

# Briefing

## Contact tracing – date timestamp issue

<b>Date due to MO:</b>	9 November 2020	<b>Action required by:</b>	N/A
<b>Security level:</b>	IN CONFIDENCE	<b>Health Report number:</b>	20201753
<b>To:</b>	Hon Chris Hipkins, Minister for COVID-19 Response		

## Contact for telephone discussion

Name	Position	Telephone
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## Minister's office to complete:

- |   |                                    |  |
|---|------------------------------------|--|
| <input type="checkbox"/> Approved             | <input type="checkbox"/> Decline   | <input type="checkbox"/> Noted               |
| <input type="checkbox"/> Needs change         | <input type="checkbox"/> Seen      | <input type="checkbox"/> Overtaken by events |
| <input type="checkbox"/> See Minister's Notes | <input type="checkbox"/> Withdrawn |  |

Comment:

# Contact tracing – date timestamp issue

## Purpose of the report

1. This report is to inform you of an issue with the accuracy of timeliness data reported for contact tracing. It summarises the impact of the issue and the steps that have been taken to correct the matter. It also provides additional context for each of the indicators that have not met the recommended targets.

## Context

2. The National Investigation and Tracing Centre (NITC) produces data reporting on the COVID-19 Disease Indicator metrics (Indicators) recommended by Dr Ayesha Verrall as part of her April review. These indicators provide an end-to-end view of the public health response to COVID-19, including metrics on timeliness and outcomes of public health interventions.
3. Since the National Contact Tracing Solution (NCTS) was stood up on 6 April 2020, a number of enhancements have been made, including: integration with EpiSurv, border health requirements and the NZ COVID Tracer App.
4. Since the August outbreak, the Ministry has built a business intelligence reporting dashboard for the Indicators. This allows the NITC and Public Health Units (PHUs) to view and monitor performance against each metric in real-time rather than the manual processes used previously. The dashboard is provided through Qlik, the Ministry's data analytics reporting platform.
5. Since 1 September 2020, the Ministry has published four COVID-19 Disease Indicator reports on the Ministry of Health website.
6. On 22 September the NITC identified that indicators relating to timeliness of contact tracing had not correctly adjusted to New Zealand Standard Time (NZST). This means an additional 12 hours was included in seven of the ten indicators.
7. This error has affected data reported from 19 August to 22 September 2020, as prior to this date manual data reporting mechanisms were used.
8. The NITC have updated the Indicator reports following the resolution of the date timestamp issue and propose to republish them on the Ministry's website with corrected data.

## Summary of date timestamp issue

9. Since 19 August 2020, contact tracing indicators that relate to timeliness had not correctly adjusted to NZST. This meant an additional 12 hours was included in seven of the ten indicators.
10. Coordinated Universal Time (UTC) is a time standard used across the world, similar to Greenwich Mean Time in the UK. The Salesforce platform used by the NCTS records time and date fields as per the UTC. For monitoring, the UTC needs to be adjusted for NZST.
11. Preliminary investigation identified that the cause of this error is the exclusion of a 'z' code in the time and date fields in the data management layer and reported through

Qlik. This means reporting of the metrics had not been correctly adjusted for NZST, effectively adding an additional 12 hours to the result.

12. A root cause analysis was undertaken by an independent expert to understand the cause of the error. The analysis was completed on 19 October 2020 and the full report is attached as Appendix Two.
13. The main findings of this report are:

- As NITC business needs grew NCTS was developed at pace. The business needs grew in response to the rapidly escalating need to contain COVID-19 in New Zealand. The growth was not linear; rather there was exponential growth as the scope of NITC accountability and NCTS functionality changed to match the requirements of New Zealand's COVID-19 response. For example, the extension to NCTS to include border health and the expansion of its use by the twelve public health units (PHUs). As such it is reasonable to observe NCTS time and resources were required to complete iterative change to the high availability IT platform in a pressured operating environment.
- Managing this scale of change in the absence of a fully mature operating environment is challenging. Defects and mistakes can be expected and NITC has not matured to the level where a systematic approach to quality has been established.

14. The actions from this report are being progressed by the Ministry. This includes:
  - a. A new governance model to support the ongoing development of NCTS across contact tracing, border and managed isolation and quarantine facilities.
  - b. The Ministry is improving the resourcing of the Ministry's capability in relation to the Salesforce platform through both the NITC and Data and Digital.
  - c. Formalising structures around the development, enhancements and testing cycles for the NCTS.
  - d. Approval for the appointment of Senior Advisor - Quality to support the delivery of a comprehensive quality system for contact tracing.

### Impact of date timestamp issue

15. The NITC routinely publish data on ten indicators using data from three distinct sources; EpiSurv (case notification), Éclair (for laboratory results) and the NCTS (for all case and contact tracing management records). EpiSurv and Éclair data do not use UTC and record time and date in NZ time.
16. The error has affected data reported from 19 August to 22 September 2020. Prior to this date, all data reported on contact tracing used manual reporting mechanisms and were recorded and reported in NZ time. Data files for reporting prior to 19 August have been checked and confirmed that these are correct.
17. Seven out of ten indicators, listed below, are affected because they draw on time points from the NCTS and an additional data source. Therefore, the start date for that indicator is adjusted for NZST but the end date for the indicator comes from the NCTS and has not been correctly adjusted for NZ time zone, effectively adding an additional 12 hours to the denominator that informs the result.
  - **S001 – Time from exposure to contact isolation/quarantine** (target 80% within 96 hours)

- **S002 – Time from case first symptom to contact isolation/quarantine** (target 80% within 96 hours)
  - **S003 – Time from test sample taken to close contact isolation/quarantine** (target 80% within 72 hours)
  - **S005 – Proportion of close contacts with confirmed or suspected COVID-19 at the time of tracing** (target <20%)
  - **P001 – Time notification to case interview** (target 80% within 24 hours)
  - **P002 – Time case notification to isolation/quarantine of contact** (target 80% within 48 hours)
  - **P004 – Proportion of contacts traced** (target 80% within 48 hours)
18. The impact of this error on key indicators is variable, depending on the circumstance. Appendix One shows the changes across the four reports as previously published on the Ministry's website. The NITC propose to republish indicator reports with corrected data.
19. The following three indicators are not affected by this error as the time points for these indicators come from sources using only NZST, or from within the NCTS using a consistent time zone.
- **L001 – Time from test sample taken to notification of positive result** (target 80% within 24 hours)
  - **C001 – Time from first symptom to test sample taken for positive cases** (target 80% within 48 hours)
  - **P003 – Time from close contact identification to contact isolated/quarantined** (target 80% within 24 hours)

#### Solution of date timestamp issue

20. A technical fix has been applied to the raw data so that time zones are correctly adjusted for NZST. A full end-to-end regression test of the data management platform has been undertaken to ensure that the fix has been successfully implemented and will support accurate reporting for COVID-19 contact tracing. This work was completed on Wednesday 30 September 2020.
21. This testing has given the Ministry full confidence in the accuracy of future reporting.

#### Indicator metrics

22. The NITC produce regular reporting on the COVID-19 Disease Indicator metrics. The performance against particular indicators are impacted by a number of factors including time between symptom onset and test result, the number of close contacts and timeliness of their identification, and total case numbers within each reporting period. Many of these factors relate to human behaviour and public awareness as opposed to the performance and delivery of the contact tracing service.

#### Context for indicator reports not meeting recommended target

23. Indicators **S001** and **S002** are affected by the inclusion of cases in MIQ as returnees' exposure is arbitrarily set to the day of arrival in New Zealand. They are placed into MIQ upon arrival and are tested if symptomatic or on approximately day 3 and day 12. Therefore, cases in MIQ will make the performance of these indicators appear low.
24. Where there are specific reasons why indicator performance is low for each reporting period, details are outlined below.

25. Detail for reporting period 11 August – 21 August 2020
- Indicators **S001**, **S002** and **C001** are significantly skewed by several of the initial community cases where case identification was delayed occurring many days after the onset of symptoms.
  - Indicator **P002** is below the target for this reporting period. During this period there were five large exposure events (greater than 80 contacts each) that were identified several days after the exposure occurred. This can occur if a case does not initially recall details during the original case interview, or if there are delays in obtaining lists of attendees. This means that all of the close contacts from these exposure events would fall outside the target time of 48 hours.
26. Detail for reporting period 21 August – 27 August 2020
- Indicators **S001** and **S002** are below target due to a particular exposure event and resulting sub-cluster during this reporting period. Backwards tracing of close contacts as part of a case source investigation resulted in a number of contacts being identified more than 14 days after exposure. These contacts were therefore not required to isolate, which impacted reporting metrics.
  - In addition, a significant number of people were not contacted due to difficulties obtaining contact information during this reporting period. This impacts on the metrics for indicators **S001**, **S002**, **S003**, **P002**, **P003**.
  - Indicator **P002** is low due to the reasons stated above in point 26.
27. Detail for reporting period 4 September – 10 September 2020
- The **S001**, **S002**, **P002**, **P004** indicators are low due to the delayed identification of three exposure events (linked to the Mount Roskill Evangelical Fellowship group) and subsequent delayed identification of close contacts. As a result, a number of close contacts were not able to be contacted within the target timeframes, although they were successfully contacted.

## Communication

28. Key messages relating to the date timestamp issue are attached as Appendix Three.

## Next steps

29. The NITC resumed producing Indicator reports as of Wednesday 30 September 2020.
30. The NITC proposes to re-publish the updated Indicator reports for the reporting period 11 August – 10 September 2020 on the Ministry's website in the same format that they were originally published (see Appendix Four). These updated reports contain the MIQ and Community data presented together in the original format.
31. Indicator reports for the period 11 September – 22 October 2020 separates the MIQ and Community data. All future reports will be published in this format. These Indicator reports will be provided to you in a separate briefing by 13 November 2020.
32. The NITC are implementing the recommendations from the root cause analysis, as detailed earlier in this report.
33. The NITC together with Auckland Regional Public Health Service (ARPHS) are undertaking a deep dive to review the core contact tracing metrics to highlight where

improvements can be made to support timely contact tracing. This will help identify specific areas where adjustments can be made to improve timeliness.

## Recommendations

We recommend you:

- a) **Agree** to the republishing of updated Indicator reports on the Ministry's website  **Yes/No**
- b) **Agree** to the proactive release of the root cause analysis report on the Ministry's website  **Yes/No**
- c) **Note** that the NITC will provide an update on Indicator reports for the reporting period 11 September – 22 October by 13 November 2020
- d) **Note** that officials are available to provide further information on this matter.



Sue Gordon  
Deputy Chief Executive  
**COVID-19 Directorate**  
Date:



Hon. Chris Hipkins  
**Minister for COVID-19 Response**  
Date: 22/11/2020

ENDS.

PROACTIVELY RELEASED

## Appendix One - Update on the COVID-19 disease indicators that were published on the Ministry's website

Key:		Reporting Period							
		11 – 21 August 2020		21 – 27 August 2020		28 Aug – 3 September 2020		4 – 10 September 2020	
Indicator	Target	Initially reported data	Revised data	Initially reported data	Revised data	Initially reported data	Revised data	Initially reported data	Revised data
S001 – Time from exposure to contact isolation / quarantine	80% within 96 hours	39%	34% ▼	14%	33% ▲	56%	58% ▲	13%	13%
S002 – Time from case first symptom to contact isolation / quarantine	80% within 96 hours	37%	17% ▼	7%	6% ▼	70%	62% ▼	26%	16% ▼
S003 – Time from test sample taken to close contact isolation / quarantine	80% within 72 hours	71%	68% ▼	50%	69% ▲	93%	64% ▼	37%	37%
S005 – Proportion of close contacts with confirmed or suspected COVID-19 at the time of tracing	Less than 20%	0.8%	1% ▼	4.2%	6.7% ▼	1.2%	2.5% ▼	2.7%	4.5% ▼
P001 – Time from notification to case interview	80% within 24 hours	98%	88% ▼	100%	93% ▼	100%	96% ▼	97%	97%
P002 – Time from case notification to isolation / quarantine of contact	80% with 48 hours	73%	60% ▼	53%	73% ▲	94%	90% ▼	89%	37% <sup>1</sup> ▼
P004 – Proportion of contacts traced in 48 hours	80% within 48 hours	86%	74% ▼	76%	72.2% ▼	96%	94.5% ▼	92%	38.4% <sup>1</sup> ▼

<sup>1</sup> P002 and P004 are low for this period due to the delayed identification of three exposure events (linked to the Mount Roskill Evangelical Fellowship group) and subsequent delayed identification of close contacts.

## Root Cause Analysis Report

### National Contact Tracing Solution Date Timestamp Issue

October 2020 – Final draft

#### **Executive Summary**

The root cause analysis (RCA) review process is complete. A principle approach guides the process:

- Thoroughness - a review of all possible causes is required.
- Fairness – participation of those involved.
- Efficiency – the time to complete the RCA is consistent with the significance of the issue being investigated.
- Independence - investigation independence reduces the impact of bias and ensure impartiality.

This issue has occurred within a new service set up to support the Ministry of Health's response to COVID-19. The recommendations are presented as draft because they are prepared without full understanding of the current operating environment of the wider COVID-19 Directorate.

The recommendations are prepared to address the risks associated with the underlying issue and the probability of its reoccurrence. The recommendations reflect the Ministry's value of Kaitiakitanga.

1. Acknowledge the commitment of NITC staff and partners to secure as soon as possible a resolution to the issue.
2. Formally recognise and celebrate the commitment of the teams that is the hallmark of CMMI Level 1.
3. Recognise the inherent process and systems risks associated with the assessment of capability maturity aligned to CMMI Level 1 with activity underway to reach Level 2.
4. Promptly progress NITC capability maturity level/s by securing enough resource and expertise to establish a system-based QMS framework including an acceptance testing approach for NCTS. The objective is to mitigate system risks to an acceptable level including the risk of diminished trust and confidence in the Ministry's response to COVID-19.
5. Promptly assess staff development and training needs to match NCTS business requirements, identify any skill or training gaps for existing staff, and analyse the benefit of a targeted workforce development plan and if required a supporting recruitment plan.
6. Promote with NITC staff and partners timely communication of a concern or issue; consider adopting a structured approach such as the RACI or RASCI matrix to safeguard individual commitment to a culture of continuous quality improvement.

*Kaitiakitanga*

*Ka mua, ka muri*

The past is clearly visible, but the future is not

The future comes out of the past

The only constant is change

## Process

A root cause analysis (RCA) is a comprehensive term encompassing a collection of problem-solving methods used to identify the underlying or fundamental cause for a non-conformance to a standard or a quality problem. The term 'root cause' refers to the precise point in a causal chain where a corrective action or intervention is required to prevent recurrence. In general, an RCA is completed soon after an issue is resolved. The RCA assumes there is no obvious human error and no previously identified concern on professional practice and or personal conduct.

To support the RCA a table top review has been conducted. This involved a review of associated documents, discussion with relevant staff and additional technical advice was sought.

The timeframe scope of the review is the operating period of National Investigation and Tracing Centre (NITC)<sup>1</sup> to the time of the incident from 18 March to late September 2020 ie, six months.

## About National Contact Tracing Solution (NCTS)

- NCTS is an information technology (IT) solution to support case investigation, management and contact tracing. It's a single national platform to be accessed by PHUs, NITC and Healthline. NCTS enables management of cases, contacts and clusters.
- NCTS monitors the performance of the system and help identify trends at a regional and national level. All data related to COVID-19 cases and close contacts will be entered and securely stored in the solution.
- NCTS is an adaptation of Salesforce. Salesforce is a customer relationship management platform operating as software as a service (SaaS). The Ministry contracted Deloitte as the platform developers.
- Since NCTS was stood up on 6 April 2020, several enhancements have been made, including integration with EpiSurv, border health requirements and the NZ COVID Tracer Application (App).
- The Contact Tracing Data Management Overview is outlined in Appendix One - Diagram 1.
- The purpose of the data monitoring platform is to create a curated data layer across all data sets involved in Contact Tracing. This enables the Ministry's end-to-end Monitoring Framework for COVID-19 Cases.
- The NCTS data monitoring platform is a solution that has been configured using Amazon Web Services (AWS) data management services to support the collection, transformation and presentation of individual case related data to support reporting and monitoring national contact tracing services for the COVID-19 response.
- The NITC routinely publish data on ten system performance indicators using data from three distinct sources; EpiSurv (case notification), Éclair (for laboratory results) and the NCTS (for all case and contact tracing management records). EpiSurv and Éclair data is recorded in Local Time (Pacific/Auckland).
- Amazon Athena<sup>2</sup> is used as the query tool for reporting from the three sources of COVID-19 case related data.
- A Qlik Sense Application (Qlik App) was developed to enable hourly reporting. The Qlik App went live in mid-August 20.

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<sup>1</sup> Initially NITC was known as the national close contact service. The name changed as the service scope and purpose changed.

<sup>2</sup> Amazon Athena aka Athena is an interactive query service that makes it easier to analyse data using standard SQL.

## Background

1. On 22 September the National Investigation and Tracing Centre (NITC) identified that since 18 August 2020, contact tracing indicators related to timeliness were not adjusted to the Local Time (Pacific/Auckland). This meant an additional 12 hours were included in the time period when reporting on seven of the ten reporting metrics. Contact tracing indicators are outlined in Appendix Two – Diagram 2.
2. The performance indicators measure the aggregated performance of the close contact and investigation service. The indicators are not prepared to track the journey of an individual COVID-19 case and their close contacts. As such the implications of a defect or an error does not affect the quality of the NITC services or the service providers. Of importance the defect did not cause harm to any person with COVID-19.
3. An accepted 'always' software requirement is compliance to an agreed time zone (in most cases local time) and preferred language ie, to develop a product that will meet local business requirements. Is it important to note that NCTS internal tracking clocks were always correct and accurate; the issue arises when combining Salesforce data with other system's data in the raw layer.
4. Coordinated Universal Time or UTC<sup>3</sup> is a time standard used across the world. The Salesforce software used by the National Contact Tracing Solution (NCTS) records time and date fields in UTC. The UTC timestamp<sup>4</sup> is identified by a trailing 'z' code<sup>5</sup> added at the end of the time and date fields. For accurate monitoring and reporting in the New Zealand context the timestamp needs to reflect New Zealand (NZ) standard time (+12 hours).

What was the issue?

A defect was identified in the raw data layer where the source Salesforce date and time data fields were not recorded in the original Salesforce format. The conversion removed a trailing 'z' from the timestamp which identifies the time zone UTC plus zero hours aka Zulu time. In other words, UTC without the trailing z code remains UTC.

This is not in line with the business requirement of the data management layer to reflect local time, nor was it apparent to the data user.

Because of this defect it was not possible for the data user to identify in the raw or curated data layer which dates were in UTC or local time (Pacific/Auckland), and where date times received from external systems are in local time. This resulted in reporting errors across the COVID-19 monitoring framework as the data calculations assumed that all dates were local time.

Therefore, reporting of the indicator was not adjusted for local time (Pacific/Auckland). The exclusion of the 'z' code effectively added an additional 12 hours to a denominator sourced from NCTS data and used in calculating the result for seven of the 10 performance indicators.

5. Although the preliminary investigation quickly identified the technical cause and the necessary fix was completed by 28 September, a further investigation for possible system related root cause/s is outlined below.
6. This review will assess why this defect was not picked up until NITC transitioned from an intensive and time-consuming manual reporting process to hourly reporting on the Qlik App.

<sup>3</sup> Coordinated Universal Time (UTC) is the primary time standard by which the world regulates clocks and time. It is within about 1 second of mean solar time at 0° longitude and is not adjusted for daylight saving time. It is effectively a successor to Greenwich Mean Time (GMT).

<sup>4</sup> A timestamp is a sequence of characters or encoded information identifying when a certain event occurred, usually giving date and time of day, sometimes accurate to a small fraction of a second.

<sup>5</sup> The z code stands for zulu code and indicates an offset of zero (0) hours from UTC

## Step 1: Define the problem

### Problem One: Defect in software development

7. The identified cause of the problem is the defect<sup>6</sup> in the software.
8. In mid-June when business acceptance testing was completed it was assumed that the UTC datetime included the 'z' code in the raw and curated data. The trailing 'z' code was described as essential in the NCTS data requirements although the z code needs to be removed from the data string when curated data is queried via Athena.
9. Athena is the query tool used by the NITC report team. The lack of the 'z' code meant the reporting team was unaware they needed to adjust the indicators affected ie, reports prepared with data from the NCTS and one other data source.
10. The objective of the Qlik App development was to achieve close to real time reporting with hourly updates on performance across the system. The Qlik App changed the reporting baseline from a result measured within a 24-hour period to a result measured within an hour. In the context of this issue, the result was confounded by plus 12 hours<sup>7</sup> added to the reporting denominator for seven of the 10 indicators.
11. Another objective of introducing the Qlik App was to improve the responsiveness of NITC because the performance indicators measures the aggregated timeliness of engagement with COVID-19 people plus close contacts and their comparative progress across the disease & contact tracing pathway.
12. As such a comparison between previous reports and the new reports would demonstrate improved granularity as the time for each date was to the hour; previously it was to the 24-hour day. Because of the Qlik App it was expected the actual performance would shift ie, the performance would improve or worsen because of improved accuracy.
13. When checking the new results, the NCTS reporting team preparing the close contact and border health indicators reports observed unexpected variance in the results. The team proposed it was linked to data from NCTS being in UTC time and not local NZ time. The team sought to confirm the matter of concern as an issue. And as noted above, on 22 September NITC identified the issue and a response plan was implemented.
14. The timestamp defect was not known to the NCTS reporting team therefore from this date the results for seven of the 10 performance indicators were incorrect. From the 18 August reports were released for the 10 performance indicators available via the Qlik App. The affected performance indicator reports have now been re-issued with corrected results.

Problem statement: There was a standing defect in quality of the source data related to the date timestamp that adversely affected the reliability of the performance indicator reports released from 18 August till the time the reporting was paused to allow the fix to occur.

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<sup>6</sup> Defect is an imperfection or deficiency in a work product where it does not meet its requirement or specifications

<sup>7</sup> Due to NZ daylight saving time from 29 September 20 the time offset is + 13 hours

Problem Two: Software development occurs in flight

15. The COVID-19 close contact service did not exist till 18 March 2020. The national close contact service stood up NCTS on 6 April 2020. Since this time NITC with Deloitte the solution developer has overseen a series of enhancements to NCTS including extension for border health, integration with EpiSurv and the Qlik App.
16. In simple terms NCTS developments progresses across a standard work flow:

**Business need > Business requirement > Data requirement > Developer enhancement > Testing > Acceptance**

17. The focus of the RCA is the quality of NCTS data management as the issue has diminished trust and confidence with report reliability on the NITC performance indicators. A fundamental business need is the preparation of timely and reliable reports.
18. In mid-June business acceptance testing of data sourced from NCTS was conducted and produced a gap analysis. From this activity a list of issues was identified and addressed by Deloitte. The absence of the UTC 'z' code to the date timestamp to match Athena's query tool requirements was not identified. No other business or user testing analysis occurred after this time.
19. As a result of the investigation into the background to this issue it was found the 'z' code was absent since the time the NCTS platform was stood up. Further when responding to the issue, the developer acknowledged there was no user expectation of the need to modify timestamp dependent on NCTS data prior to reporting on performance indicators.
20. The reporting team attempted a fix with a workaround on the Qlik App. A fix of this kind may have addressed the specific reporting issue, but it would not have isolated the underlying timestamp issue or resolved the defect. Assuring the quality of the reporting inputs depends on a balance of timely and targeted quality assurance (QA) activity to assure adherence to appropriate development procedures and processes to prevent product defects, and quality control to detect and correct product defects.
21. A quality management system (QMS) <sup>8</sup> is necessary to assure the quality of NITC close contact service provision including NCTS as a critical business enabler. A NCTS testing strategy or approach can fulfil this function with a testing plan across the product work flow ie, a testing plan can incorporate the developer's quality assurance activity to evidence comprehensive coverage and support shared risk mitigation actions in partnership with the developer.
22. In general terms the function of testing strategy or a testing approach to plan, design and execute tests, analyse, monitor and control in order to evaluate the quality of the developer's work products such as match to requirements, user story<sup>9</sup>, design and code.
23. The extent of quality related testing activity can be matched to the business's appetite for risk. Within a strategic approach risk base testing<sup>10</sup> includes timely notification to the business owner for critical decision-making including acceptance sign off or highlighting an issue that may affect the trust and confidence and or reputation of NITC.

Problem statement: The business acceptance testing did not detect the defect.

<sup>8</sup> A quality management system (QMS) A formal system that documents the structure, processes, roles, responsibilities and procedures required to achieve effective quality management. It is aligned with an organisation's purpose and strategic direction.

<sup>9</sup> User story is a user or business requirement consisting on one sentence expressed in the everyday or business language which is capturing the functionality a user needs, the reason behind it, any non-functional criteria and including acceptance criteria.

<sup>10</sup> Risk based testing is the engagement, selection, prioritisation, and use of testing activities and resources are based on corresponding risk types and risk levels (informed by the appetite for risk)

### Problem Three: Quality Assurance

24. Business acceptance testing is not an end in itself; it is one quality assurance activity in a suite of interactive QA actions aligned to a comprehensive strategic approach.
25. As NITC business needs grew NCTS was developed at pace. The business needs grew in response to the rapidly escalating need to contain COVID-19 in New Zealand. The growth was not linear; rather there was exponential growth as the scope of NITC accountability and NCTS functionality changed to match the requirements of New Zealand's COVID-19 response. For example, the extension to NCTS to include border health and the expansion of its use by the twelve public health units (PHUs). As such it is reasonable to observe NCTS time and resources were required to complete iterative change to the high availability<sup>11</sup> IT platform in a pressured operating environment.
26. Managing this scale of change in the absence of a fully a mature operating environment is challenging. Defects and mistakes can be expected and NITC has not matured to the level where a systematic approach to quality has been established. A capability maturity model<sup>12</sup> is one framework for appraising the process and capability maturity of the organisation.
27. The Capability Maturity Model Integration model (CMMI) is used to provide guidance for developing or improving processes that meet the business goals of an organization. A diagram of CMMI is attached in Appendix Three. As stated by CMMI Institute "The maturity level or capability level of an organization provides a way to characterize its capability and performance. Experience has shown that organizations do their best when they focus their process improvement efforts on a prioritized and manageable number of practice areas at a time."
28. A mature system will afford reasonable protection and evidence an acceptable level of capability to safeguard against system or enabler defects, as well as human error and mistakes affecting the system performance. The maturity of NITC and NCTS are inextricably linked by purpose and time. At the time of preparing this report and in accordance with the CMMI model the NITC and NCTS capabilities are assessed as Level 1 with activity underway to reach Level 2.
29. A risk-based approach to QA can inform the level of investment required to progress to a satisfactory level of capability maturity. At a minimum the investment should be to a level to prevent a repeat of a situation the same or like this issue. As noted, human error and mistakes can occur when the system has not developed capability with a strategic approach to business processes and a quality framework.
30. For a wider context to this issue there is direct relevance with the World Health Organisation (WHO)'s approach to quality to achieve patient safety. The WHO states "Traditionally, the individual provider who actively made the mistake (active error) would take the blame for such an incident occurring and might also be punished as a result. Unfortunately, this does not consider the factors in the system that led to the occurrence of error (latent errors). It is when multiple latent errors align that an active error reaches the patient."

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<sup>11</sup> High availability (HA) is a characteristic of a system which aims to ensure an agreed level of operational performance, usually uptime, for a higher than normal period. For example, hospitals and data centres require high availability of their systems to perform routine daily activities. Availability refers to the ability of the user community to obtain a service or good, access the system, whether to submit new work, update or alter existing work, or collect the results of previous work. If a user cannot access the system, it is – from the user's point of view – unavailable. Generally, the term downtime is used to refer to periods when a system is unavailable.

<sup>12</sup> The Capability Maturity Model was originally developed as a tool for objectively assessing the ability of government contractors' processes to implement a contracted software project.

31. The WHO supports a system approach to quality and explains this by stating “Humans are guarded from making mistakes when placed in an error-proof environment where the systems, tasks and processes they work in are well designed. Therefore, focusing on the system that allows harm to occur is the beginning of improvement, and this can only occur in an open and transparent environment where a safety culture prevails. This is a culture where a high level of importance is placed on safety beliefs, values and attitudes and shared by most people within the workplace.”
32. It is recognised that a commitment to staff development is vital in fostering a high level of staff satisfaction and supports staff retention in a positive workplace culture. In relation to the last six months NITC’s work has produced a significant level of unique business knowledge; NITC is exposed to the risk of loss even with low staff turnover, as such professional development is a benefit to NITC capability. NITC can enhance capability building by engaging staff with quality improvement principles and supporting their individual contribution to develop a culture of quality.

Problem Statement 3: Product testing did not occur within a quality assurance framework.

## Step 2 Additional Information

### 1. Timeline

As a record of completeness an incident timeline has not been prepared to assist the RCA.

### 2. Source of information

- Situation Report prepared by Deloitte
- Data Management & Monitoring Report Test Plan and Summary – NCTS Test Lead
- NITC information from Astrid Koornneef, NITC Group Manager
- International Software Testing Qualifications Board Glossary
- 2020 American Society for Quality Terms & Definitions
- Discussions with Eddie Gray, Technology Director Population Health, Ministry of Health
- Incident response team briefs
- International Software Testing Qualifications Board Syllabus: Certified Tester Foundation Level
- NCTS Data Platform for Contact Tracing Monitoring Design Document

## Step3: Identify possible causal factors

This issue occurred in a snapshot of time and the possible casual factors reflect the operating environment in which the issue occurred. They do not reflect individual behaviour or action. The following factors may have contributed to the root cause of the issue. The possible causal factors also support the assessment that in accordance with the CMMI model NITC and NCTS capability is Level 1 with activity underway to reach Level 2.

In no priority order and as they relate NITC enablers, systems and processes:

### 1. Process

Managing change at pace which impacted on:

- Not enough time to check business needs to all data requirements
- Limited full record keeping of agreements on business needs, business requirements
- Not enough time to preserve, repeatedly transfer business and developer knowledge
- Not enough resource with the necessary skill to support all change and quality assurance related processes
- Little time to complete enough staff and contractor induction
- A challenging operating environment to keep QA processes front of mind

## 2. System

Rapid development of the system and:

- Individual or group assumptions made with little time to check and recheck
- The business needs altered with rapidity to achieve exponential steps in the first six months of operating
- Little inbuilt system resilience to consistently perform at a high level within the context COVID-19 and its impact on the lives of New Zealanders (including the staff working in or with NITC or NCTS)
- Existing system and monitoring functions could not be adapted to detect system and process issues such as non-conformity to business requirements
- In context of the pressure to perform and the time available, it wasn't possible for NCTS reach an accepted level of performance with supporting processes

## 3. Governance

Meeting the business design needs while establishing adequate monitoring and oversight at pace such as:

- Experiencing time and resource constraints with limited resource to support governance 'line of sight' activity over the effectiveness of the system enablers, partner functions and key relationships
- Accountability and relationship forums to guide service, system and enabler planning & design were completed at pace
- Consolidating accountability structure, roles and functions could not be prioritised due to the pressure to achieve business goals

### **Step 4: Identify root causes**

A three-legged RCA method<sup>13</sup> was applied to identify the root cause of the issue.

The three legs of the RCA are:

#### 1. Direct cause

The immediate reason and cause/s that lead to the non-conformity is:

- a. A defect in NCTS production phase.

#### 2. Detectability

The process controls that failed or not in place to detect the non-conformity:

- a. The business acceptance testing did not detect the defect.

#### 3. System Cause

The core programme policies, procedures, processes and overall governing system that allowed the problem/s to occur and go undetected:

- a. NITC approach to quality assurance acceptance testing is not established.
- b. A system-based approach to quality and culture is not established.

#### A Related Finding

- a. There was no person directed error either by commission or omission identified in this RCA.

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<sup>13</sup> A targeted RCA method to solving persistent and/or a systemic problem

## Step 5: Recommended solutions

The following recommendations are presented as draft for consideration by the Ministry and NITC leadership:

1. Acknowledge the commitment of NITC staff and partners to secure as soon as possible a resolution to the issue.
2. Formally recognise and celebrate the commitment of the teams that is the hallmark of CMMI Level 1.
3. Recognise the inherent process and systems risks associated with the assessment of capacity maturity aligned to CMMI Level 1 with activity underway to reach Level 2.
4. Promptly progress NITC capability maturity level/s by securing enough resource and expertise to establish a system-based QMS framework including an acceptance testing approach for NCTS. The objective is to mitigate system risks to an acceptable level including the risk of diminished trust and confidence in the Ministry's response to COVID-19.
5. Promptly assess staff development and training needs to match NCTS business requirements, identify any skill or training gaps for existing staff, and analyse the benefit of a targeted workforce development plan and if required a supporting recruitment plan.
6. Promote with NITC staff and partners timely communication of a concern or issue; consider adopting a structured approach such as the RACI or RASCI matrix<sup>14</sup> to safeguard individual commitment to a culture of continuous quality improvement.

In closing the RCA was not possible without the timely assistance and advice from many people including Ministry's NITC team, contractors and Deloitte's staff.

The reviewer is Christine Nolan, Quality Manager National Screening Unit  
The RCA report style and limitations are outlined in Appendix Four.  
Date: October 2020

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<sup>14</sup>A responsibility assignment matrix to describe the participation by various roles in completing tasks or deliverables for a project or business process. It's used for clarifying and defining roles and responsibilities in cross-functional or departmental projects and processes.

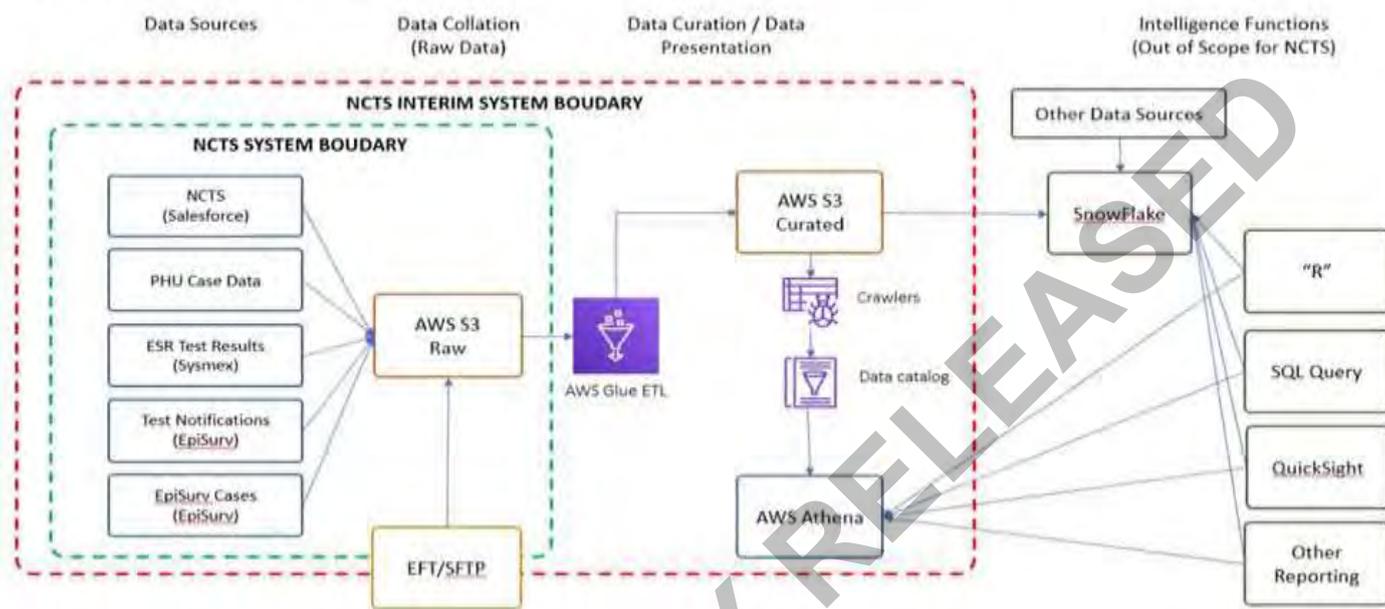
RACI: Responsible, Accountable, Consulted, Informed or RASCI: Responsible, Accountable, Supported, Consulted, Informed

## APPENDIX ONE

### Diagram 1: Contact Tracing Data Management Overview

The diagram below describes at a high level the Data Monitoring Platform components. Source systems on the right send files to an S3 bucket in the NSS AWS<sup>15</sup> account. These are then processed by AWS Glue and other tools. Data is then made available in two different ways, either via the AWS S3 Curated data set (file based), or AWS Athena (allows SQL queries to be run).

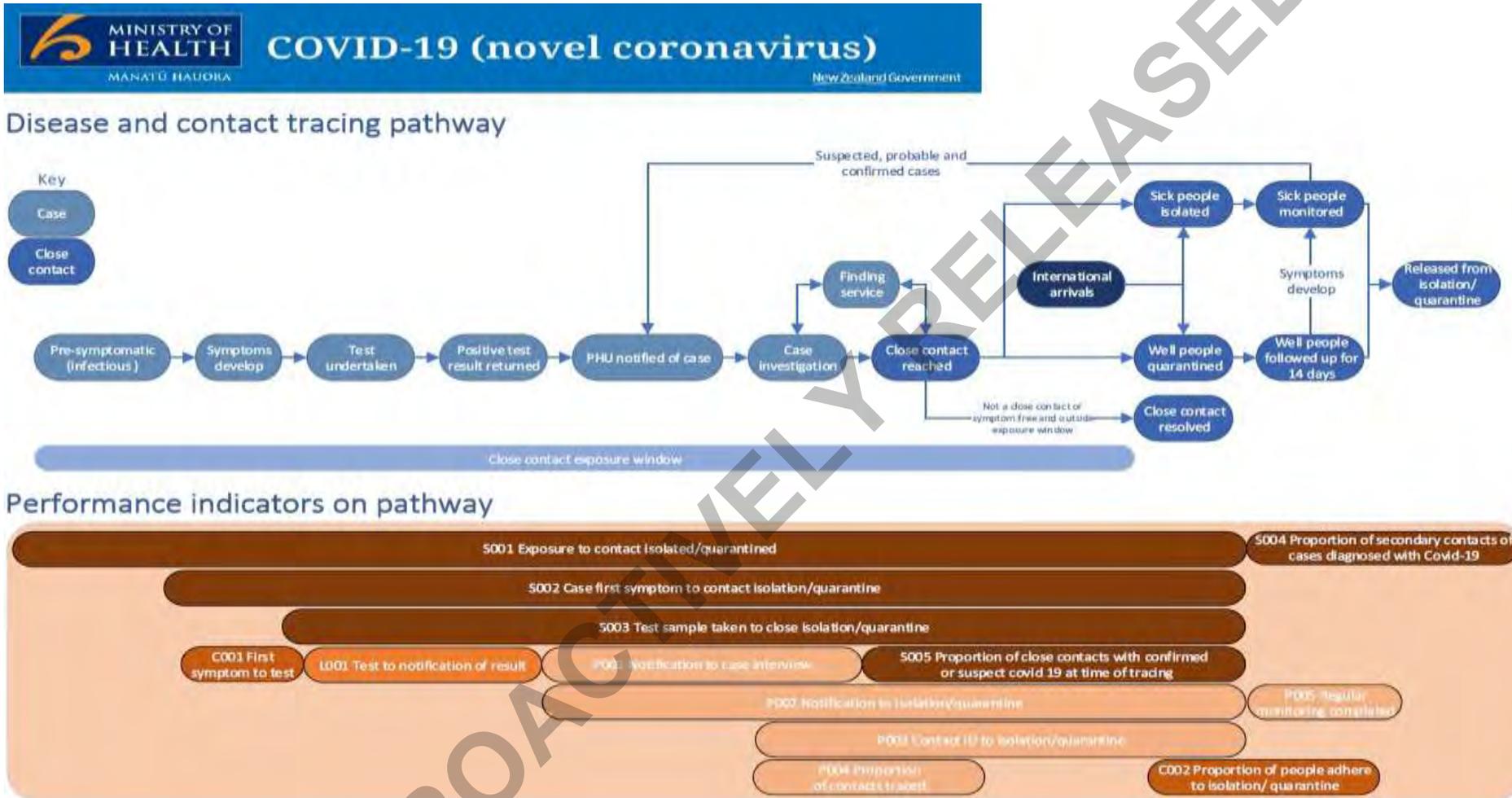
Contact Tracing Data Management Overview



<sup>15</sup> National Screening Solution Amazon Web Services

APPENDIX TWO

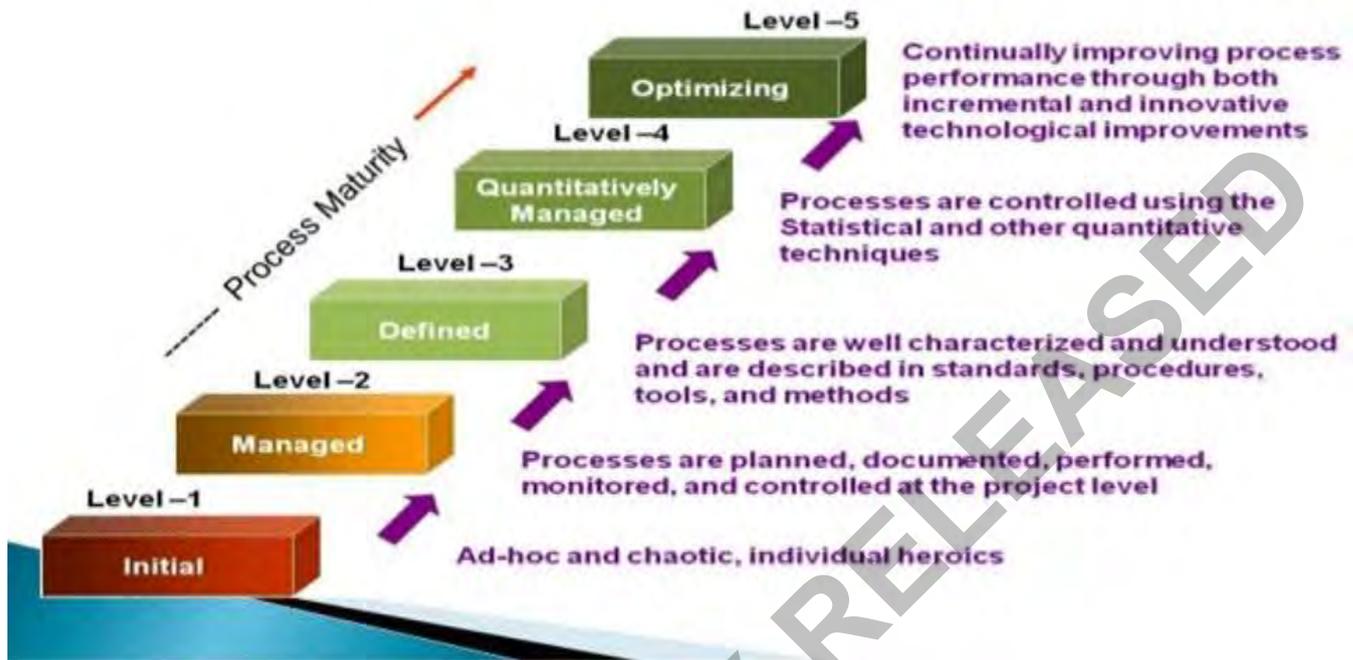
Diagram 2: Disease and Contact tracing Pathway with Performance Indicators



APENDIX THREE

Capability Maturity Model Integration (CMMI) - sourced from CMMI Institute

### CMMI Maturity Levels



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## APPENDIX FOUR

### RCA Report style and limitations

#### Style

- The IS terms used in this report are all drawn from the *Standard Glossary of Terms used in Software Testing Version 3.4*
- The body of the report is prepared in the passive voice to link and balance the flow of information and to avoid statements of blame.
- This is a table top review. There were no formal interviews with the participants or

#### minutes taken Limitations

- The reviewer has no training or expertise in Information System development, testing or use.
- The RCA has drawn reference from the named reports and material as it relates to the RCA only.
- The RCA report is not prepared to update the previously released material or related reports.
- It is assumed the reader of the RCA report has a working knowledge of the Ministry's COVID-19 response and contemporary knowledge of the COVID-19 accountability structure, role and functional responsibilities, enablers and support processes.
- Any gaps or errors in the report are the reviewer's own.

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## Appendix Three - Key messages on contact tracing time stamp issue

### Summary

- Contact tracing is a vital part of New Zealand's fight against COVID-19.
- Once a positive case of the virus has been identified, Public Health Units and the Ministry of Health use contact tracing methods to track down people who may have been exposed to the virus, so we can stamp the virus out before it has a chance to spread widely.
- The effectiveness of New Zealand's contact tracing is measured against performance metrics as part of the COVID-19 disease indicators.
- On 22 September 2020, we identified that a data processing glitch following the switch from a manual to automated reporting process resulted in an inflated time frame being used for key performance measures during a five-week period.
- The glitch, which related to the reporting software not being adjusted to account for New Zealand's time zone, automatically added 12 hours to timing measures so that the Ministry effectively had longer reporting deadlines for seven of its ten reporting measures for the period between 19 August and 22 September.
- This issue was not identified during testing of the software that supports the automated reporting process.
- The error was detected in late September and an immediate internal investigation was carried out. A fix was implemented by 30 September 2020.
- Data used in our performance measures reported publicly has now been rerun and corrected data will be published in the next week.
- We have delayed the publication of our corrected data to coincide with the completion of the root cause analysis, so that any findings could inform our advice to the Minister prior to the public release of the information.
- The data processing issue has now been resolved and we have full confidence in the accuracy of future reporting on contact tracing.
- The internal investigation, which was finalised on 19 October, made several recommendations that are now being progressed, including introduction of a new governance model to support ongoing development of the National Contact Tracing Solution (NCTS), and formalising structures around the technology development, enhancement and testing cycles.
- It's important to note this issue only affected reporting: our contact tracing methods and processes are robust and continue to be an effective measure in fighting COVID-19.

## Appendix Four - Updated COVID-19 Disease Indicator Summary Reports for the period 11 – 21 August, 21 – 27 August, 28 August – 3 September, 4 – 10 September 2020

### National Indicator Summaries for August 11 to August 21 2020

Report date: 30/09/2020

These provisional Covid-19 Disease Indicators provide an end-to-end view of the public health response to COVID-19. This report covers the period from 11 August, the notification of the first community case in the current outbreak, to 21 August 2020. It includes both community cases and cases in Managed Isolation and Quarantine (MIQ) and includes close contacts only.

The indicators have been grouped by focus area.

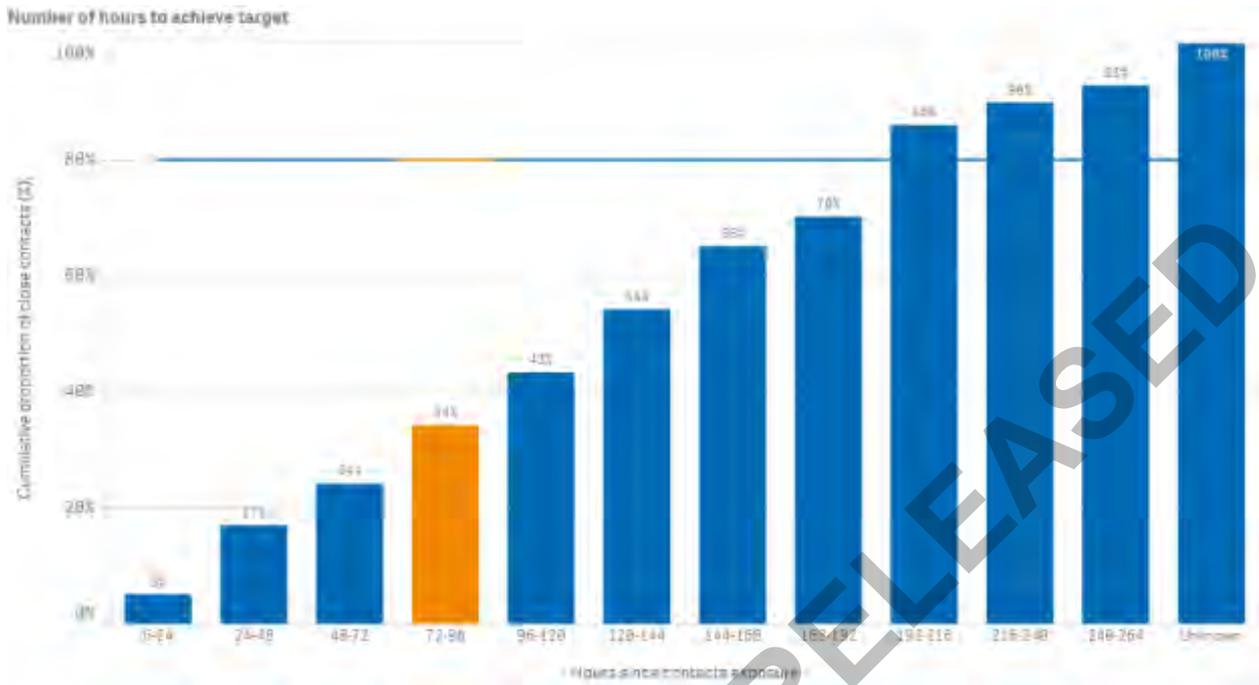
- **System-level indicators:** provide a view of the end-to-end collective actions of the wider health system response (indicators prefixed with an S#).
- **Community-level indicators:** focus on community behaviours and the impacts of communication, education and societal attitudes (indicator prefixed with a C#).
- **Laboratory sector indicators:** provide insights into the effectiveness of testing facilities and programmes (indicators prefixed with an L#).
- **Public health sector indicators:** provides a national overview on contact tracing and case and close contact management by Public Health Units (PHUs) and the National Investigation and Tracing Centre (indicators prefixed with a P#).

Points of interest:

- The indicators that include a date of symptom onset (S002 and C001) are significantly skewed by several of the initial community cases who appear in this indicator but were diagnosed in mid-August, many days after the onset of symptoms.
- Performance for indicator P002 (Time from case notification to isolation/quarantine of contact) is lower (60%) than the target of 80% for this period. This is largely due to the addition of new close contacts to exposure events *after* the 48-hour period since case notification. This can happen for several reasons, including a case recalling further details following the original case interview or the time it takes to prepare a list of close contacts (e.g. a list of people who visited a workplace). However, the contact tracing performance reported by indicator P004, only includes close contacts of exposure events which were entered in the National Contact Tracing Solution within 48 hours of case notification. For this period, 74% of the close contacts were identified and contacted within 48 hours of case notification.
- The system (S#) and community (C#) indicators are less relevant for cases in MIQ as new arrivals are placed into MIQ upon arrival and are tested if symptomatic or around day 3 and day 12. As the cases are already in isolation/quarantine, the time from exposure event (S001) to quarantine of contact, or symptom onset (S002 and C001) to testing or quarantine of contact is not very informative. Additionally, these two indicators - which have a target of 80% reached within 96 hours - will always appear low given that the first test is done on day 3.

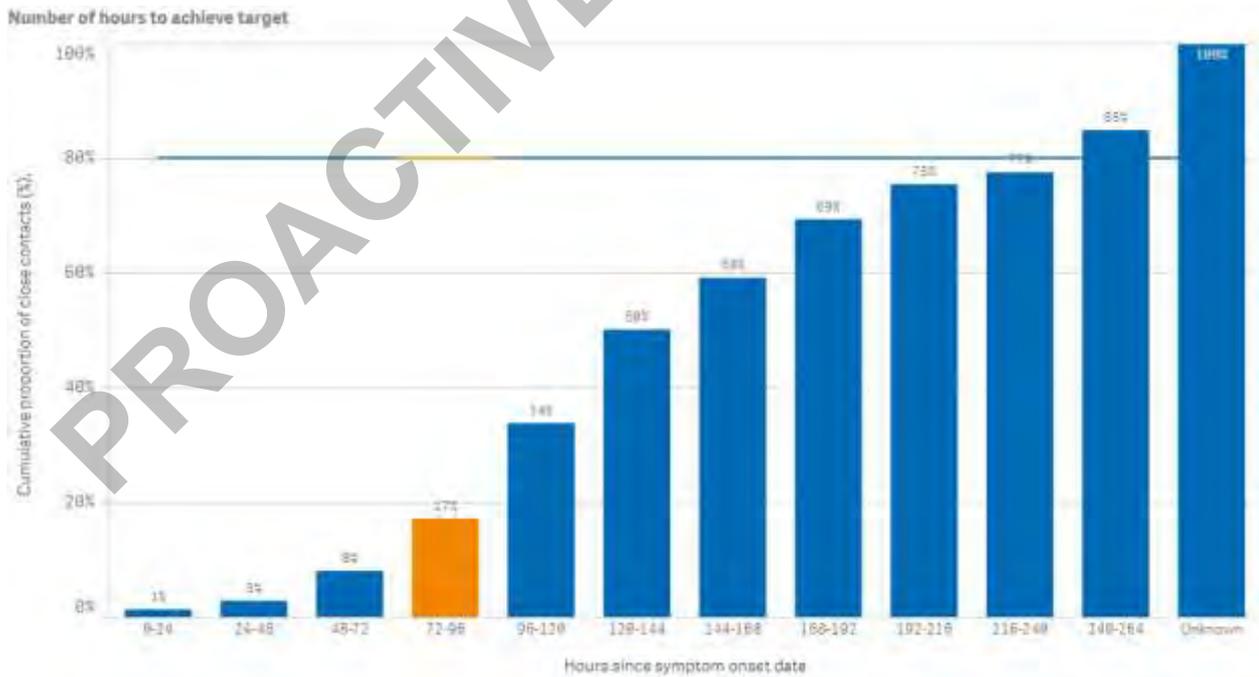
### S001 - Time from exposure to contact isolation / quarantine

Target – 80% within 96 hours



### S002 - Time from case first symptom to contact isolation / quarantine

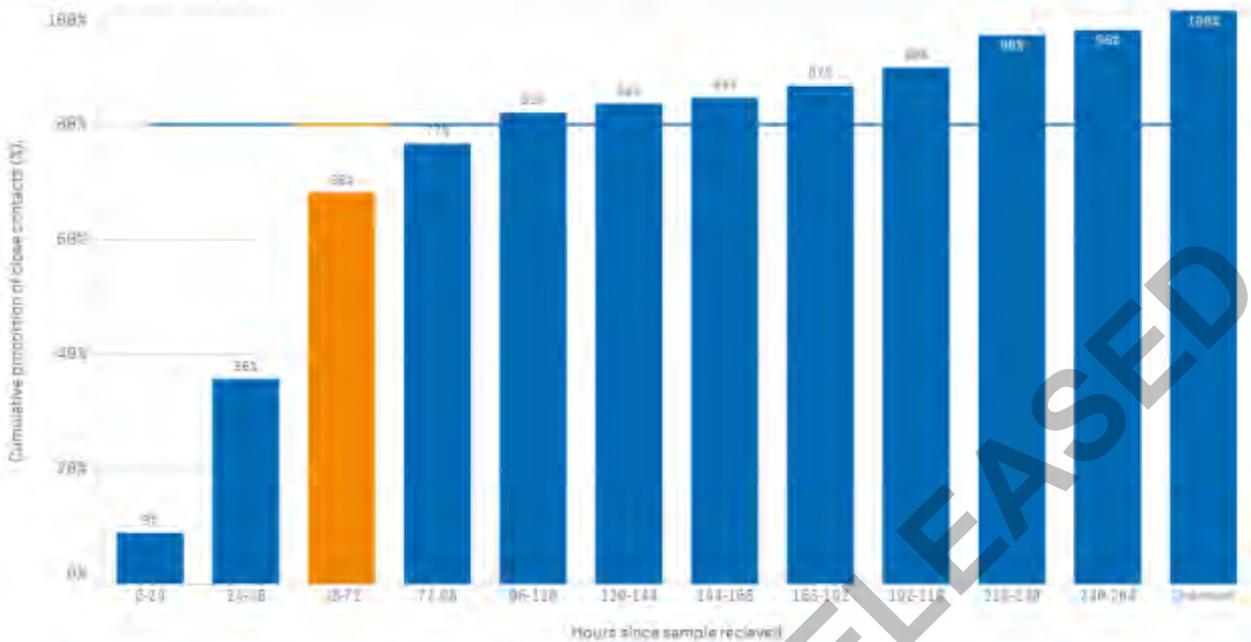
Target – 80% within 96 hours



**S003 - Time from test sample taken to close contact isolation / quarantine**

Target – 80% within 72 hours

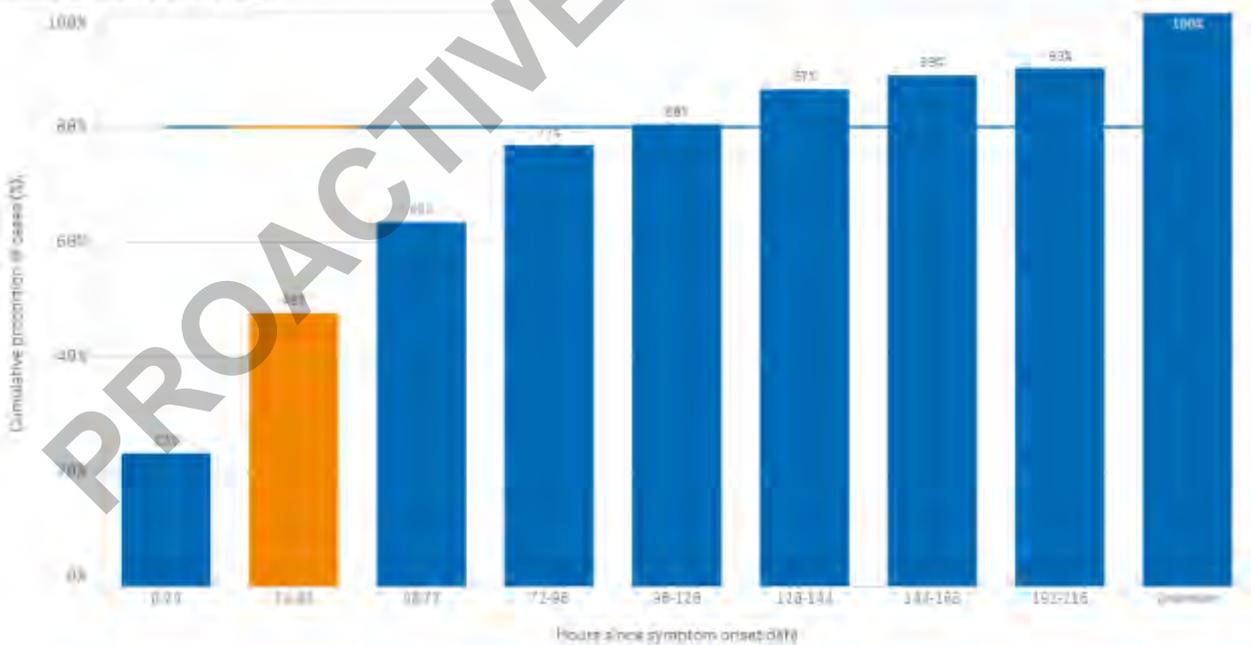
Number of hours to achieve target



**C001 - Time from first symptom to test sample taken for positive cases**

Target - 80% within 48 hours

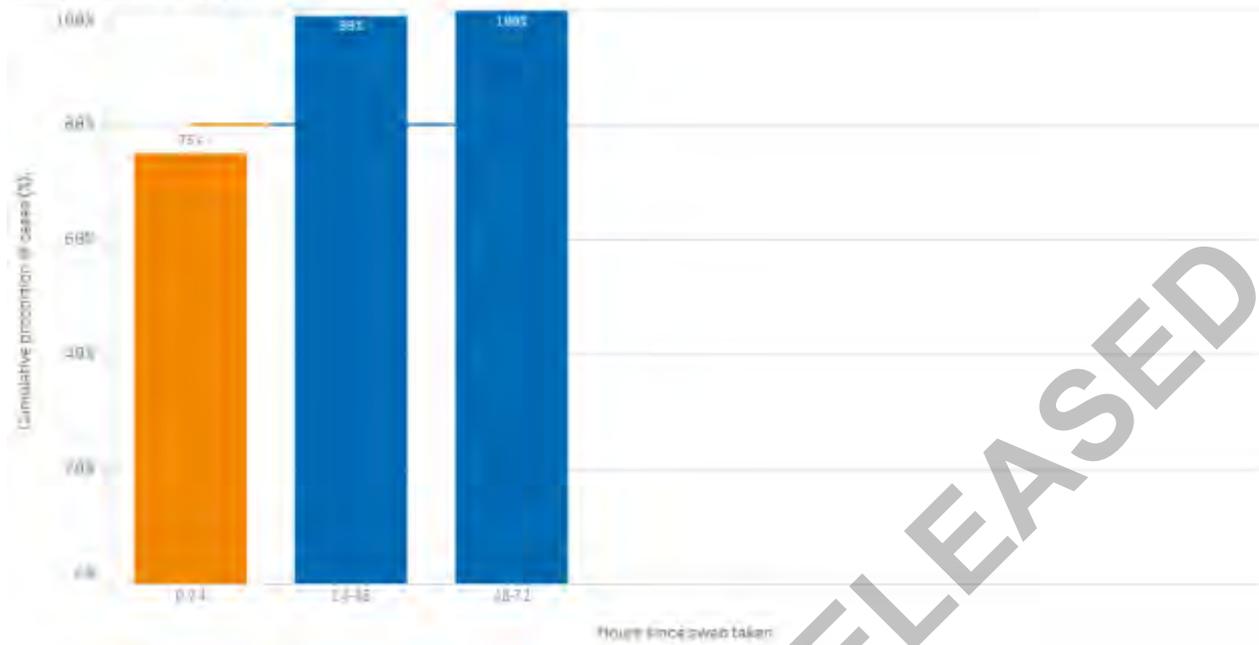
Number of hours to achieve target



### L001 - Time from test sample taken to notification of positive result

Target - 80% within 24 hours

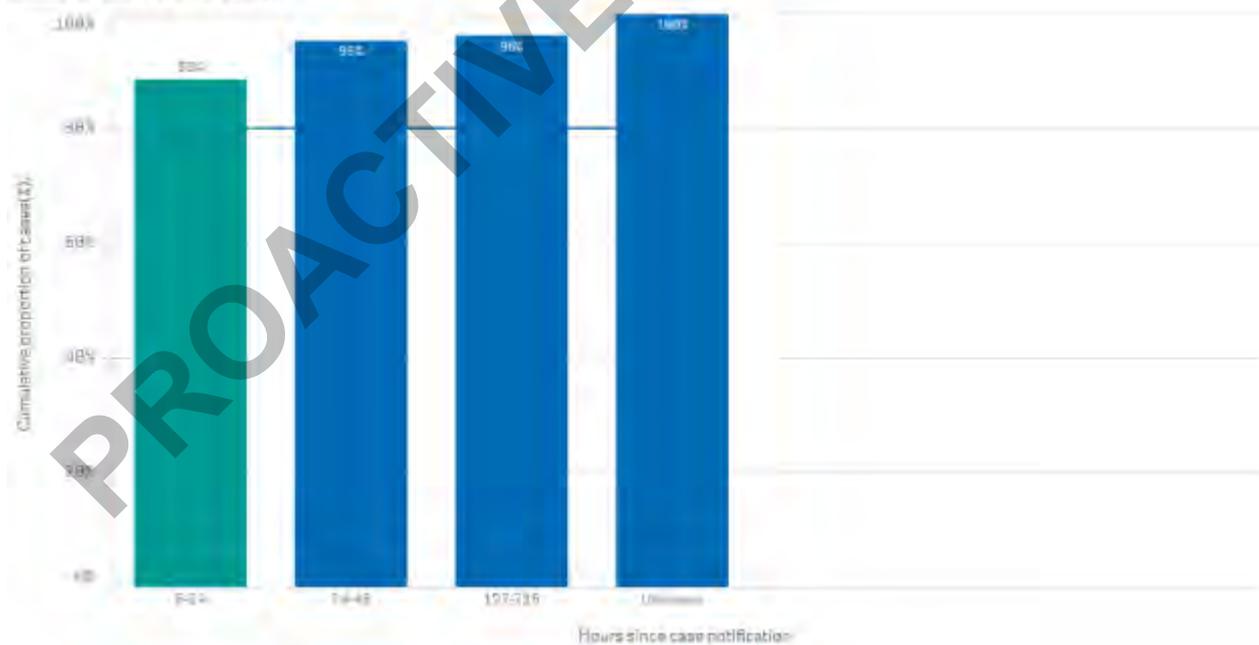
Number of hours to achieve target



### P001 - Time from notification to case interview

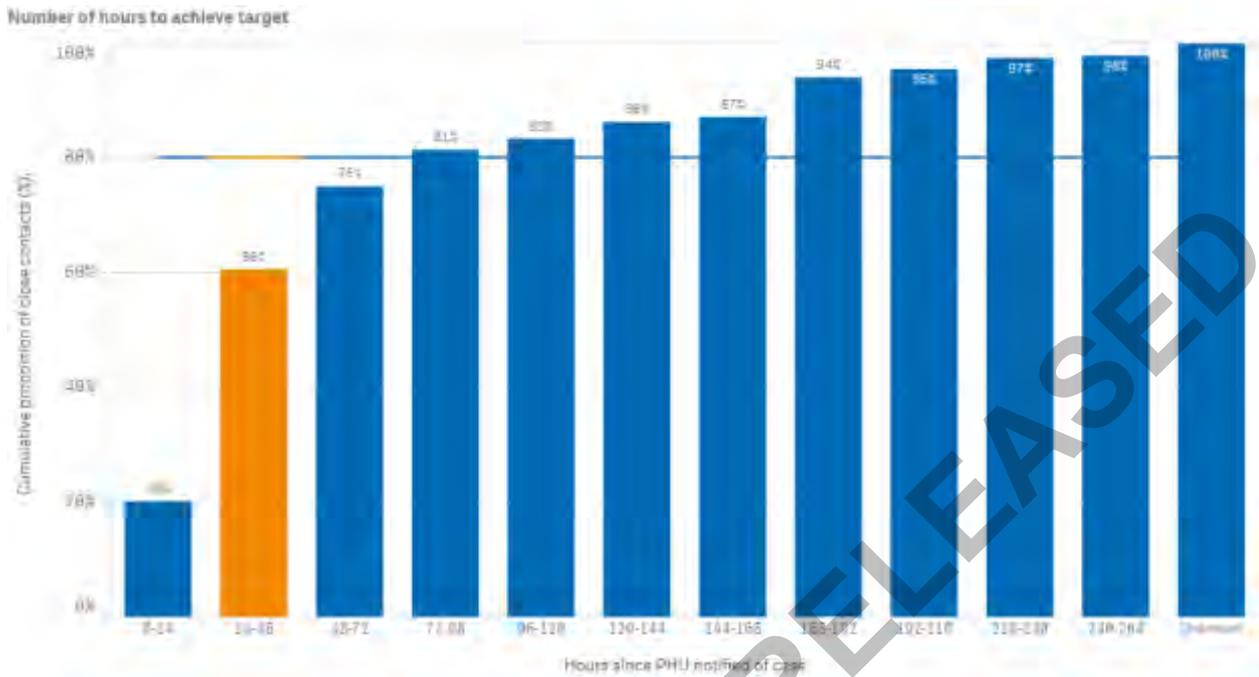
Target - 80% within 24 hours

Number of hours to achieve target



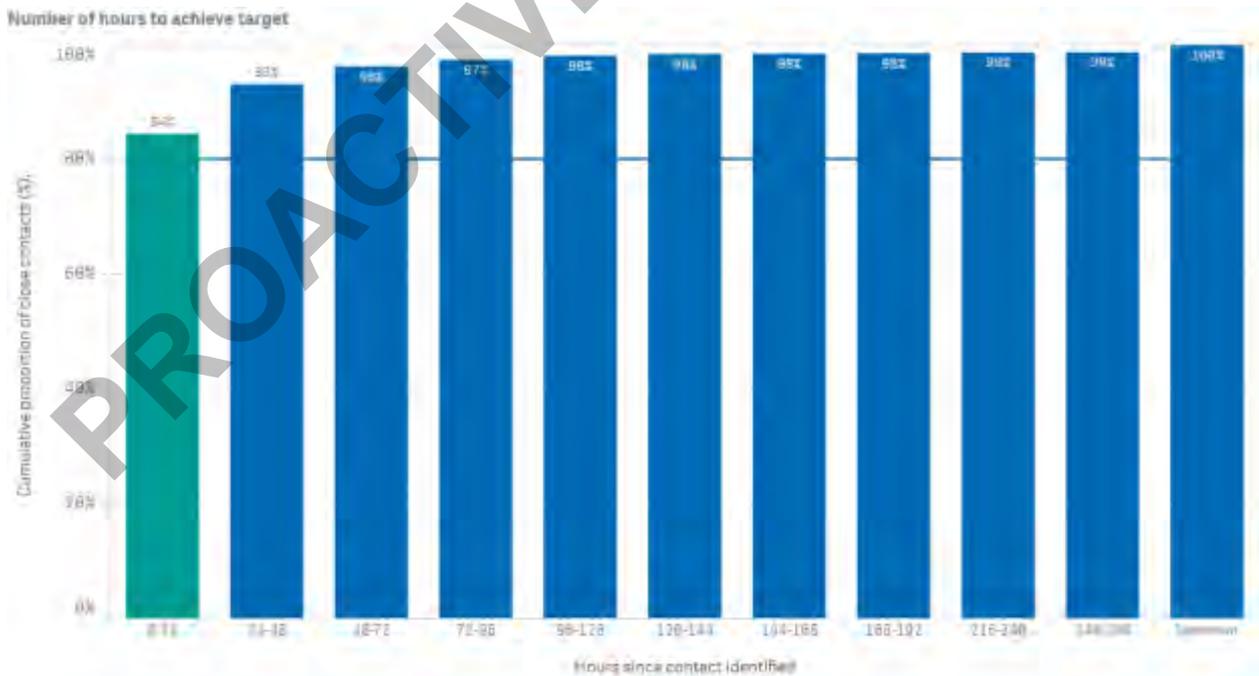
**P002 - Time from case notification to isolation / quarantine of contact**

Target – 80% within 48 hours



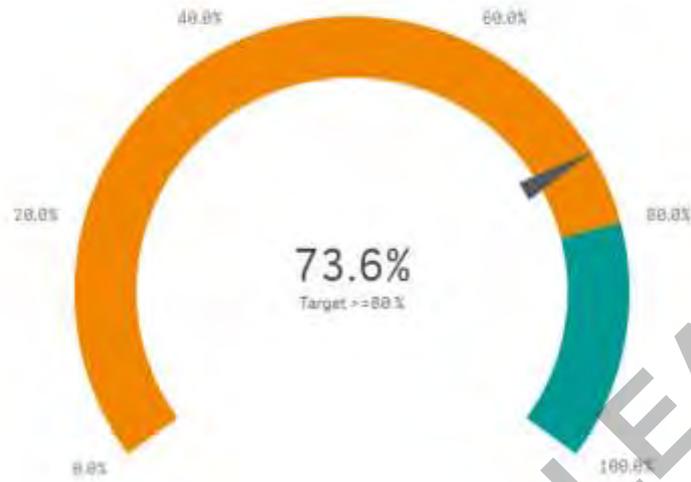
**P003 - Time from close contact identification to isolated / quarantined**

Target – 80% within 24 hours



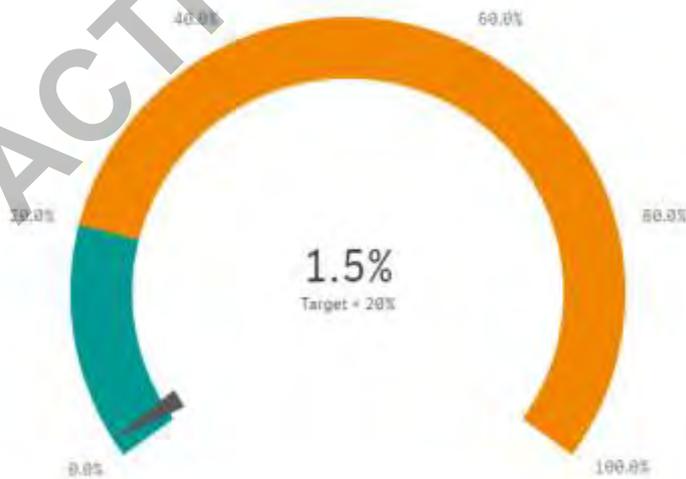
**P004 - Proportion of contacts traced in 48 hours**

Target – 80% within 48 hours



**S005 - Proportion of close contacts with confirmed or suspected COVID-19 at the time of tracing**

Target – less than 20%



# Summary of COVID-19 Disease Indicators for 21 August 2020 to 27 August 2020

Report date: 30/09/2020

This summary report presents performance against the COVID-19 Disease Indicators between 21 August 2020 to 27 August 2020.

## Key:

 Performance against target (S001, S002, S003, C001, L001, P002, P003)

## System-level indicators

These indicators provide a view of the end-to-end collective actions of the wider health system response (indicators are prefixed with an S#).

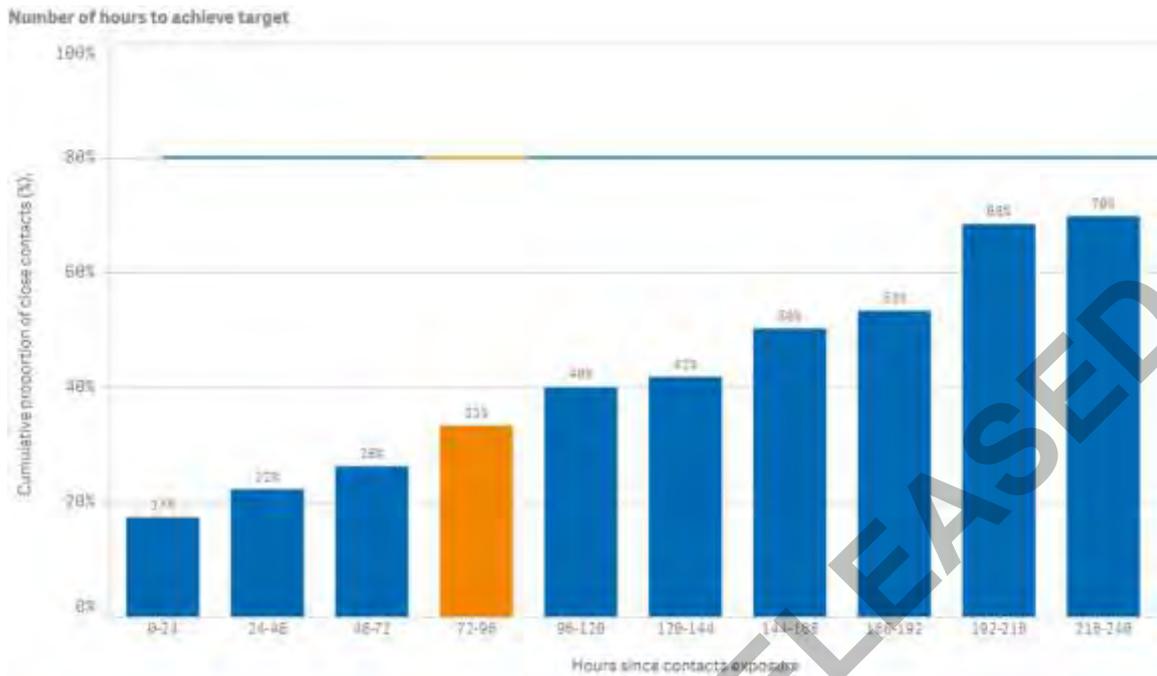
The metrics for Indicators **S001** and **S002** are low mainly due to a particular exposure event and resulting sub-cluster during this period. Around 400 people were identified as close contacts through exposure to a case that was identified via a source attribution investigation. In this instance, the Case was not identified until more than 14 days after the exposure event. After 14 days from an exposure, the need to isolate close contacts has passed as this is the full incubation period, therefore close contacts were not isolated. Despite impacting metrics this delayed case identification and subsequent delayed close contact communication demonstrates that an effective trace back process occurred, leading to successful source identification.

In addition, a significant number of people have not been contacted due to a delay in obtaining phone numbers during this reporting period. This impacts on the metrics for indicators **S001, S002, S003, P002, P003**.

Indicators **S001** and **S002** are also affected by the inclusion of cases in MIQ as returnees' exposure is arbitrarily set to the day of arrival in New Zealand. They are placed into MIQ upon arrival and are tested if symptomatic or on approximately day 3 and day 12. Therefore, cases in MIQ will make the performance of these indicators appear low.

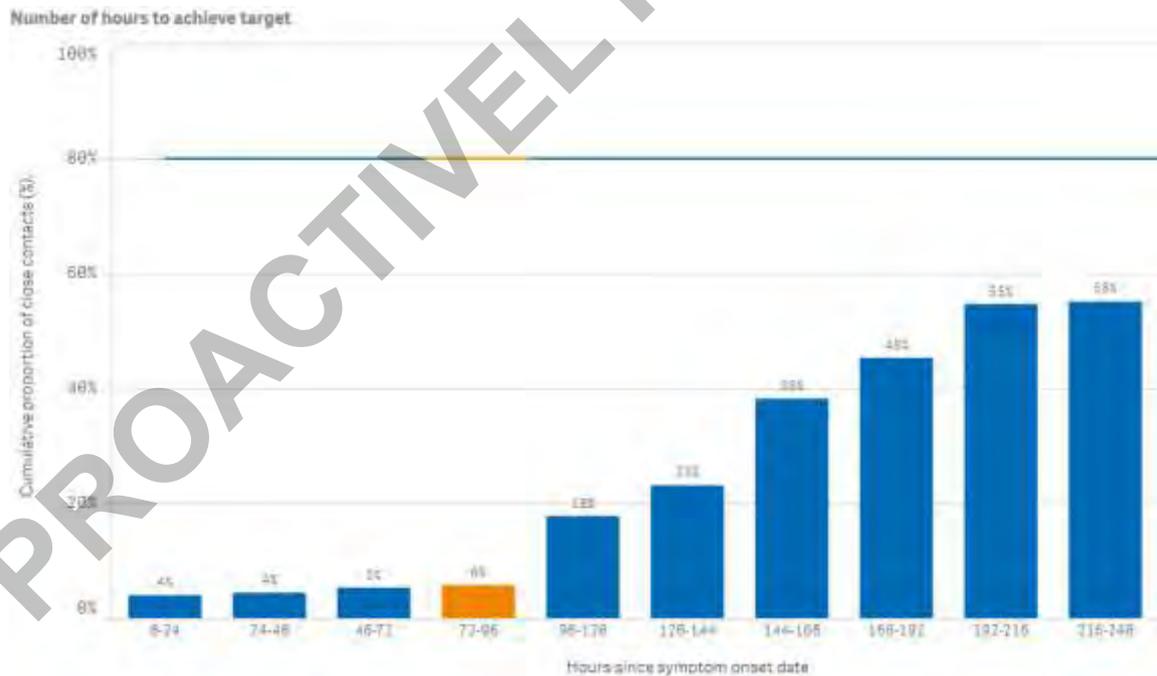
### S001 - Time from exposure to contact isolation / quarantine

Target – 80% within 96 hours



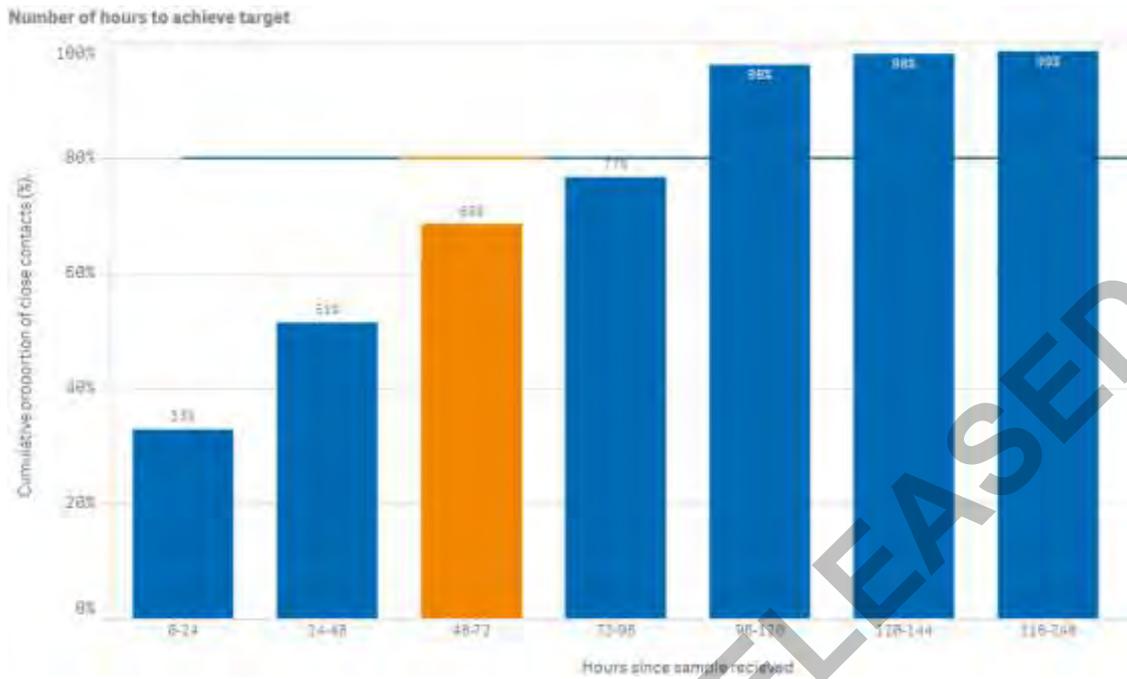
### S002 - Time from case first symptom to contact isolation / quarantine

Target – 80% within 96 hours



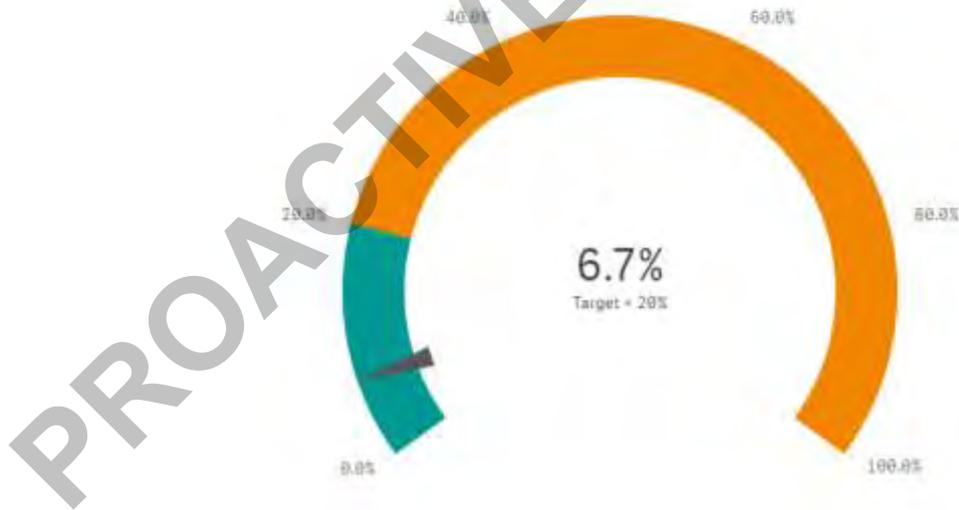
### S003 - Time from test sample taken to close contact isolation / quarantine

Target – 80% within 72 hours



### S005 - Proportion of close contacts with confirmed or suspected COVID-19 at the time of tracing

Target – less than 20%

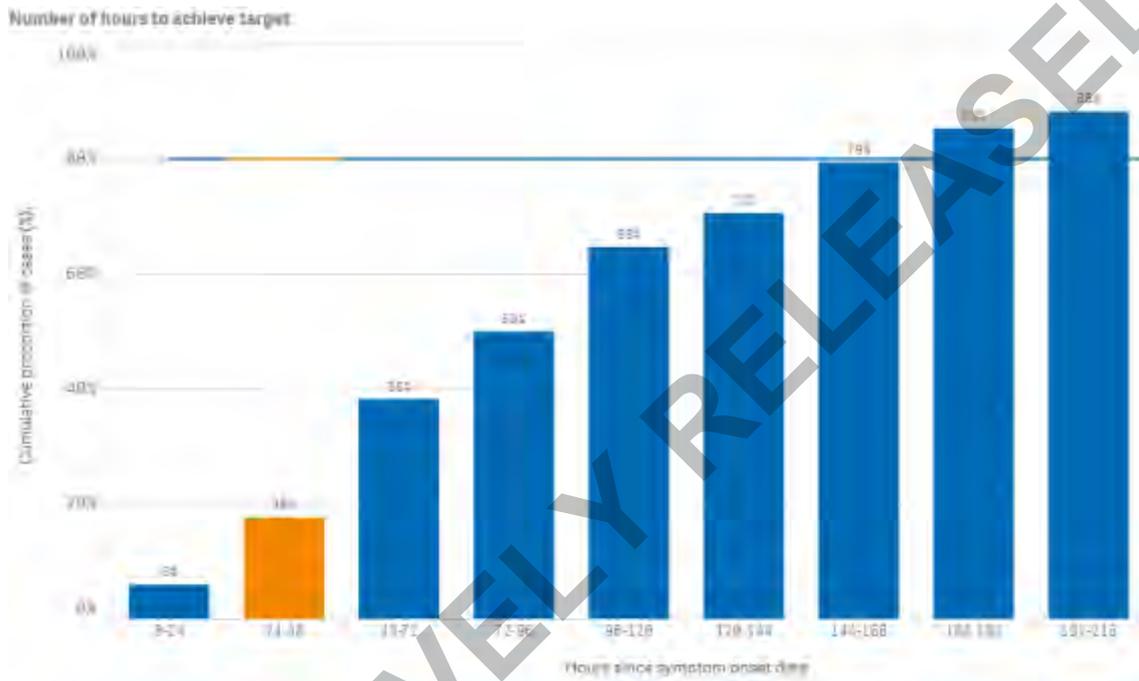


## Community-level indicator

This indicator focuses on community behaviours and the impact of communication, education and societal attitudes (indicator is prefixed with a C#). Indicator **C001** is affected by the inclusion of cases in MIQ as returnees' exposure is arbitrarily set to the day of arrival in New Zealand. They are placed into MIQ upon arrival and are tested if symptomatic or on approximately day 3 and day 12. Therefore, cases in MIQ will make the performance of these indicators appear low.

### **C001 - Time from first symptom to test sample taken for positive cases**

Target - 80% within 48 hours

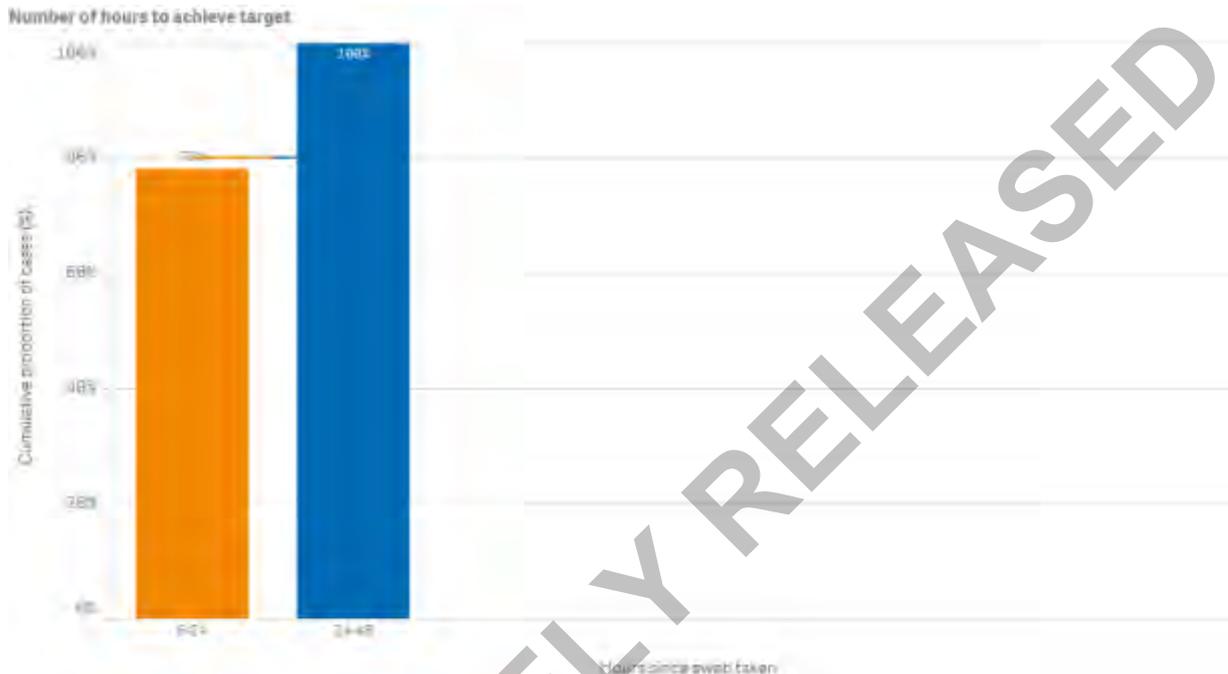


## Laboratory sector indicator

This indicator provides insight into the effectiveness of testing facilities and programmes (indicator is prefixed with an L#). The time period measured is from the time the laboratory received the sample to notification of a positive result.

### **L001 - Time from test sample taken to notification of positive result**

Target - 80% within 24 hours



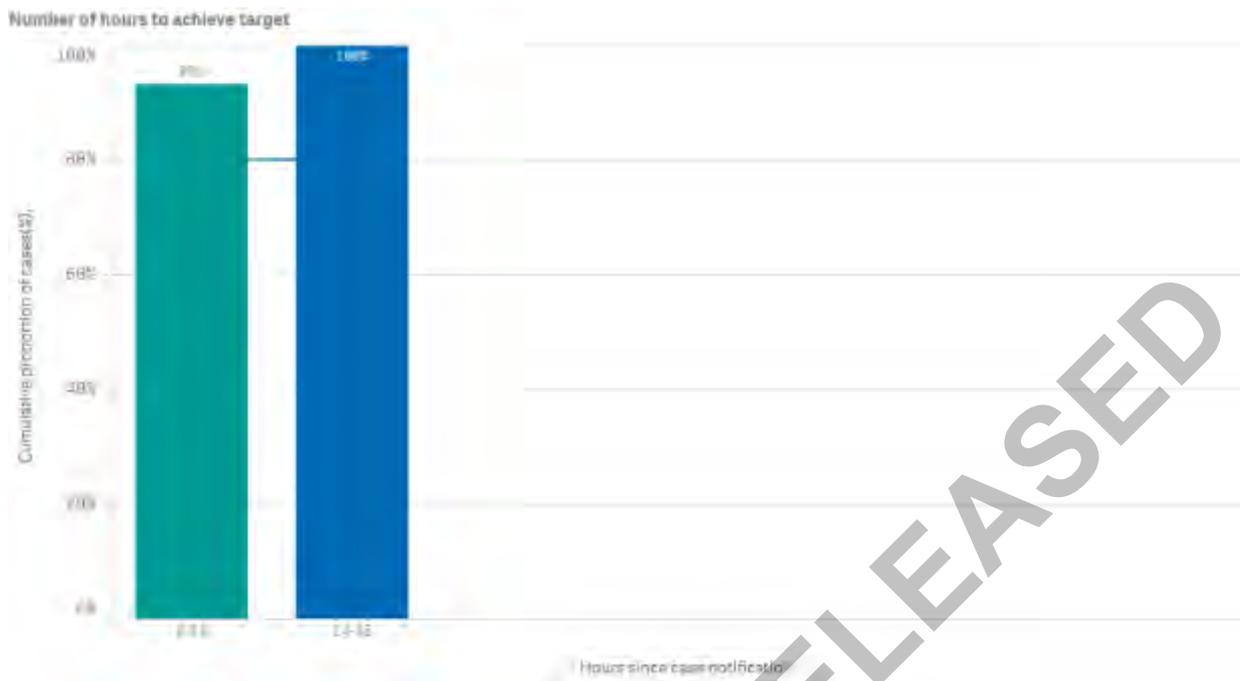
## Public health sector indicators

These indicators provide a national overview of contact tracing as well as case and close contact management by public health units (PHUs) and the National Investigation and Tracing Centre (indicators are prefixed with a P#).

Performance for indicator **P002** (Time from case notification to isolation/quarantine of contact) is lower (53%) than the target of 80% for this period. This is partially due to the addition of new close contacts to exposure events *after* the 48-hour period since case notification. This can happen for several reasons, including a case recalling further details following the original case interview or the time it takes to prepare a list of close contacts (e.g. a list of people who visited a workplace, or attended a church service). However, the contact tracing performance reported by indicator **P004**, which only includes close contacts of exposure events which were entered in the National Contact Tracing Solution within 48 hours of case notification. For this period, 76% of the close contacts were identified and contacted within 48 hours of case notification.

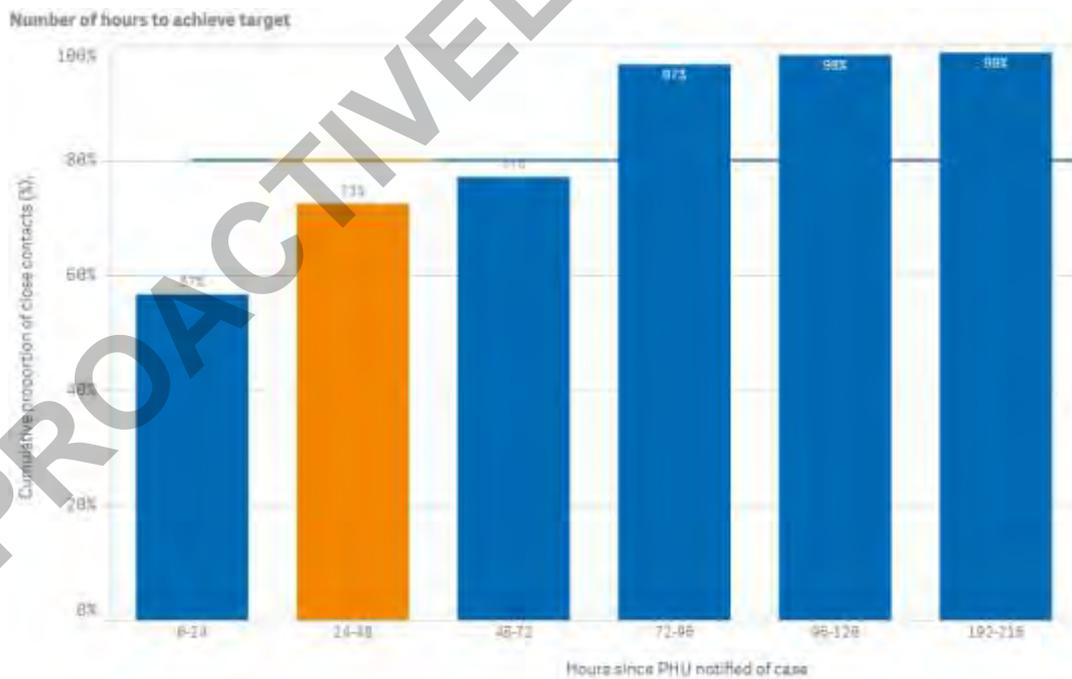
### P001 - Time from notification to case interview

Target - 80% within 24 hours



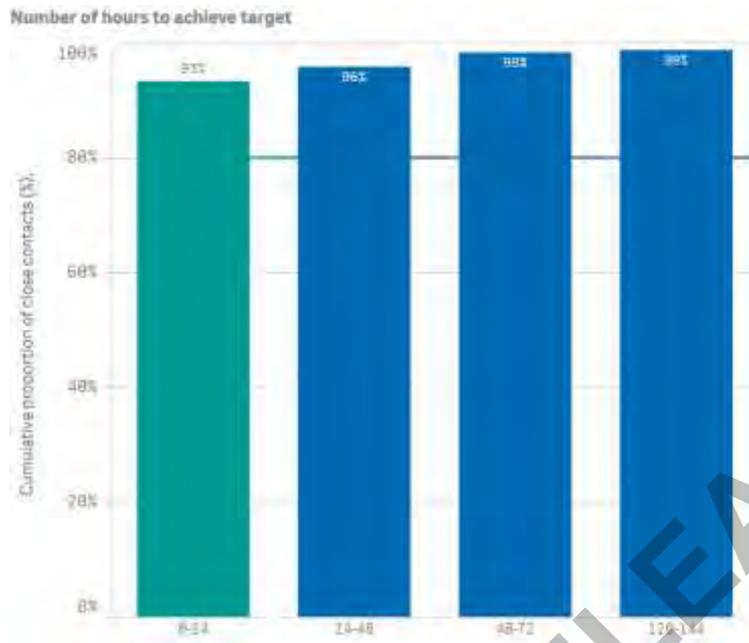
### P002 - Time from case notification to isolation / quarantine of contact

Target – 80% within 48 hours



### P003 - Time from close contact identification to isolated / quarantined

Target – 80% within 24 hours



### P004 - Proportion of contacts traced in 48 hours

Target – 80% within 48 hours



# Summary of COVID-19 Disease Indicators for 28 August 2020 to 3 September 2020

Report date: 08/09/2020

This summary report presents performance against the COVID-19 Disease Indicators between 28 August 2020 to 3 September 2020.

## Key:

- Performance below target
- Performance improved compared to the previous reporting period
- Performance above target
- Performance lower compared to the previous reporting period

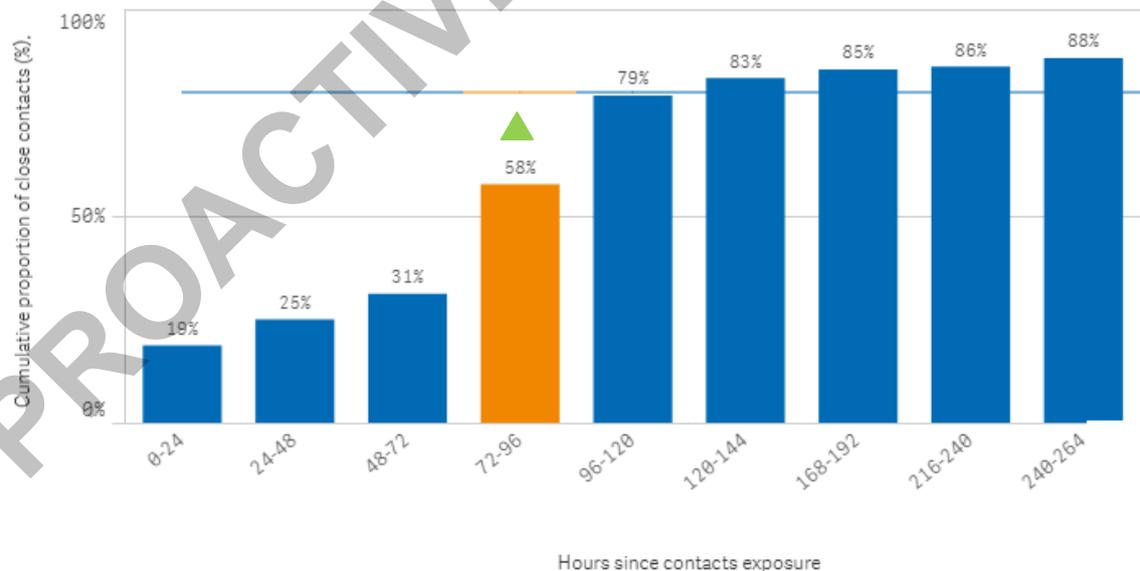
## System-level indicators

These indicators provide a view of the end-to-end collective actions of the wider health system response (indicators are prefixed with an S#).

### S001 - Time from exposure to contact isolation / quarantine

Target: 80% within 96 hours

Number of hours to achieve target



### S002 - Time from case first symptom to contact isolation / quarantine

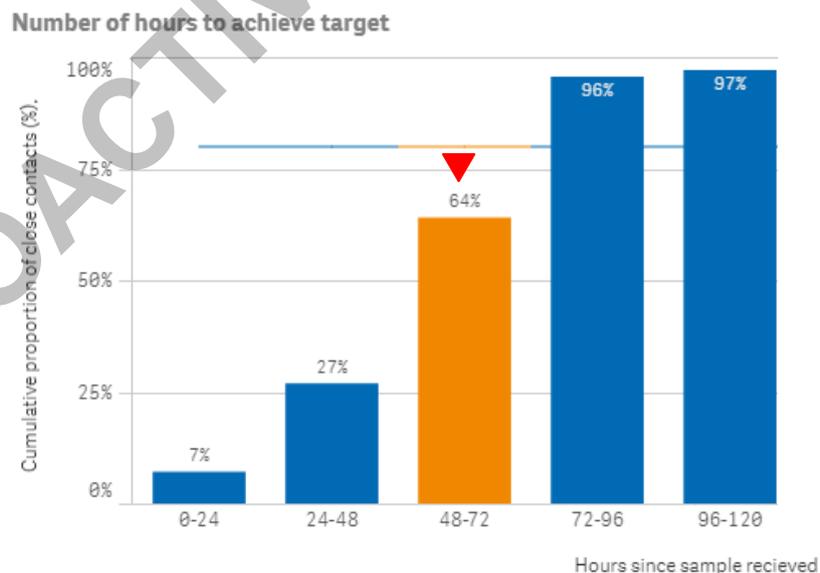
Indicator **S002** is affected by the inclusion of cases in MIQ as returnees' exposure is arbitrarily set to the day of arrival in New Zealand. They are placed into MIQ upon arrival and are tested if symptomatic or on approximately day 3 and day 12. Therefore, cases in MIQ can make the performance of this indicator appear low.

Target: 80% within 96 hours



### S003 - Time from test sample taken to close contact isolation / quarantine

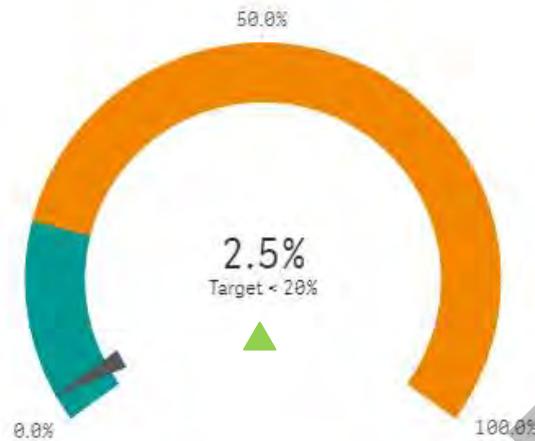
Target: 80% within 72 hours



## S005 - Proportion of close contacts with confirmed or suspected COVID-19 at the time of tracing

Target: less than 20%

Proportion of close contacts with confirmed or suspected Covid-19 at the time of tracing



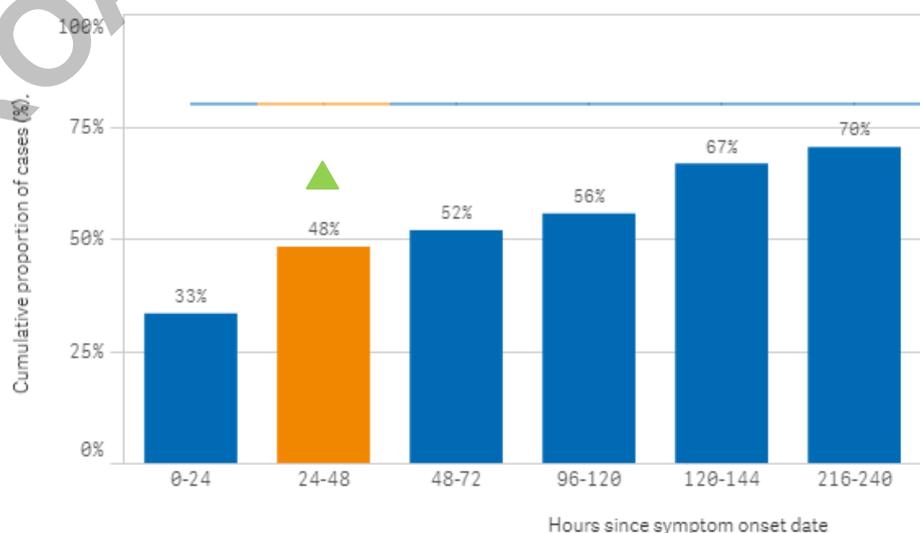
## Community-level indicator

### C001 - Time from first symptom to test sample taken for positive cases

This indicator focuses on community behaviours and the impact of communication, education and societal attitudes (indicator is prefixed with a C#). The time period measured is from the symptom onset date as recorded in EpiSurv to the date/time the laboratory received the sample. The time between a sample taken and the receipt date/time of the sample at the laboratory, including transport time, will affect this indicator. Indicator **C001** is also affected by the inclusion of cases in MIQ as returnees are placed into MIQ upon arrival and are tested if symptomatic or on approximately day 3 and day 12. Therefore, cases in MIQ can make the performance of this indicator appear low.

Target: 80% within 48 hours

Number of hours to achieve target



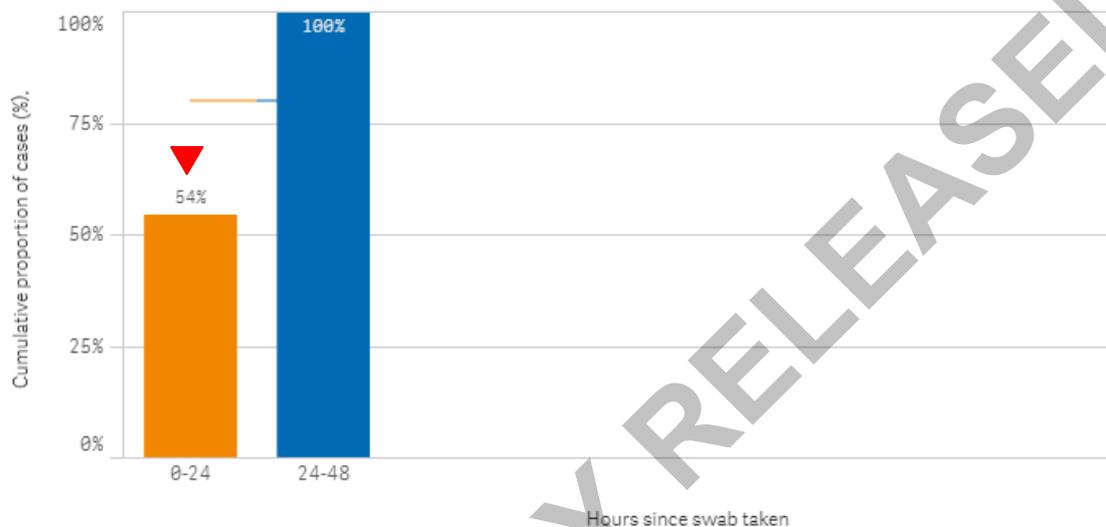
## Laboratory sector indicator

This indicator provides insight into the effectiveness of testing facilities and programmes (indicator is prefixed with an L#). The time period measured is from the time the laboratory received the sample to notification of a positive result in EpiSurv. There was a substantial increase in the number of tests during this reporting period compared to the previous reporting period (21 August 2020 to 27 August 2020). In this reporting period, over 80 percent of positive results were notified at hour 38.

### L001 - Time from test sample taken to notification of positive result

Target: 80% within 24 hours

Number of hours to achieve target



PROACTIVELY RELEASED

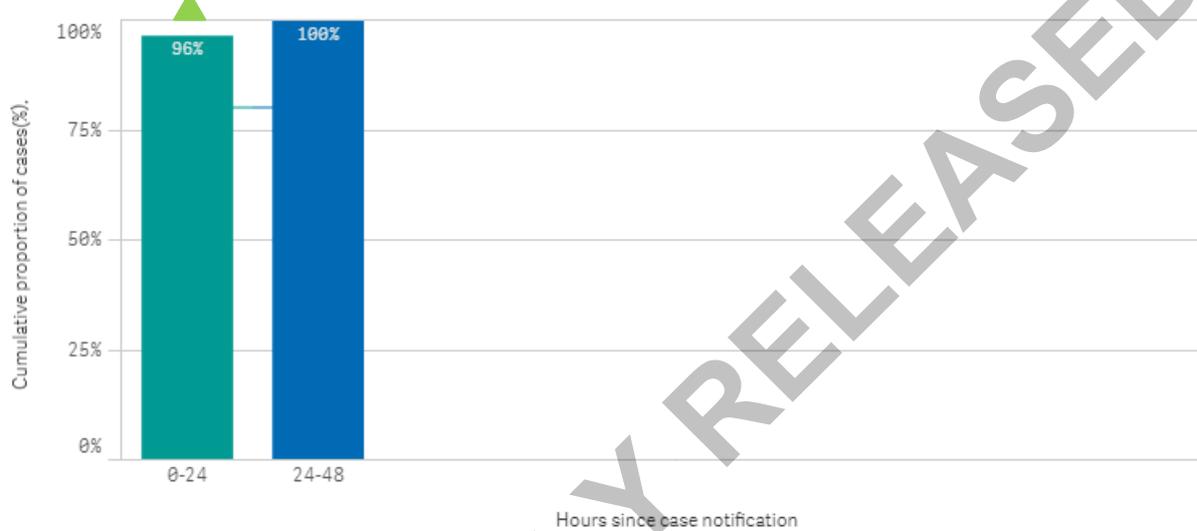
## Public health sector indicators

These indicators provide a national overview of contact tracing as well as case and close contact management by public health units (PHUs) and the National Investigation and Tracing Centre (indicators are prefixed with a P#).

### **P001 - Time from notification to case interview**

Target: 80% within 24 hours

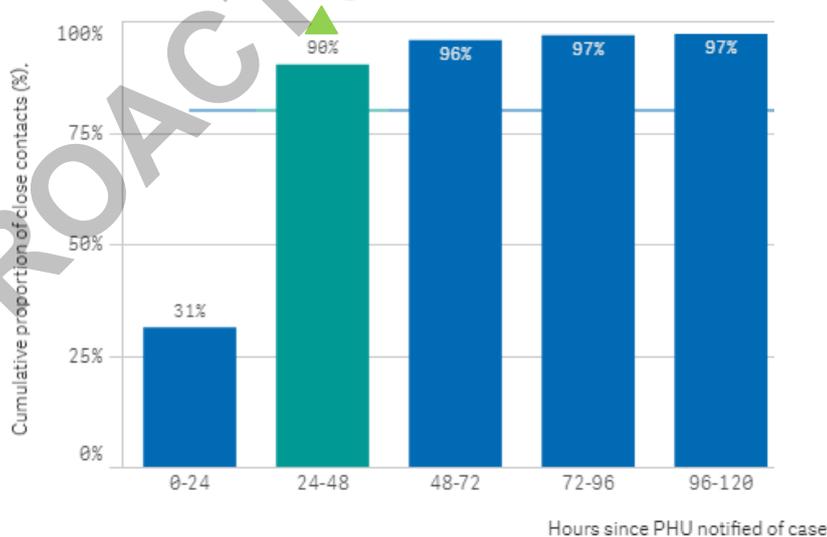
Number of hours to achieve target



### **P002 - Time from case notification to isolation / quarantine of contact**

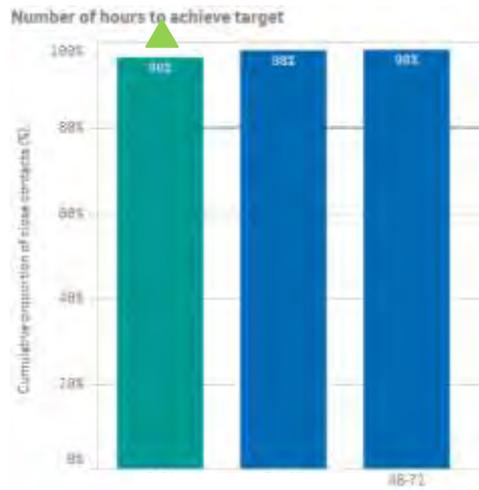
Target: 80% within 48 hours

Number of hours to achieve target



### P003 - Time from close contact identification to isolated / quarantined

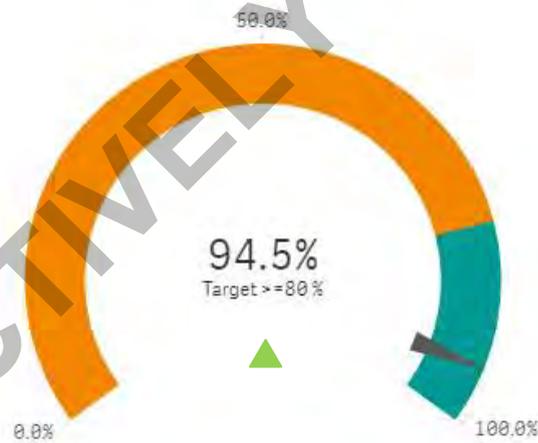
Target: 80% within 24 hours



### P004 - Proportion of contacts traced in 48 hours

Target: 80% within 48 hours

Proportion of contacts traced in 48 hours



# Summary of COVID-19 Disease Indicators for 4 September 2020 to 10 September 2020

Report date: 30/09/2020

This summary report presents performance against the COVID-19 Disease Indicators between 4 September 2020 to 10 September 2020.

## Key:

- Performance below target
- Performance above target
- Performance improved compared to the previous reporting period
- Performance lower compared to the previous reporting period

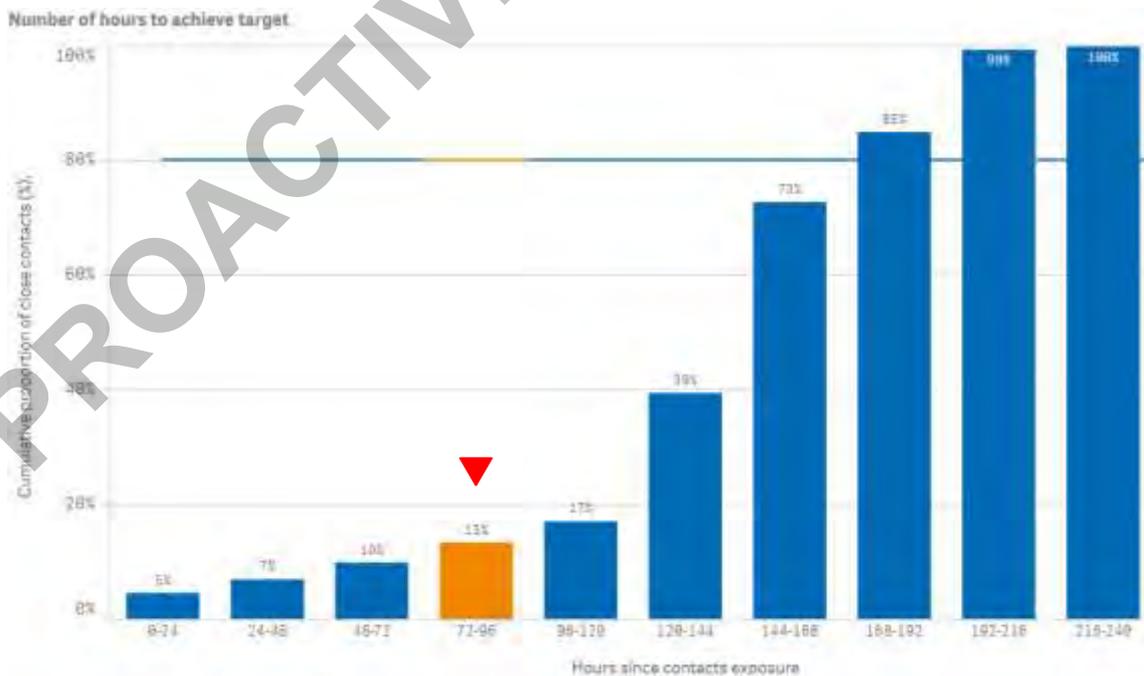
## System-level indicators

These indicators provide a view of the end-to-end collective actions of the wider health system response (indicators are prefixed with an S#).

The metrics for the system-level COVID-19 Disease Indicators (**S001**, **S002**) are primarily low due to the delayed identification of two exposure events (linked to the Mount Roskill Evangelical Fellowship group) and subsequent delayed identification of close contacts. As a result, a number of close contacts were not able to be contacted within the target timeframes.

### S001 - Time from exposure to contact isolation / quarantine

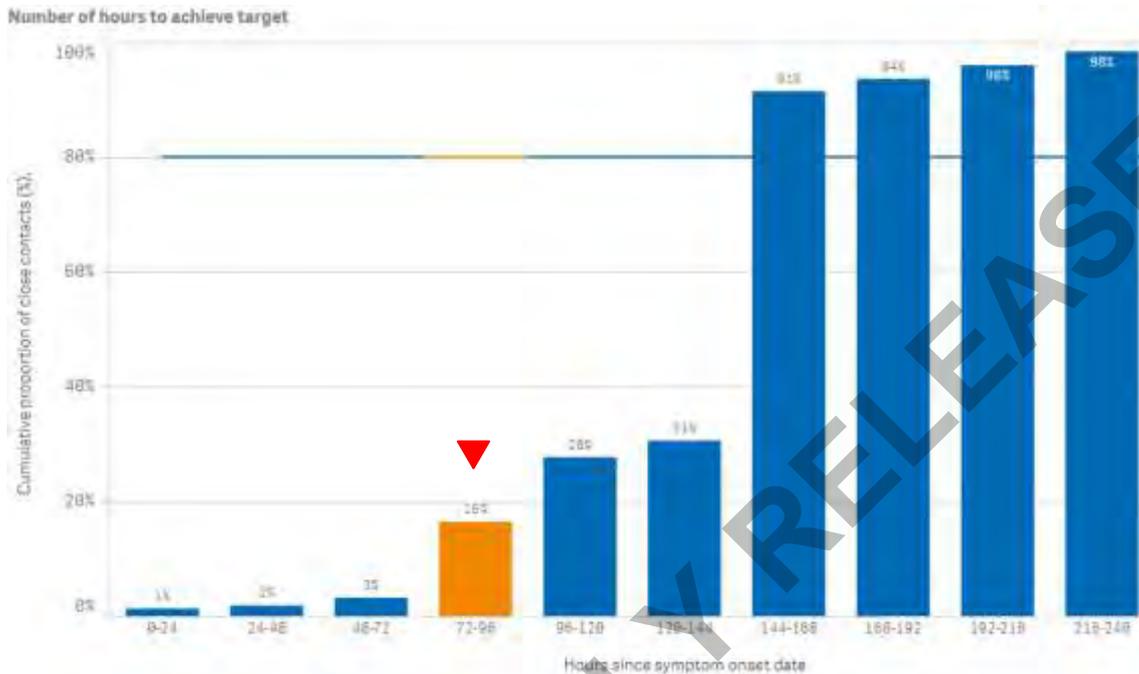
Target: 80% within 96 hours



### S002 - Time from case first symptom to contact isolation / quarantine

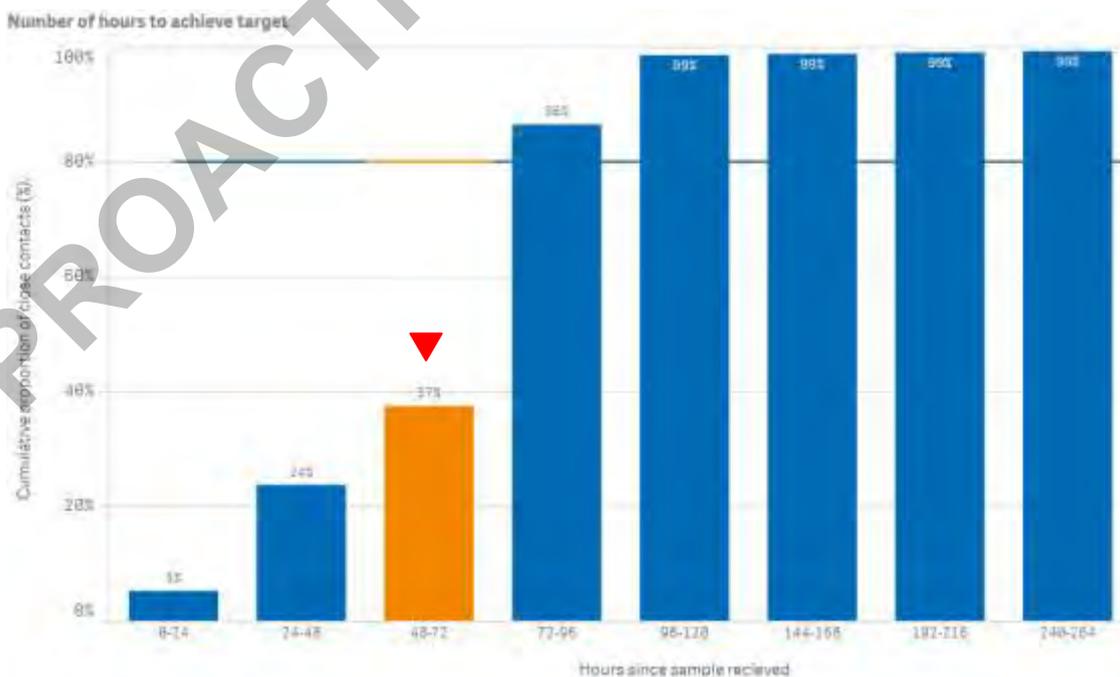
Indicator **S002** is affected by the inclusion of cases in MIQ as returnees' exposure is arbitrarily set to the day of arrival in New Zealand. They are placed into MIQ upon arrival and are tested if symptomatic or on approximately day 3 and day 12. Therefore, cases in MIQ can make the performance of this indicator appear low.

Target: 80% within 96 hours



### S003 - Time from test sample taken to close contact isolation / quarantine

Target: 80% within 72 hours



## S005 - Proportion of close contacts with confirmed or suspected COVID-19 at the time of tracing

Target: less than 20%

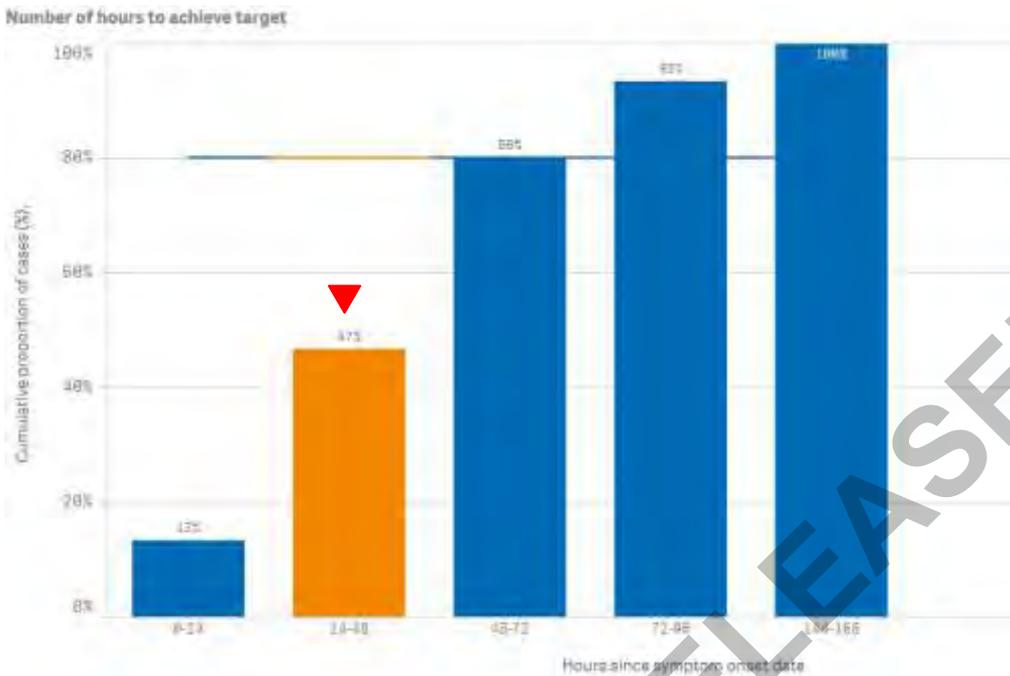


### Community-level indicator

#### **C001 - Time from first symptom to test sample taken for positive cases**

This indicator focuses on community behaviours and the impact of communication, education and societal attitudes (indicator is prefixed with a C#). The time period measured is from the symptom onset date as recorded in EpiSurv to the date/time the laboratory received the sample. The time between a sample taken and the receipt date/time of the sample at the laboratory, including transport time, will affect this indicator. Indicator **C001** is also affected by the inclusion of cases in MIQ as returnees are placed into MIQ upon arrival and are tested if symptomatic or on approximately day 3 and day 12. Therefore, cases in MIQ can make the performance of this indicator appear low.

Target: 80% within 48 hours

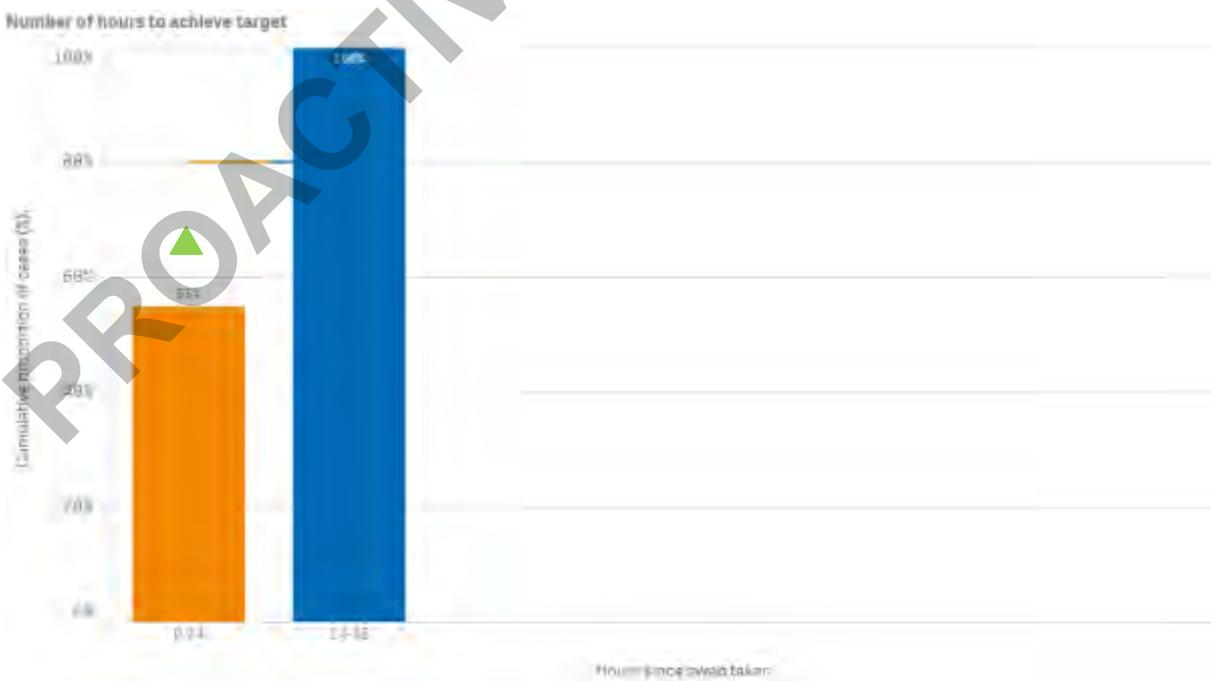


### **Laboratory sector indicator**

This indicator provides insight into the effectiveness of testing facilities and programmes (indicator is prefixed with an L#). The time period measured is from the time the laboratory received the sample to notification of a positive result in EpiSurv. In this reporting period, over 80 percent of positive results were notified at hour 37 and 100 percent reached by hour 39.

#### **L001 - Time from test sample taken to notification of positive result**

Target: 80% within 24 hours



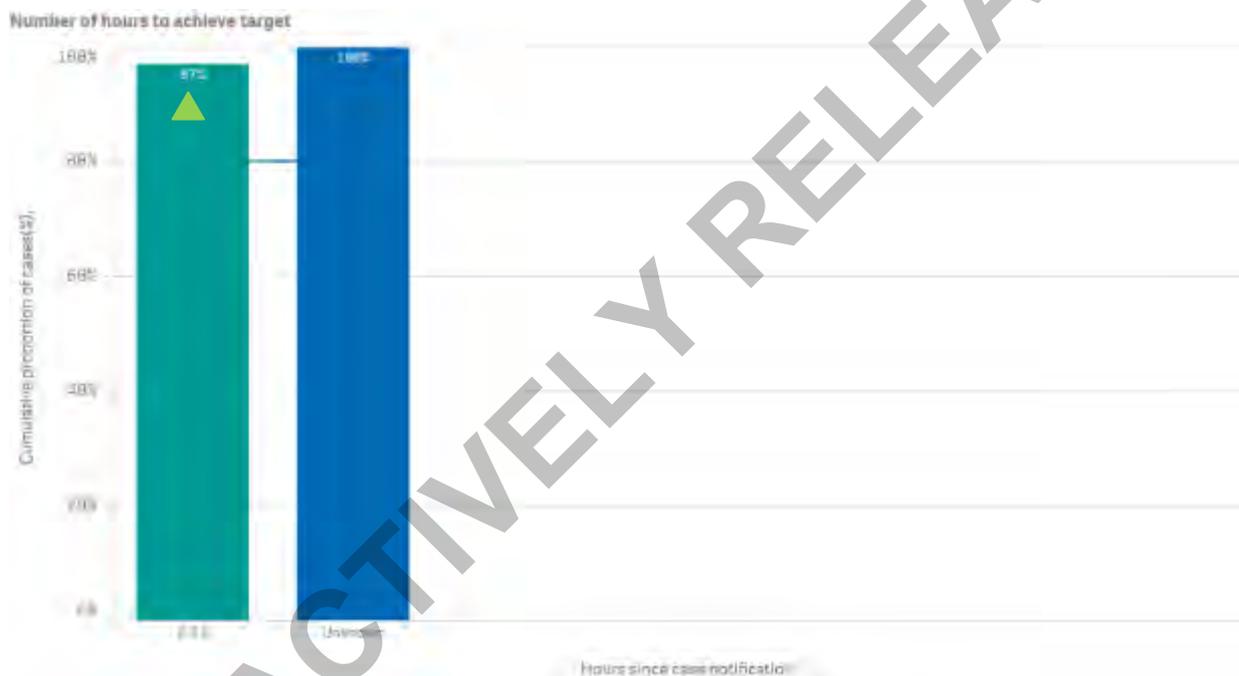
## Public health sector indicators

These indicators provide a national overview of contact tracing as well as case and close contact management by public health units (PHUs) and the National Investigation and Tracing Centre (indicators are prefixed with a P#). For this reporting period, performance for all public health sector indicators (**P001**, **P002**, **P003**, **P004**) are above the set targets.

The **P002** and **P004** metrics are primarily low due to the delayed identification of three exposure events (linked to the Mount Roskill Evangelical Fellowship group) and subsequent delayed identification of close contacts. As a result, a number of close contacts were not able to be contacted within the target timeframes.

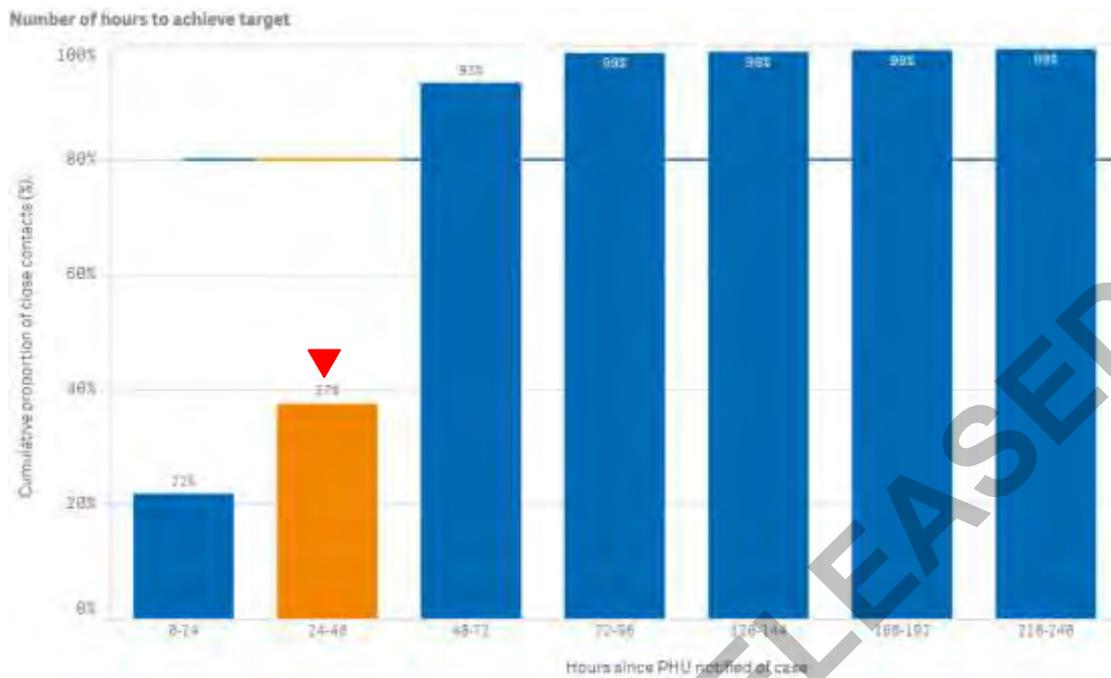
### **P001 - Time from notification to case interview**

Target: 80% within 24 hours



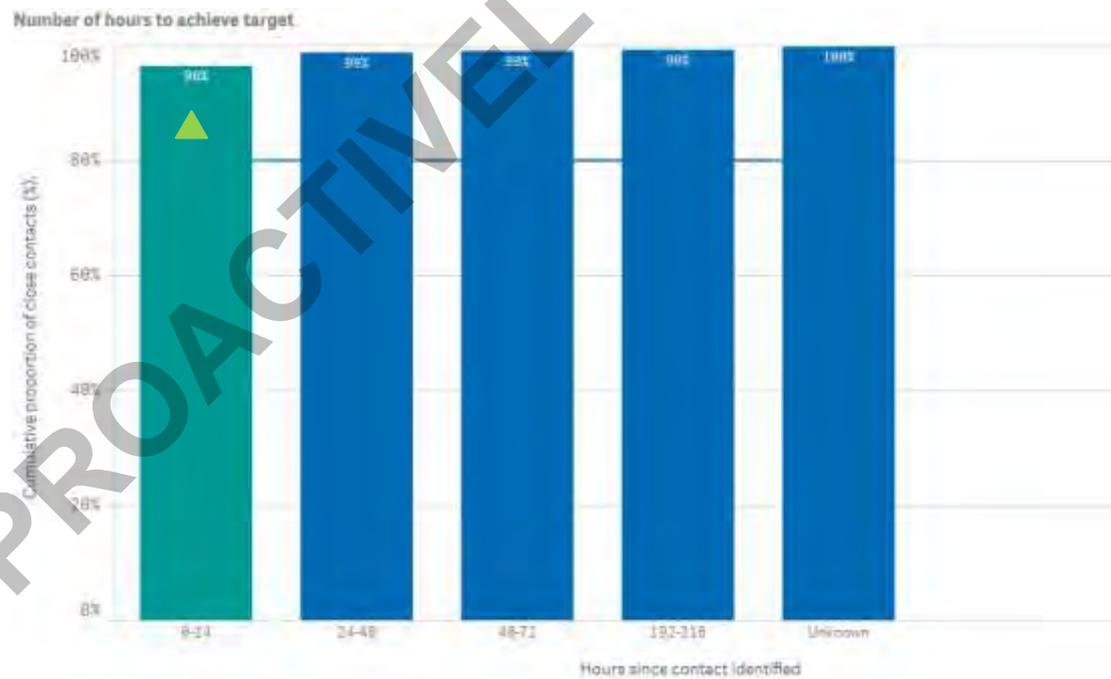
### P002 - Time from case notification to isolation / quarantine of contact

Target: 80% within 48 hours



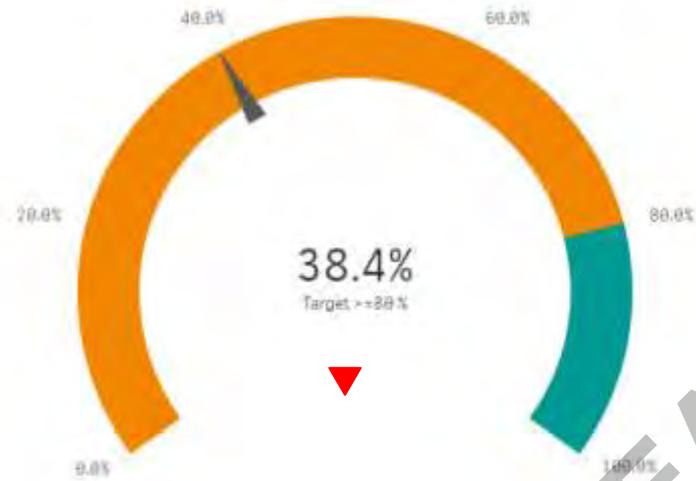
### P003 - Time from close contact identification to isolated / quarantined

Target: 80% within 24 hours



## P004 - Proportion of contacts traced in 48 hours

Target: 80% within 48 hours



PROACTIVELY RELEASED