicians and qualified experts in communicable disease epidemiology from the Ministry of Health, ESR and seconded as necessary. This team will direct the analyst team on the production of data analysis for surveillance, and will draw upon ESR surveillance outputs. This team will provide the interpretation of epidemiological measures to feed in to public health, policy and other teams within the Ministry of Health.

The first surveillance report will be produced by Monday 13th April. This will be provided to the Epidemiology Subgroup of TAG for comment before incorporation into Ministry of Health advice about COVID-19 surveillance during the lockdown period.

Following the initial report, a subset of information will be updated on a daily basis, and a complete update provided weekly. Ad hoc questions raised by the internal epidemiology team will be

addressed. It is expected that aspects of the standard reports will evolve in the initial stages, as the nature of questions about COVID-19 change, and as the picture about transmission becomes clearer.

It is proposed that surveillance products be replicated by an independent team external to the Ministry of Health, to provide quality assurance and to ensure maximum confidence in the epidemiological analysis.

9 Core surveillance measures

New Zealand is currently employing an elimination strategy for COVID-19. The two primary aims of this strategy are:

- To eliminate transmission chains in Aotearoa NZ; and
- To prevent the emergence of new transmission chains originating from cases that arrive from outside the country.

To achieve these aims the reproduction number R0 must be reduced throughout the country to <1, or down as near to 1 as possible.

As such, the elimination strategy has three key objectives:

- To identify and stop each transmission chain;
- To prevent undetected transmission; and
- To prevent seeding of new clusters into communities using border control measures

The current criteria for moving between alert levels are based upon:

1. The spread of disease in New Zealand (case numbers, community transmission, rates of change, location of cases and clusters)
2. The performance of our testing regime, contact tracing, quarantine/isolation and border measures
3. The available resources of the health system, including workforce, ICU capacities and PPE
4. Effects of economic and social resilience
5. Compliance and public attitudes to the measures

9.1 Response questions

In order to monitor if the key objectives are being met and to provide information for the criteria, the following questions must be answered:

1. How are cases distributed in New Zealand and what are the rates of change?
2. What is the level of community transmission across New Zealand by region, including the trend over time, and in specific population groups?
3. Are cases and contacts being isolated/quarantined in an appropriate and timely manner?
4. Are returning international travellers a current source of ongoing local and community transmission in New Zealand?
5. What is the current health system capacity by region?
6. What are the compliance and attitudes of the general public to the measures?

9.2 Priority data outputs

Where possible, all cases will be characterised by age, sex, ethnicity, deprivation quintiles and District Health Board (and other appropriate geographical area) and time of onset, testing and reporting as required.

- Rates using demographic data will be used to compare data between different (sub)groups.
- Trends in time and comparison between subgroups
- NB: data outputs in bold are priority outputs

How are cases distributed in New Zealand and what are the rates of change?

Cases:

- Age, sex, ethnicity, deprivation. With NHI data linkage the standard NHI ethnicity can be used.
    - New cases by location/population/sub-group in a period of time
    - Trend rate of change of cases by location/population/sub-group
- Location (by DHB and by smaller areas where necessary)
- Setting at which they were identified (border, GP, CBAC, ED, hospital ward, ICU)
- Occupation (either specific occupation or by essential worker/non-essential worker, but particularly health care workers)
    - This may require active surveillance for essential workers
- Groups at high risk for severe disease (older age, chronic conditions—diabetes, CVD and HT in particular)
- Clinical severity including hospitalisation rate, ICU rate and deaths (including case fatality rate)
- Risk factors for COVID-19 outcomes stratified (age, co-morbidities etc) and multivariate analysis

Testing:

Number of tests and number positive, as well as number of individual tested and number positive, by:

- Age, sex, ethnicity, deprivation. With NHI data linkage the standard NHI ethnicity can be used.
- Trend in time
- Location (by DHB and by smaller areas where necessary)
    - Testing rates by DHB
- Source (imported, epidemiologically linked to imported case, sporadic locally acquired, and epidemiologically linked to locally acquired case/s and, where discernible, stage in transmission chain i.e. secondary, tertiary etc)
- Setting at which they were identified (border, GP, CBAC, ED, hospital ward, ICU)
- Occupation (either specific occupation or by essential worker/non-essential worker, but particularly health care workers)

Outputs will include testing rates and testing positivity rates in various populations groups, and the trends in time.

What is the level of community transmission across New Zealand by region?

Cases

- Source (Imported, epidemiologically linked to imported case, sporadic locally acquired, and epidemiologically linked to locally acquired case/s and, where discernible, stage in transmission chain i.e. secondary, tertiary etc)
    - Level of community transmission (including by subgroups): sporadic, locally acquired cases, contacts of non-import related cases
    - Trend in time (including new cases of community transmission by location)

Cluster outbreaks

- Outbreak epi-curves
- Source of clusters (e.g. the proportion of clusters originating from international arrivals)
- Size and duration of outbreak clusters
- Outbreaks chains of transmission in time
- Onset/reporting date of first and last case
- Age, sex, ethnicity, deprivation, location of cases.
- Outbreak settings
- Molecular epidemiology (integrated epidemiological and microbial genomic analyses)
- Other indicators as appropriate e.g.
  - Median time from case identification to contact quarantined (also concerned with distribution e.g. proportion <4 days)
  - Time from symptom onset and testing/diagnosis to isolation (median and intervals)

Other epidemiological information

- Basic reproductive number (R0) for New Zealand
- Timeline of key COVID-19 PH intervention events relative to the epidemic curve by infection source and transmission patterns
- Incubation period/Serial interval i.e. time between case symptom onset/arrival in New Zealand/case exposure and symptom onset in close contact symptom onset for imported cases or outbreak chains

Are cases and contacts being isolated/quarantined in an appropriate and timely manner?

Cases

- Time from symptom onset and testing/diagnosis to isolation (average, median, intervals)
- Pre v post intervention comparison/7 day moving average of time between symptom onset and diagnosis / isolation

Contacts

- Number of contacts identified
- Number and distribution of contacts per case
- Number and proportion of contacts quarantined (%)
- Median number of contacts per case
- Median time from case identification to contact quarantined (also concerned with distribution e.g. proportion <4 days)
- Proportion adhering to quarantine (self-isolation)
- Number of contact tracing investigations open longer than 2 days
- Secondary clinical attack rate (risk of symptomatic infection among close contacts)
- Number of contacts among health care workers
- Proportion of contacts that are confirmed / probable Covid-19 cases (overall and periodically according to age, sex, setting (household, workplace other) of exposure)

Are returning international travellers a current source of ongoing local and community transmission in New Zealand?

Border data

- Number of travellers (Total and by source country)
- Number and proportion testing positive for COVID-19 on arrival (by age, sex, ethnicity and source country)
- Number and proportion testing positive for COVID-19 during managed quarantine (by age, sex, ethnicity and source country)
- Number of travellers testing positive for COVID-10 after managed quarantine
- Number and proportion placed in managed quarantine
- Number and proportion of them who adhered to 14 days quarantine
- Number and proportion placed in self-quarantine (self-isolation)
- Any cases of local transmission related to international travel

What is the current health system capacity by region?

- Hospital occupancy levels
- ICU capacity percentage
- Ventilator percentage use

What are the compliance and attitudes of the general public to the measures?

COVID-19 Health and Wellbeing Survey:

- Levels of anxiety
- Other outputs yet to be defined

Additional surveillance information to trigger investigation/active case finding and testing for COVID-19

- ILI information sources
  - Flutracking
  - HealthStat
  - Healthline
  - Information report
  - Sentinel Severe Acute Respiratory Infection (SARI) activity
- Potential systematic breach of physical distancing in a given area of population
  - Smart phone data: high density in same location in a given area (especially areas at higher risk of transmission
  - Other documents reports
- More detailed and focused testing in relation to a cluster outbreak

Seroprevalence data

This will be considered once accurate serology testing is available.