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## Maintaining cancer services during the COVID-19 pandemic: the Aotearoa New Zealand experience

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### ABSTRACT

COVID-19 caused significant disruption to cancer services around the world. The health system in Aotearoa New Zealand has fared better than many other regions, with the country being successful, so far, in avoiding sustained community transmission. However, there was a significant initial disruption to services across the cancer continuum, resulting in a decrease in the number of new diagnoses of cancer in March and April 2020.

Te Aho o Te Kahu, Aotearoa New Zealand's national Cancer Control Agency, coordinated a nationwide response to minimise the impact of COVID-19 on people with cancer. The response, outlined in this paper, included rapid clinical governance, a strong equity focus, development of national clinical guidance, utilising new ways of delivering care, identifying and addressing systems issues and close monitoring and reporting of the impact on cancer services.

Diagnostic procedures and new cancer registrations increased in the months following the national lockdown, and the cumulative number of cancer registrations in 2020 surpassed the number of registrations in 2019 by the end of September. Cancer treatment services – surgery, medical oncology, radiation oncology and haematology – continued during the national COVID-19 lockdown in March and April 2020 and continued to be delivered at pre-COVID-19 volumes in the months since. We are cautiously optimistic that, in general, the COVID-19 pandemic does not appear to have increased inequities in cancer diagnosis and treatment for Māori in Aotearoa New Zealand.

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### Introduction

The COVID-19 pandemic has caused substantial disruption to the detection and treatment of cancer worldwide<sup>1-3</sup>. The diversion of health services toward the pandemic response, combined with reduced access to screening, primary care and secondary treatment

services, has resulted in a downturn in cancer registrations and, in some regions heavily impacted by the crisis, a probable increase in cancer mortality<sup>4</sup>. It is likely that the impact of COVID-19 on the cancer care continuum is occurring inequitably, further expanding the divide in access to best-practice cancer care services for minority and underserved populations<sup>5,6</sup>.

The Aotearoa New Zealand health system has fared better than many other regions around the world. Early border closure, national (and later regional) strict lockdowns, combined with strong leadership, public health messaging and a national testing and contact tracing system, has thus far prevented sustained community

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transmission<sup>7</sup>. A strong Māori and iwi response to COVID-19 ensured that issues arising for Māori communities were highlighted and Māori led local and national solutions were developed swiftly. The overall response to COVID-19 has protected populations at greatest risk of the impact of COVID-19 from widespread infection<sup>7</sup>.

However, in the early months of the COVID-19 pandemic, it was not clear whether this elimination strategy would be successful. Modelling work suggested that Māori and Pacific communities would be particularly susceptible to risk factors for accelerated transmission of infection and higher COVID-19 infection fatality rates<sup>8</sup> and Aotearoa New Zealand's intensive care unit (ICU) capacity would quickly be exceeded in the event of widespread community transmission<sup>9</sup>. After seeing the devastating impact COVID-19 was having on health systems in the Northern hemisphere, Aotearoa New Zealand prepared for the worst. Preparation work included freeing up resources within hospitals and putting measures in place to minimise person contact with the health system, such as deferring non-urgent appointments and procedures and re-directing resources to maximise ICU readiness for an influx of acute cases.

This preparatory work caused major disruptions along the cancer care pathway. This was reflected in an initial drop in new cancer registrations, with a 40% decline in new cancer registrations in the month of April 2020 compared to April 2019 (1000 fewer cancers)<sup>10</sup>. This was seen alongside a large drop in diagnostic procedures, including bronchoscopy and gastrointestinal endoscopy<sup>10</sup>.

Te Aho o Te Kahu is Aotearoa New Zealand's national Cancer Control Agency. The Agency has responsibility for national leadership and oversight of cancer control in Aotearoa New Zealand. Te Aho o Te Kahu is a new agency, established in December 2019, meaning that the COVID-19 pandemic hit during the establishment phase of the organisation. Although Te Aho o Te Kahu has national oversight of cancer control, some aspects of cancer care (such as cancer screening and palliative care) are the responsibility of the Ministry of Health, not Te Aho o Te Kahu. Aotearoa New Zealand has universal health care, with the large majority of cancer care provided through the public health care system. People with symptoms of cancer will usually present to primary care and be referred through to secondary care for further investigation and management.

In this manuscript we outline the planning and action completed by Te Aho o Te Kahu and the wider cancer sector to minimise the impact of COVID-19 on outcomes for people with cancer.

## Overview and timeline of response

Aotearoa New Zealand closed its borders (except for returning citizens and residents) on the 19<sup>th</sup> of March 2020 and a week later went into a strict national lockdown lasting for five weeks<sup>7</sup>. The national cancer response to COVID-19, led by Te Aho o Te Kahu, occurred rapidly and had six key components:

- Rapid clinical governance
- Ensuring equity
- Development of minimum treatment guidance
- Utilising new ways of delivering care
- Identifying and addressing systems issues
- Monitoring and reporting

The overall response plan provides a framework for responding to the COVID-19 pandemic, as well as any future pandemics or disruptions to care. **Table 1** provides a high-level timeline of key events and outputs from Aotearoa New Zealand's cancer response to COVID-19, including the pro-equity actions taken at each step. After which we overview the key components of the response.

## Rapid clinical governance

As part of the national cancer response to COVID-19 the Cancer Agency COVID Agile Response Team (CACART) was set up in March 2020 to provide rapid clinical support and guidance. The group included senior leadership from Te Aho o Te Kahu, the chairs of the national clinical working groups for medical oncology, radiation oncology and clinical haematology, equity and Māori health expertise, and representatives for paediatric oncology, surgery, nursing and palliative care. During the early stages of the pandemic the group met daily via videoconference. This structure enabled Te Aho o Te Kahu to rapidly ascertain key issues for clinicians on the ground that needed national coordination and also to convey key information and developments occurring at a national level.

Te Aho o Te Kahu also met regularly – initially weekly – with speciality-specific working groups (medical oncology, radiation oncology and clinical haematology). These groups included representation from every cancer centre across Aotearoa New Zealand, which allowed a comprehensive understanding of issues across the country and supported consistent messaging.

## Equity Response Framework

In Aotearoa New Zealand there are substantial longstanding structural barriers, that are avoidable and unjust, which mean that Māori and Pacific peoples have worse cancer outcomes than non-Māori and non-Pacific peoples<sup>11-13</sup>. A priority of the COVID-19 cancer response was to ensure that the pandemic did not further exacerbate existing inequities.

Te Aho o Te Kahu worked with Hei Āhuru Mōwai (Aotearoa New Zealand's national Māori cancer leadership network) on a daily basis to identify and respond to critical areas of concern for Māori. In early April, Te Aho o Te Kahu, Hei Āhuru Mōwai and Māori researchers developed an equity response framework. The Framework identified: a) where cancer inequities are known to occur along the cancer continuum; b) how these existing inequities might be exacerbated by the COVID-19 pandemic; c) actions that could be taken to mitigate the exacerbation of inequities, and d) residual issues related to equity in cancer outcomes that lie outside the pandemic response.

The Equity Response Framework includes the three key systemic drivers in inequitable cancer outcomes: 1) inequities in the incidence of poor-prognosis cancer, 2) inequities in the receipt of early diagnosis and 3) inequities in the receipt of timely best-practice treatment (including inequities in psychosocial support). An excerpt of the Framework is included in **Appendix 1**. Some actions within the Framework, such as development of pro-equity clinical guidance, occurred during the initial national response to COVID-19, whereas others, such as the prioritisation of Māori and Pacific to receive diagnostic procedures during the recovery and the stocktake of accommodation and transport providers, occurred in the months that followed. The COVID-19 situation stabilised in New Zealand before all actions within the framework were implemented; however, the Framework provides a useful way of considering equity during future disruptions to health care.

We are cautiously optimistic that, in general, the COVID-19 response does not appear to have increased inequities in the cancer system. With the exception of lung cancer (see *Changes for future responses* below), Māori were generally less impacted by disruptions to the cancer care with a smaller decrease in new cancer registrations and diagnostic procedures seen for Māori compared to non-Māori<sup>10</sup>. By the end of October 2020 there was a 2% increase in cancer diagnoses for Māori and a 1% decrease for non-Māori<sup>14</sup>. This may have, at least partially, been the result of the equity focus taken during the cancer response. Several other factors may have also influenced this, including strong Māori-focussed public health

**Table 1**  
Summary timeline with key events

Date	Category	Description	Equity actions
<b>28-Feb 17-Mar</b>	<b>First case of COVID-19 in a returned traveller</b> Clinical Governance	Cancer Agency COVID Agile Response Team (CACART) formed, to rapidly respond to clinical issues	Worked in partnership with Māori cancer clinicians in CACART
<b>19-Mar 20-Mar</b>	<b>Border closures except to returning national citizens and residents</b> New ways of delivering care	Messaging to the sector to maximise remote working, remote communication to patients and social distancing to minimise chance of COVID-19 spread.	Hei Āhuru Mōwai developed specific messaging for Māori patients and whānau.
<b>20-Mar</b>	New ways of delivering care	Look at ways to enhance day unit capacity when there is a therapeutically equivalent option with a view to increasing capacity to offset likely reduced capacity from staff illness/self-isolation.	
<b>22-Mar 22-Mar</b>	<b>Government announces four-level alert system, NZ moved to alert level 2 and those who are immunocompromised are advised to stay home<sup>a</sup></b> New ways of delivering care	Default consultations now telephone follow up, with clinicians deciding if they need to see a patient in person.	Māori specific public and sector messaging developed in collaboration with Hei Āhuru Mōwai.
<b>24-Mar 24-Mar</b>	<b>Aotearoa New Zealand moves to alert level three</b> Treatment guidance	Messaging to the sector that new oncology patient assessment and treatment is to continue unchanged.	
<b>26-Mar 27-Mar</b>	<b>Aotearoa New Zealand moves to alert level 4</b> Treatment guidance	Medical oncology, radiation oncology and haematology minimal intervention levels: guidance on expectations around cancer treatment service provision at different hospital alert levels developed and distributed.	Worked in partnership with Hei Āhuru Mōwai to operationalise equity in guidance, including prioritisation of Māori, Pacific and vulnerable populations.
<b>7-Apr</b>	Equity Response	Draft equity response framework sent out for feedback, outlining areas where inequities arise on the cancer pathway, how inequities might be exacerbated by COVID-19 and what mitigation actions could be undertaken.	
<b>17-Apr</b>	Treatment guidance	Surgical minimal intervention levels: guidance on expectations around cancer surgery service provision at each hospital alert level developed and distributed.	Worked in partnership with Hei Āhuru Mōwai to operationalise equity in guidance, including prioritisation of Māori, Pacific and vulnerable populations.
<b>17-Apr</b>	Treatment guidance	Radiology minimal intervention response levels: guidance on expectations around cancer imaging service provision at each hospital alert level developed and distributed	Worked in partnership with Hei Āhuru Mōwai to operationalise equity in guidance, including prioritisation of Māori, Pacific and vulnerable populations.
<b>23-Apr</b>	New ways of delivering care	Proposal sent to PHARMAC (Aotearoa New Zealand's national pharmaceutical purchasing organisation) outlining list of medications that could be used (if funded) to amend treatment regimens to be less resource intensive including modelling work to understand the impact of requests	Equity analysis included in the review process.
<b>28-Apr 8-May</b>	<b>Aotearoa New Zealand moves to alert level 3</b> Treatment guidance	Gastrointestinal endoscopy minimal intervention levels: Guidance on expectations around endoscopy service provision at each hospital alert level developed and distributed.	Worked in partnership with Hei Āhuru Mōwai to operationalise equity in guidance, including prioritisation of Māori, Pacific and vulnerable populations.
<b>13 May 28-May</b>	<b>Aotearoa New Zealand moves to alert level 2</b> Monitoring and Evaluation	First report on the impact of COVID-19 on cancer services at a national level distributed	Māori expertise included in the monitoring team and specific equity priorities included. All metrics reported by ethnicity.
<b>8 June</b>	<b>Aotearoa New Zealand moves to alert level 1</b> Following this there were no further national lockdowns; however, two regional lockdowns occurred in Auckland in August 2020 and February 2021 due to new community cases.		

<sup>a</sup> Alert levels are described here: <https://covid19.govt.nz/alert-system/about-the-alert-system/>

and other medical messaging from organisations such as Te Rōpū Whakakaupapa Urutā – the National Māori Pandemic Group.

### Treatment guidance

As part of the National COVID-19 response the Ministry of Health developed a high-level National Hospital Response Framework. The National Hospital Response Framework used colour-coded alert levels to support a nationally consistent approach to

clinical service delivery in hospitals based on the local COVID-19 situation, where green indicated hospital readiness with little or no impact, yellow indicated initial hospital impact, orange moderate impact and red severe impact of COVID-19 (summarised in [Table 2](#)).

The National Hospital Response Framework was an overarching, high level framework, and did not provide guidance on what specific diagnostic and treatment services should be amended. There was some initial variation in how the framework was interpreted

**Table 2**

High-level summary of treatment guidance that was developed in response to COVID-19. This provides a high-level overview of minimum treatment expectations at different hospital alert levels. Note that full guidance contained further detail, including specific regimens for medical oncology, additional guidance for radiation oncology and haematology, and advice around the prioritisation of Māori, Pacific and other vulnerable populations.

Triggers		Medical Oncology	Surgery	Radiology	Endoscopy
National Hospital Response Framework Triggers <sup>a</sup>	Service Capacity Triggers <sup>b</sup>				
Community transmission/widespread outbreaks in your community; isolation & ICU at capacity; all available staff redeployed to critical care	Fall to <25% service capacity	<b>Maintain as able:</b> Curative therapy with a high (>50%) chance of success. Curative therapy with an intermediate (15- 50%) chance of success.	<b>Maintain as able:</b> Acute/emergency care Urgent high-risk cancer Curative intent oUnlikely to have major resource implications or ICU requirement oLimited options for alternative or delaying treatment (time sensitive)	<b>Maintain as able:</b> Acutes <24 hours Urgent non deferrable < 2 weeks and essential time sensitive planned imaging (High suspicion of cancer)	<b>Maintain as able:</b> Emergency endoscopy Symptomatic urgent patients (timeframe, within 2 weeks)
Community transmission/multiple clusters in your community; isolation & ICU capacity impacted; significant staff absence, extensive staff redeployment, gaps not being covered	Fall to <50% service capacity	<b>Maintain red services, plus following as able:</b> Non-curative therapy with a high (>50%) chance of >1 year of life extension. Curative therapy with a low (0-15%) chance of success. Non-curative therapy with an intermediate (15-50%) chance of > 1-year life extension	<b>Maintain red services, plus following as able:</b> Curative intent, may have resource implications or ICU requirement for a short time eg cystectomy, gastrectomy Cannot be safely deferred for more than 3 months as this would affect overall survival	<b>Maintain red services, plus following as able:</b> Non deferrable < 6 weeks and time sensitive non deferrable planned imaging	<b>Maintain red services, plus following as able:</b> Screening FIT positive colonoscopy Semi-urgent, within 6 weeks, higher priority for more urgent clinical need
Isolation capacity and ICU capacity manageable; some staff absence and some staff redeployment to support response and manage key gaps	Fall to <75% service capacity	Maintain red and orange services, plus following as able: Non-curative therapy with a high (>50%) chance of palliation / temporary tumour control but < 1-year life extension. Non-curative therapy with an intermediate (15-50%) chance of palliation.	<b>Maintain red and orange services, plus following as able:</b> Palliative procedures in patients with good functional status Curative procedures for slow growing tumour types	<b>Maintain red and orange services, plus following as able:</b> Deferrable scans with a time frame of 6-12 weeks. Time sensitive planned imaging that may be deferred if capacity constraints.	<b>Maintain red and orange services, plus following as able:</b> Standard risk endoscopy (timeframe within 6 weeks) 1-year surveillance (e.g. hereditary nonpolyposis colorectal cancer)
Managing service delivery as usual with only staffing and facility impact being for training & readiness purposes	Maintaining >75% service capacity	Consider treatments that could be stopped or altered immediately to preserve day unit capacity and minimise spread of COVID-19.	Consider stopping surveillance procedures and palliative procedures in patients with marginal/poor functional status	Continue service as usual	Consider pausing 5 yearly surveillance

<sup>a</sup> The National Hospital Response Framework indicates when a whole-of-hospital adjustment to services is required because of a change in the COVID-19 situation.

<sup>b</sup> A service may face a specific situation that limits their ability to provide care (e.g. specialised staff required to enter self-isolation). If a unit is unable to redeploy staff and/or work with another cancer centre they may be required to change delivery of care.

and implemented, with some hospitals delaying or cancelling procedures to aid with preparation for COVID-19 influx. Te Aho o Te Kahu worked rapidly with clinical speciality working groups to develop cancer-specific guidance in line with the National Response Framework. The focus was on ensuring cancer services continued in a consistent and equitable way across Aotearoa New Zealand regardless of the extent to which the health system was compromised.

Te Aho o Te Kahu developed guidance for medical oncology, radiation oncology and clinical haematology utilising a similar approach to NHS England<sup>15</sup>. The guidance provided step-wise advice on specific care that should be continued given a

specified level of health system compromise. Due to the successful completion of medical oncology, haematology and radiation oncology guidance, Te Aho o Te Kahu led the development of guidance on cancer surgery, cancer radiology and gastrointestinal endoscopy (for indications wider than cancer). **Table 2** provides a high-level summary of the treatment guidance that was developed.

As well as preventing unwarranted regional variation to delivery of cancer care, the national guidance was also a critical component of the equity-focused response. In the context of high levels of clinical uncertainty, disparities in care tend to worsen and there is evidence that standardising key steps of care across treatment

pathways reduces inequities<sup>16,17</sup>. The majority of Aotearoa New Zealand's oncology care is provided in the public system; however, some care is also provided privately. Of note the Medical Oncology Working Group worked with private providers to get agreement to follow the same treatment guidance to ensure equitable provision of care during the COVID-19 response.

The treatment guidance was distributed to all hospitals by the Ministry of Health COVID-19 emergency response team and distributed through the clinical working groups. Cancer centres were advised to alert Te Aho o Te Kahu if they needed to move up alert levels. Except for a brief acute disruption that required one centre to move to 'Yellow Alert' for two days, cancer centres were able to continue to deliver care at the 'Green Alert' level.

Cancer services also made use of additional general advice on managing haematology and oncology patients during the COVID-19 pandemic, developed by Aotearoa New Zealand and Australian cancer and infectious disease specialists and endorsed by Te Aho o Te Kahu<sup>18</sup>.

### Utilising new ways of delivering care

As was seen worldwide, health professionals quickly adapted to new ways of working. This included the rapid increase in telehealth, with 80 percent of oncology follow-up appointments performed via telehealth in April 2020, compared to 1.3 percent in 2019<sup>13</sup>. High levels of telehealth continued throughout the lockdown period across all cancer specialties<sup>13</sup>.

Other new ways of working included the use of radiotherapy hypofractionation. The National Radiation Oncology Working Group, which includes the radiation oncology clinical leads from every New Zealand radiation treatment centre, endorsed the Peter MacCallum Cancer Centre hypofractionation guidance in the event of capacity constraints<sup>19</sup>, although ultimately these were not required. Following the publication of new five year data<sup>20</sup>, the National Radiation Oncology Working Group worked rapidly with the radiation oncology leads for breast cancer to endorse the use of hypofractionation for selected patients with early breast cancer as part of routine care.

Te Pātaka Whaioranga – Pharmaceutical Management Agency (PHARMAC), is Aotearoa New Zealand's governmental agency that decides which medicines are subsidised by the government. Some medicines require clinicians to complete Special Authority conditions, which often include criteria around ongoing monitoring such as the completion of regular radiological studies or blood tests. It was recognised that Aotearoa New Zealand's lockdown made it harder for people to access medical care, and in response PHARMAC made changes to access criteria for some medicines. Te Aho o Te Kahu and PHARMAC also looked into options of alternative cancer treatments that could be given less frequently and/or be given in the community to reduce the need for outpatient chemotherapy, and to provide alternatives in the event that hospital chemotherapy workforce capacity became compromised by the COVID-19 outbreak.

Many of the new ways of working have added benefits. For example, telehealth has the potential to remove barriers to accessing care<sup>21</sup> and removing Special Authority requirements can minimise the number of tests people are required to have whilst on treatment. In the months since the COVID-19 lockdown, the cancer (and broader health) sector has been looking at opportunities to incorporate some of these changes into improved routine standards of care.

### Identifying and addressing systems issues

As regions across Aotearoa New Zealand responded to the pandemic, issues and barriers to providing cancer care were identi-

fied. Whilst some of these were local issues, such as configuring the physical environment to provide socially distanced care, others were systems issues experienced in multiple centres, which would benefit from national response and coordination.

These issues were escalated to Te Aho o Te Kahu either directly or through the clinical working groups. Examples of issues that arose during the response included technicians needing to travel into and throughout Aotearoa New Zealand to install and repair Linear Accelerator (LINAC) machines, as well as people who would usually travel internationally for cancer treatment, for example, New Zealanders usually travel to Australia to receive Peptide Receptor Radionuclide Therapy (PRRT) (as a solution a local service was able to be rapidly set up to deliver care within Aotearoa New Zealand). COVID-19 also saw changes in the travel and accommodation infrastructure that meant previously available support, such as volunteer driving services and some accommodation options, became unavailable during Level 4 lockdown. Some of these issues were able to be addressed by Te Aho o Te Kahu, but others required link in with, and guidance from, the national Ministry of Health response to COVID-19.

### Monitoring and Reporting

In mid-April 2020, Te Aho o Te Kahu established a Cancer and COVID-19 Data Response Advisory Group, a pan-sector group comprised of academic, clinical, technical and Māori expertise from around Aotearoa New Zealand. The group met regularly and started the process of putting together the data required to monitor the impact of COVID-19 on access to cancer services.

The focus was on using national data to understand the magnitude of any delays to diagnosis and treatment, and the extent to which the impacts of this may be creating or exacerbating inequities. During the initial lockdown the focus was on providing data to inform evidence-based decision-making in relation to the relative benefits and harms of COVID-19 response policies, and as the lockdown restrictions eased the data was able to assist with recovery planning. Consistent monitoring and evaluation of service delivery, including the provision of data to local regions on their own performance, may have also increased the focus on cancer service delivery.

A key output from this group were monthly reports on new cancer registrations, diagnostic testing (bronchoscopy and gastrointestinal endoscopy) and treatment (including curative surgery, radiation oncology assessments and treatment and medical oncology assessments and chemotherapy)<sup>14,22</sup>. These reports were produced using data from national collections, including cancer registration data sourced from the New Zealand Cancer Registry (NZCR), a population-based, mandated tumour register of all new diagnoses of primary malignant cancers diagnosed in New Zealand. Data were analysed for the whole population and stratified by ethnicity and District Health Board region (n=20) to monitor the impact on equity. Later in the year, the group was able to focus these reports on key parts of the continuum that required further review and analysis. For example, the October report focussed on the impact of a regional shutdown in August/September in Auckland, and the December report focused on the specific impact on lung cancer diagnosis and treatment<sup>14</sup>. The reports were distributed to all hospital chief executive and chief operating officers, to cancer clinicians via clinical working groups, to the Ministry of Health and were published on the Te Aho o Te Kahu website.

Providing close to real-time monitoring meant that the dip in new cancer registrations was identified early, which assisted with shifting the public messaging and encouraging people to seek medical attention if they were unwell. It also supported ongoing clear messaging to the cancer and wider health sector around the ongoing delivery of services. New cancer registrations and diagnos-

tic procedures increased in the subsequent months, and the cumulative number of cancer registrations in 2020 surpassed the number of registrations in 2019 in September.

Given the rapid nature of this work there was an element of pragmatism, focusing on elements for which there was readily available national data. This means that there were important parts of the cancer continuum, such as access to radiology and palliative care, that we were unable to measure. A secondary outcome from this work was to further highlight gaps in data and data quality, which will help shape areas of future work.

### Changes for future responses

It is not possible to know what might have occurred to cancer diagnosis and treatment had Te Aho o Te Kahu, Hei Āhuru Mōwai, cancer clinicians and other key organisations taken little or no action to alter the course of events across 2020. It is also not possible to know what might have happened if Aotearoa New Zealand's elimination strategy to COVID-19 had not been (thus far) successful. Aotearoa New Zealand will continue to prepare for future resurgence of COVID-19 and look at what could be done to improve outcomes for people with cancer in the event of future disruptions to the health sector. Although there were many positive aspects of the cancer sector's response, key areas for improvement include:

- **Travel and accommodation provision:** in Aotearoa New Zealand travel support services are often provided by non-government organisations and by volunteers, many of whom are older and were advised to stay home during the lockdown(s). This meant that several travel support services were running at limited capacity and accommodation providers had to alter the way they provided services to ensure social distancing occurred. This disrupted people's ability to access cancer services and is a key area for improvement in the event of COVID-19 resurgence.
- **Lung cancer inequities:** although COVID-19 and the response did not, generally, increase inequities for Māori with cancer, one key exception was lung cancer. The sixth national monitoring report published in December 2020 showed that there was a 7.5% decrease in new diagnoses of lung cancer for Māori in 2020 compared to 2019. However, the same was not true for European/other, where there was a stable 4.5% increase in lung cancer diagnoses over 2020<sup>14</sup>. This is particularly concerning given the large inequities that already exist with lung cancer and the large and disproportionate burden of disease that lung cancer causes for Māori<sup>13</sup>. For other cancer types there was a similar, or smaller, impact for Māori compared to non-Māori and it remains unclear why lung cancer is different. Te Aho o Te Kahu will continue to work with clinicians, Hei Āhuru Mōwai and COVID-19 response planners to look at how to address barriers to lung cancer diagnosis in the context of COVID-19, as well as continue broader work to improve the diagnostic pathways for Māori with lung cancer.

### Conclusions

Worldwide, COVID-19 has disrupted health services and had far reaching consequences for people with cancer. In Aotearoa New Zealand, COVID-19 caused a decrease in the number of new diagnoses of cancer in March and April 2020; however, close monitoring meant this was picked up early and a strong response from the cancer sector meant that the number of registrations was back to levels observed in 2019 by September 2020. Cancer treatment services – surgery, medical oncology, radiation oncology and haematology – continued during the COVID-19 lockdown and continued to be delivered at pre-COVID-19 volumes in the months since. Perhaps most positively, Māori appeared to be less impacted by disruptions to the cancer care than non-Māori in Aotearoa New Zealand. One key exception was lung cancer, where more work is needed to address barriers to the diagnosis of lung cancer for Māori in the context of COVID-19. Aotearoa New Zealand now has a framework for future pandemic planning, which can be rapidly put into place as required. We hope that the Aotearoa New Zealand experience may be useful for other countries that are still grappling with the consequences of COVID-19 on cancer services.

### Contributors

**Elinor Millar** drafted the manuscript, and revised content based on feedback. **Jason Gurney** provided conceptualisation support, data verification and provided critical revision of drafts. **Claire Hardie, Mary-Ann Hamilton, Chris Jackson, Suzanne Beuker and Tom Middlemiss** provided clinical advice and support and provided critical revision of drafts. **Michelle Mako, Jason Gurney and Moahua Goza** provided equity-focussed input and provided critical revision of drafts. **Myra Ruka** provided equity-focussed input, clinical advice and provided critical revision of drafts. **Nicole Willis** provided communications support and critical revision of drafts. **Diana Sarfati** led the team and provided critical revision of drafts.

### Declaration of Competing Interest

The authors declare no conflicts of interest.

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## Appendix 1: Excerpt from Equity Response Framework

Equity Issue	Likely exacerbation by COVID-19	Activity
<p><b>Inequities in health promotion and cancer prevention.</b></p> <ul style="list-style-type: none"> <li>– Māori are substantially more likely to be diagnosed with poor-prognosis cancers (lung, stomach, liver, pancreas).</li> <li>– Pacific peoples are disproportionately impacted by poor-prognosis cancers including liver, stomach and uterus.</li> <li>– Drivers of these inequities include differences in rates of smoking, and certain infections (e.g. H pylori, Hepatitis B and C)</li> </ul>	<p>Māori and Pacific peoples are likely to be disproportionately impacted by deferral of preventive health activities during COVID. High incidence of cancers with highest levels of inequity driven by inequities in exposure to known carcinogens:</p> <ul style="list-style-type: none"> <li>– Tobacco</li> <li>– Alcohol</li> <li>– Chronic infection</li> <li>– Chronic non-communicable diseases including diabetes</li> </ul>	<p>Recommend national messages and strategies/funding targeted for Māori and Pacific peoples stop smoking services be continued and prioritised.</p> <p>Recommend that tobacco cessation activities continue as normal as is feasibly possible.</p> <p>Recommend advice, support and resources to minimise alcohol related harm be continued and prioritised.</p> <p>Recommend vaccination programmes for HPV and identification and treatment of Hepatitis B and C be continued and prioritised.</p> <p>Support increased flu vaccinations for Māori and Pacific peoples with comorbidities</p>
<p><b>Inequities in the receipt of early diagnosis.</b></p> <ul style="list-style-type: none"> <li>– Māori have poorer access to early diagnosis for several common cancers.</li> <li>– A significant driver of these inequities sit within the failings of the primary care system including access to and through primary care</li> <li>– Poorer access to and through secondary care services may also drive later diagnosis</li> <li>– Differential access to national screening programmes is also a driver of late diagnosis for screen-detected cancers</li> </ul>	<ul style="list-style-type: none"> <li>a) Diagnosis may be delayed by diversion of health services towards pandemic response.</li> <li>&gt;b) Removal of diagnostic services will further exacerbate existing inequities in access to early diagnosis for Māori and Pacific peoples.</li> <li>c) Reduction in primary care utilisation during lock down likely to affect Māori and Pacific peoples disproportionately</li> <li>d) Barriers to accessing virtual consultations (eg due to phone/internet access, or whānau living in crowded homes without access to private space for virtual health consultation).</li> <li>e) Delays in diagnosis of poor-prognosis cancers will disproportionately impact cancer outcomes for Māori</li> <li>f) Cessation of screening programmes may exacerbate poorer outcomes and delay diagnosis and access to treatment</li> </ul>	<p>Recommend prioritising tumour streams where Māori and Pacific peoples are disproportionately represented and ensure they are targeted in diagnostic and treatment pathways during the return of diagnostic capacity.</p> <p>Recommend that decisions on pausing or restarting screening programmes should consider the equity impact of such decisions.</p> <p>Ensure that Māori and Pacific peoples are prioritised when screening programme restarted</p> <p>Develop communications reassuring whānau that it's ok to seek help for non-COVID-19 issues and encourage Māori and Pacific peoples to access services early</p>
<p><b>Inequities in the receipt of timely best-practice treatment.</b> Social inequities in cancer outcomes can be driven by differences in the availability, affordability and accessibility of best-practice cancer treatment.</p> <ul style="list-style-type: none"> <li>– Best-practice treatment is less <b>available</b> to Māori, likely due to factors such as where treatment centres are relative to where Māori live</li> <li>– Best-practice treatment is less <b>affordable</b> to Māori, because of inequities in resources including transport (i.e. deprivation) and access to privately-funded care</li> <li>– Best practice treatment may be less <b>acceptable</b> to Māori, partially due to the scarcity of Māori treatment providers and navigators</li> <li>– <b>Access barriers</b> to cancer care for Pacific peoples include cost, geographical location of services, transport, understanding the nature and necessity, cultural and communication factors related to language, health literacy, and competing family and other commitments</li> <li>– <b>Comorbidity</b> is a cause of the inequitable cancer outcomes for Māori and Pacific peoples</li> </ul>	<ul style="list-style-type: none"> <li>a) Delays in the diagnosis of the poor-prognosis cancers more common among Māori (as above) will result in increased complexity of care once these cancers are diagnosed.</li> <li>b) Regional variation in provision of services (as a result of COVID-19) will exacerbate inequities. Standardisation of care receipt across ethnic groups reduces inequities in cancer outcomes for Māori.</li> <li>c) The diversion of publicly-funded services away from cancer may result in those with financial resources to seek treatment privately, further exacerbating existing inequities in care access.</li> <li>d) Increased pressure on health system during COVID-19 will exacerbate these ethnic biases and lead to systematic differences in treatment decisions.</li> <li>e) Presence of comorbidities for Māori and Pacific peoples is recognised as a complication in the treatment of cancer and is likely to be further exacerbated in the presence of COVID-19.</li> <li>f) Services that provide psychosocial support likely to be impaired.</li> <li>g) Accommodation and transport providers may close, making it difficult for whānau to access treatment</li> <li>h) Heightened stress at an already emotionally stressful time. This could lead to increased need for support and a potential overwhelming of existing psychosocial support services.</li> <li>i) Growing financial hardship during COVID-19 and inability to access social welfare due to offices closing/unable to access the office</li> <li>j) Staff stress and burnout, reduced capacity for patient/whānau distress</li> </ul>	<p>Development of minimum treatment standards for oncology, radiation oncology, haematology at different hospital alert levels to ensure ongoing provision of services.</p> <p>Development of cancer surgical and radiology minimum treatment standards at different hospital alert levels to ensure ongoing provision of services.</p> <p>Recommend Cancer Nurses proactively contact Māori and Pacific patients to discuss what is happening with their treatments and other psychosocial needs are identified and met</p> <p>Advice to Primary Care Providers to ensure effective ongoing management of cancer and other comorbidities to mitigate adverse impact of COVID-19 on patient outcomes.</p> <p>Recommend regions work with private providers to follow the same treatment provisions at different hospital alert levels to ensure equitable provision of care during COVID-19 response.</p> <p>Facilitate Cancer Service resilience planning and support of cancer treatment services, with a particular focus on those with a high proportion of Māori patients so they are able to continue to provide care.</p> <p>Undertake stocktake and communicate available transport and accommodation options for those who have to travel for treatment</p> <p>Provide specific cancer and COVID-19 information and education on managing fear and anxiety for both patients/whānau and staff.</p> <p>Ensure accurate information about financial relief is available.</p> <p>Reinforce support options for staff self-care strategies.</p>

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