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It’s about who they are and what they can do: Māori perspectives on frailty in later life
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This study explores Māori understandings of frailty. Focus groups were held with older people in supported living, health professionals working with older Māori and a rural community. A qualitative thematic analysis was conducted. There were two main messages from the discussions important for understanding frailty. (1) We need to look at the whole person, not just their physical changes. (2) We need to look at strengths and not just problems. Culturally appropriate support and care for older Māori with frailty needs a rounded strength-based approach and good listening skills.

Will access to COVID-19 vaccine in Aotearoa be equitable for priority populations?
Jesse Whitehead, Nina Scott, Polly Atatoo Carr, Ross Lawrenson
We examined the equity implications of the geographic distribution of COVID-19 vaccine delivery locations in Aotearoa New Zealand under five potential scenarios. We mapped the distribution of priority populations, who are at the highest risk of infection and COVID-19 severity or death, and then calculated travel times to all potential vaccination facilities including: stadium mega-clinics; Community Based Assessment Centres; GP clinics; community pharmacies; and schools. Our results indicate that most potential scenarios resulted in travel-time barriers for a substantial proportion of the population, and that these barriers disproportionately burden Māori, older communities and people living in areas of high socioeconomic deprivation.

Te Tiriti o Waitangi compliance in regulated health practitioner competency documents in Aotearoa
Heather Came, Jacquie Kidd, Deborah Heke, Tim McCreanor
Regulated health professionals have potential to play a central role in upholding te Tiriti and addressing inequities. Competency documents define health professionals’ scope of practice and inform curriculum in health faculties. We reviewed competency documents of 18 regulated health practitioners using Critical te Tiriti Analysis to determine te Tiriti compliance. There was considerable variation in the quality of the competency documents reviewed. Most were not te Tiriti compliant. We identified a range of alternative competencies that could strengthen te Tiriti engagement.
Meeting the Crown's te Tiriti o Waitangi commitments and obligations to Māori with lived experience of disability through the Health and Disability System Review

Gabrielle Baker, Paula Toko King, Bernadette Jones, Tristram R Ingham

Our paper looks at last year's Health and Disability System Review report recommendations with an Indigenous, kaupapa Māori lens to assess the extent to which it can support the Crown to meet its te Tiriti o Waitangi / the Treaty of Waitangi obligations. Drawing on five principles of te Tiriti / the Treaty relevant to health services, articulated by the Waitangi Tribunal in 2019, the paper finds that the proposals only go part way to complying with te Tiriti / the Treaty obligations and that, in particular, tānagata whaikaha (Māori with lived experience of disability and their whānau) are left largely invisible. If the Government is to deliver an equitable, anti-racist health and disability system, then it needs to also work in partnership with tānagata whaikaha as a starting point.

Hearing loss and hearing service experiences among older Māori and whānau: a scoping review

Alehandrea Raiha Manuel, Grant Searchfield, Elana Curtis

This literature review aimed to analyse current literature on the experiences of hearing loss and hearing services among older Māori and whānau. Using a Kaupapa Māori lens, the review illustrates the paucity of research and information on hearing loss and hearing service experiences among older Māori and whānau in New Zealand. Findings from the review will be used to guide Kaupapa Māori research on hearing loss and hearing services among older Māori and whānau.

Bowel cancer screening age range for Māori: what is all the fuss about?

Melissa McLeod, Ricci Harris, Sue Crengle, Donna Cormack, Nina Scott, Bridget Robson

The current New Zealand Bowel Screening Programme (BSP) is inequitable. Māori and non-Māori have a similar chance of getting bowel cancer at any given age, but Māori have a higher proportion of bowel cancers being missed by the BSP. This is because Māori are a younger population. At present, just over half of bowel cancers in Māori present before the age of 60 years (58% in females and 52% in males). Whereas, just under a third of bowel cancers in non-Māori are diagnosed before the age of 60 years (27% in females and 29% in males). Starting the BSP at 50 years of age for Māori with high coverage will fix this inequity.
Structural reform or a cultural reform? Moving the health and disability sector to be pro-equity, culturally safe, Tiriti compliant and anti-racist

Papaarangi Reid

Forty years ago, in 1980, Professor Eru Pōmare published the first volume in the series Hauora – Māori Standards of Health. That volume documented patterns of mortality, comparing Māori with non-Māori between the years of 1955 and 1975. Although we now know that data at that time undercounted the number of Māori deaths, this work drew attention to inequities for Māori for most of the common and amenable diseases in Aotearoa. Since that time, efforts have been made to improve the quality of ethnicity data and the literature detailing health inequities has expanded, including another three volumes in the Hauora series.

Health inequities are defined as “the presence of systematic disparities in health between groups.” Within Aotearoa and internationally, significant work has sought to understand how inequities arise, how they are maintained and how they can be eliminated. Internationally, the work of Professor Sir Michael Marmot has provided leadership, and in 2011 the New Zealand Medical Association hosted Professor Marmot on his visit to Aotearoa. It is generally understood that inequities in health are bad, not only for those who suffer from inequity, but also for the public health of a nation. Social and political willingness to invest in the elimination of inequities fluctuates over time. We are currently in a time of some political willingness to address equity.

On 21 April this year, the Minister of Health, Honourable Andrew Little, released details of the proposed programme of reform for the New Zealand health and disability sector. This proposal follows the publication of reports from a review of the sector, led by Ms Heather Simpson, and from Stage 1 of the WAI 2575 Hauora claim to the Waitangi Tribunal. Both reports highlighted comprehensive, consistent and compelling health inequities for Māori as motivations for reform, and noted that the health and disability system continues to underperform for Māori.

While New Zealanders are generally proud of the work that our health system is able to achieve, many of us would also agree that the system faces very significant challenges from repair, replacement or development of critical infrastructure; integration of new technologies; ensuring access to services and timely primary care across our unique geography; health workforce development and appropriate distribution; elimination of duplication of planning and administration functions; seeking ways to increase publicly funded services such as dental health and new cancer therapies; becoming more sustainable with a decreasing carbon footprint; reducing waiting lists that have become longer with COVID-19; all the while being responsive to our changing demography. Further, we must not forget the production and reproduction of ethnic inequities—our health system must...
become culturally safe. Change is needed but the health and disability system is a big and complex beast.

The Minister proposes a set of structural changes. The Ministry of Health will retain its function of sector stewardship and leadership of strategy, policy advice and monitoring. A new entity, Health New Zealand, will be tasked with developing a national plan for health and amalgamating all 20 district health boards (DHBs) and arrange them into four regions and a number of localities. Health New Zealand will have a lead role commissioning health services through these regional and locality bodies. Another new entity, the Māori Health Authority (MHA), will also be created. It will have a number of roles: providing strategy, policy and monitoring in parallel to the Ministry of Health; commissioning health services for Māori in addition to co-commissioning health services for the total populations in parallel with Health New Zealand. That is a lot of roles for the MHA—most of them aim to ensure the health system performs equitably.

Many Māori are excited by the proposed MHA, but there are still questions. Most of the proposed functions of the MHA exist already. The Ministry of Health, DHBs and Te Puni Kōkiri already have legislative and regulatory abilities to perform many of these roles. But they just don’t prioritise them, or they choose not to perform them. If we want our health system to change and become equitable and Tiriti compliant, we need to ask ourselves: What is our theory of change? What changes are necessary to achieve the outcomes we seek? Will the proposed structural change lead to different outcomes? Can equitable outcomes be achieved without a culture change within the health sector, to a culture of willingness to prioritise equity and compliance with guarantees of Te Tiriti o Waitangi?

These are big questions for the Government, the health and disability sector and health practitioners. The fundamental issue underpinning our culture change is to overcome our addiction to sameness. We have a reliance on singular ‘one size fits all’ policies and processes as a demonstration of ‘treating everyone equally’. This has led to inequitable outcomes because different groups experience different barriers to access opportunities in health. This culture change is a necessary prerequisite to achieving the stated objectives of the health reforms. Are we in the health sector ready and committed to this culture change?

The contributions to this volume of the New Zealand Medical Journal assist our focus in this regard. Some describe inequities and highlight important areas for change and future monitoring. Manuel and colleagues describe the public health importance of hearing loss and note significant inequities for kaumātua Māori accessing hearing services. Gee et al also focus on kaumātua and explore frailty and the range of issues that influence outcomes.

Gabrielle Baker and colleagues highlight missed opportunities in the Health and Disability System Review to uphold the Tiriti rights of Māori with lived experience of disability. Other contributions focus on proposals that are necessary to achieve equitable outcomes. In workforce, Sandra McDonald notes the importance of kaupapa Māori approaches to training the Māori nursing workforce, and Came et al describe the potential of health professional regulatory bodies to drive Tiriti compliance.

Whitehead and colleagues are concerned with the equity of the COVID-19 vaccine rollout and have modelled which of the different delivery localities across a DHB for larger-scale programmes have the least equity barriers. Hoek et al report on urgent work that needs to be done to achieve Smokefree 2025.

Three other contributions are important because they call out racism in the health system. It is easy to be a ‘racism denier’, but the broader impacts are just as dangerous as being a ‘COVID denier’ or a ‘climate denier’. In effect, if a system displays systematic ethnic inequities, it displays racism. It is at the heart of the culture that needs changing.

Elsewhere, renowned academic and anti-racism researcher Dr Camara Jones noted that naming racism is important and the first part of addressing it. But we need to go further and ask: How is racism operating here? What structures, policies, practices, norms and values are operating that permit racist outcomes and prevent us acting to overcome them?
Dr Wil Harrison has written an open letter to medical professionals after a racist incident was called out at a medical conference. Although the individuals and college involved have begun restorative work, he challenges the profession to be honest and reflect on what we can learn individually and collectively about racism in our own lives and practice. From this reflection he seeks collective commitment and action against racism.

Dr Julie Bennett and a collective of colleagues committed to the prevention of acute rheumatic fever and devastating rheumatic heart disease call on us to demand the establishment of a national register. This step to address one of our national shames is long overdue.

Dr Mel McLeod and colleagues present another clear agenda for our immediate collective support. There has been a debate back and forth about the age range of the Bowel Screening Programme (BSP) and whether the current age range (60–75 years for all New Zealanders) ignores important Māori demography that predicts that the BSP will deliver inequitable outcomes. This paper provides clear epidemiological arguments for an age extension of the BSP rollout to begin screening Māori at a younger age. Inaction in the face of this evidence would seem to constitute institutional racism.

Health professionals often expect recognition of leadership within the health and disability sector, especially in times of change. In order for the proposed structural reforms to the health and disability sector to be truly effective for Māori and therefore equity, a culture change must occur—within the health system, within the health professions and within us. We must accept the overwhelming evidence that ‘sameness’ creates inequity. Silence and inaction show us to be complicit in these inequitable and racist outcomes.

Our advocacy and action is overdue. Mauri ora.
Crown’s te Tiriti o Waitangi commitments and obligations to Māori with lived experience of disability through the Health and Disability System Review. NZ M J. 2021 May 21;134(1535):44-54

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Recommendations for implementing HPV self-testing in Aotearoa

Karen Bartholomew, Beverley Lawton, Susan M Sherman, Collette Bromhead, Jane Grant, Georgina McPherson, Anna Maxwell, Marion Saville, Sue Crengle, Nina Scott

In Budget 2021 published earlier this month, the Government made the welcome and long-awaited announcement that they will invest “up to $53 million to complete the design of and implement a new human papillomavirus (HPV) test” in 2023. Here we explain HPV self-testing and the background to this announcement, and we make evidence-based recommendations as to how the Government can most equitably and effectively implement rollout of HPV self-testing.

**HPV self-testing**

High-risk types of HPV cause more than 90% of cervical cancers. HPV-based screening offers 60% to 70% greater protection against the development of invasive cervical cancer compared to cytology-based screening. Many countries (eg, Australia, UK, US, Netherlands) have now introduced HPV testing as the primary screening test. Under HPV primary screening, the procedure remains the same. However, an HPV test is conducted on the cervical sample rather than cytology. If the HPV test is positive, the cells are then examined using liquid-based cytology. Crucially, by moving to HPV primary screening, HPV self-testing becomes possible. HPV self-testing, in which the participant carries out their own vaginal swab, does not require a speculum, does not require finding the cervix and can be done in a clinic or potentially in the privacy of the home. A Cochrane review found self-testing for HPV using polymerase chain reaction (PCR) assays reliably offers equivalent sensitivity to clinician-collected samples.

**Background**

Cervical cancer is almost entirely preventable through screening and HPV vaccination. Despite this, there are approximately 150 new diagnoses and 50 deaths from cervical cancer in Aotearoa New Zealand every year. Although these figures represent a dramatic decrease since the National Cervical Screening Programme (NCSP) was established in 1990, there are longstanding ethnic and socioeconomic inequities in cervical cancer incidence and mortality, with cancers concentrated in unscreened and under-screened groups, in particular Māori and Pacific women and other women living in higher deprivation. For example, there are more than twice as many Māori (wāhine Māori, tangata Māori with a cervix (including tangata trans, non-binary and intersex)) with diagnoses and deaths from cervical cancer as for non-Māori. The importance of cervical cancer for Māori was highlighted with Cabinet Minister Kiritapu Allan’s recent diagnosis with stage III cervical cancer.

The NCSP currently recommends three-yearly routine cytology screening for 25–69-year-old people with a cervix (the start age was recently changed in the NCSP from 20 to 25 years). The current test requires attendance at a clinic with a health-professional collected sample of cells from their cervix during pelvic exam (requiring insertion of a speculum). The cells are sent for microscopic examination. Cervical screening attendance in New Zealand has declined from a high of 76% of all eligible women in 2009 to 70% in August 2020, including the impact of COVID-19, leaving more women at risk of developing...
cervical cancer. Screening figures for Māori, Pacific and Asian women are even lower. In March 2021, the national coverage was 61.4% for Asian, 63.1% for Pacific and 61.2% for Māori, compared to 75.6% for others (the coverage equity gap between Māori and others (mostly European) is 14.4%).

There are many explanations why the present cervical screening programme has failed to reach some women. For example, direct and opportunity costs including work or family commitments, the nature and invasiveness of the test, a previous negative experience of screening or cancer, history of sexual violence, embarrassment and shyness or whakamā. Women with physical or intellectual disability and members of the LGBTQI community frequently face additional and multiple barriers.

However, the new HPV self-test is likely to overcome many of these barriers, improve the cervical screening programme coverage and reduce the incidence of cervical cancer. International research, and our collective local research, demonstrates HPV self-testing is more acceptable and likely to improve equitable access compared with current screening.

**What we have learned from research into HPV self-testing in Aotearoa?**

The acceptability of HPV self-testing for never- and under-screened Indigenous populations and minoritised groups has been explored internationally, as well as in Aotearoa. Kaupapa Māori hui-based research confirmed the acceptability, empowerment, potential for improving coverage and equity of HPV self-testing, and showed that the majority of Māori surveyed were positive about attending follow-up cytology or colposcopy appointments if required. A feasibility study in seven West Auckland general practices included co-design of tailored participant materials taking a health literacy and ethnic-specific approach. The study demonstrated high acceptability, found women with cervical abnormalities and highlighted the importance of support to follow-up.

A Northland community-based trial in never- and under-screened women found a high 51% uptake of self-testing, with Māori 2.8 time more likely to self-test than attend usual care. The study found an 11% positivity rate, which is comparable to international studies. In a recent urban Auckland-based randomised controlled trial, 3,553 Māori, Pacific and Asian women were invited to take part in clinic-based HPV self-testing, home-based self-testing or a standard smear test. Women were much more likely to take part if they were in the home-based group, particularly Māori women (9.8 times more likely to complete a mailed screen at home compared to usual care). With tailored support more than 90% follow-up of participants with positive HPV tests was achieved in this community trial. In a survey alongside the community trial the most frequently cited reasons for choosing a self-testing were its simplicity, being less embarrassing, not requiring an appointment with a clinician, not requiring a speculum and that the test is free.

In a small pilot testing different device types, the feedback from Māori, Pacific and Asian women was positive, underscoring the need for a flexible programme with different options and the importance of the relationship with the health professional, such as preferring a female and, usually, a culturally concordant sample taker.

It was notable that Māori reported the current screening programme as being disempowering, whereas their involvement with HPV self-testing, by comparison, was empowering. Similarly in Australia, Aboriginal participants perceived self-testing as a way of exerting control over their own health. It may be that exploring and promoting messages of empowerment might further increase uptake of self-testing in Māori and indeed other groups.

**HPV and healthcare providers**

New Zealand healthcare providers have talked about the importance of delivering empathetic cervical screening services and wanted an assurance that women would be supported appropriately to have cytology or colposcopy if they had a positive HPV self-test result. Many supported HPV-pos-
itive women going straight to colposcopy and stressed the importance of avoiding multiple clinic visits. Additionally, in a recent survey of New Zealand healthcare providers’ knowledge and understanding about HPV testing, it was evident that more targeted education is required before the rollout of HPV primary screening. Many healthcare providers surveyed agreed they did not feel adequately informed to confidently respond to patients’ questions about HPV testing. Ongoing education for sample takers is essential to ensure that misinformation, stigma associated with the sexually transmitted nature of HPV and the widening of inequalities are not inadvertent consequences of interactions between health professionals and the public.\(^\text{16}\)

**Recommendations for implementation**

We outline key recommendations from our collective expertise to the NCSP in the Ministry of Health as they develop the HPV self-testing implementation plan for Aotearoa New Zealand:

- **Centralisation of equity, specifically Māori health equity.** Universal access is likely to be pro-equity. However, ensuring access equity requires intentional action in planning and implementation. Hei Āhuru Mōwai, the national Māori Cancer Leadership Aotearoa group, have outlined a number of recommendations on HPV self-testing:\(^\text{17}\) two key recommendations are Māori governance and the need to consider interim measures due to the lead time for implementation.

- **With universal access, many well-screened women will access self-testing and their needs will not be the same as those who are under-screened.** In addition to equity of access, we recommend a focus on equity in follow-up, colposcopy and treatment to ensure equity of outcomes. Building on the recent review of current cervical and breast support-to-service models, consideration should be given to redirection of resources to enable tailored follow-up of people who are HPV positive, particularly for those currently underserved. Support services will need to be available and culturally safe. Achieving follow-up can be intensive and has to be adequately resourced and performed by skilled staff using a shared decision-making approach.

- **Rapid review and reconsideration of Part 4A of the Health Act 1956 (National Cervical Screening Programme) to remove the current data-related barriers to equitable access to screening, and to realign and strengthen Māori data governance and sovereignty, including the opportunity to restore cultural licence for use of data.**

- **Ensure that the new IT solution is population-based and facilitates easy access to screening, including providing multiple methods for invitation of eligible women.** The IT solution must integrate with primary care systems and be able to capture participant preferences for receipt of self-test kits.

- **Review the place of cervical screening in the broader context of women’s health and reproductive health in general practice, with particular emphasis on the importance of diagnostic investigations for gynaecological symptoms.**

- **Plan for a facility within the programme for at least an ‘on-request’ service of mailed self-testing kits, leveraging knowledge from local research and approaches used in the National Bowel Screening Programme.**

- **Review positive result triage/follow-up pathways to ensure that these are risk-stratified, women-centred and have an equity lens applied.** Expected colposcopy demand from primary HPV screening and self-testing needs proactive management and additional resource. Workforce development needs to consider the wider implementation of the nurse colposcopist role.

- **Rapid development and implementation of an education package for healthcare providers ahead of the implementation start date, as well**
as ongoing updates and continuing professional education opportunities in HPV and cervical cancer.

- There needs to be simple, well-designed resources based on local research that explain how to take a self-test, what happens next and when to see a health professional. Culturally appropriate health promotion and materials that cater to Māori, Pacific and Asian women’s health literacy needs are required.
- Alongside health professional education and communication, there needs to be a public communications strategy, including timelines for implementation to manage public expectations and pressure on primary care. Consideration of the empowerment potential of self-testing in promotional messages is recommended.

Our two research groups are progressing implementation studies in Northland and Auckland in upcoming months, to inform NCSP implementation planning on a range of the recommended issues.

Conclusions

There is considerable support across New Zealand for the introduction of HPV self-testing, with local evidence and expertise available to shape implementation planning. Hei Āhuru Mōwai have outlined their recommendations in a position paper calling for the urgent implementation of a national ‘māu anō he kuhu—do it yourself HPV test’ programme alongside Māori governance. Support has also been expressed by the Royal New Zealand College of General Practitioners, Te Rōpū Whakakapapa Urutā (National Māori Pandemic Group), the Royal Australian and New Zealand College of Obstetricians and Gynaecologists and Smear Your Mea, a community funded and whānau-driven campaign to encourage women to attend cervical screening—all of whom also backed a recent petition calling for the introduction of HPV self-testing. As a collective, we welcome the Government’s commitment to and investment in HPV testing. Evidence-based implementation strategies are now required to maximise the potential for this technology to address current inequities.
Competing interests:
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It’s about who they are and what they can do: Māori perspectives on frailty in later life

Susan Gee, Irihapeti Bullmore, Gary Cheung, Ulrich Bergler, Hamish Jamieson

ABSTRACT

AIM: This study aimed to explore Māori (the indigenous people of Aotearoa New Zealand) understandings of frailty.

METHOD: Focus groups were held with older Māori in supported living, health professionals working with older Māori and a rural community. A qualitative thematic analysis was conducted.

RESULTS: Two interlinked, overarching themes emerged: (1) Frailty is a multidimensional experience, not simply a physical one. (2) The experience of frailty is a balance between deficits and strengths. The Waikarero te Waka o Meihana model provided a useful framework for structuring the thematic results.

CONCLUSIONS: Culturally appropriate and comprehensive support and care for older Māori with frailty will be facilitated by a rounded strength-based approach and listening skills.

There are pervasive health disparities between Māori and non-Māori in Aotearoa New Zealand, and frailty is no exception. Māori experience frailty more often and at a younger age than non-Māori New Zealanders,1,2 with Māori aged 65–70 years being as likely to be frail as non-Māori in their early 80s.3

There is general agreement that frailty represents an elevated state of risk or vulnerability to a sudden decline in health and other negative outcomes.4,5 There is less agreement about the operationalisation and assessment of frailty. One approach views frailty as a physical syndrome with an underlying biological cause,6 while an alternative approach views frailty as an accumulation of medical deficits.7 Moreover, there have been calls for a more holistic approach to frailty to better inform personalised care and management plans that integrate older individuals’ views and goals.8,9 However, research to understand views on frailty has generally been limited to Western cultures and has not interfaced with the Māori worldview (te ao Māori).

How frailty is conceptualised and understood can shape policies, access to services, care practices and social responses, and in turn the subjective experience of frailty.10 In New Zealand, service delivery for Māori may be compromised if the approach is not comprehensive within a Māori cultural context.11 This qualitative study therefore explored understandings of frailty within te ao Māori to help inform appropriate assessment and support for older Māori with frailty.

Methods

Settings and participants

Three focus groups were held in Canterbury, New Zealand:

i. The first group involved six residents in a Māori-model supported living villa, with the discussion taking place in situ. There were five females and one male, all of whom were aged over 65 (66 to 83) and identified as Māori.

ii. The second group was drawn from an existing network of health profes-
sionals working with older Māori and was held at a community venue as part of a regular meeting. Twelve of the 14 professionals identified as Māori and 13 were female.

iii. The third group was held as part of a hui (meeting) on health services for older Māori in rural communities and was held at the community centre in a small coastal community. The 19 participants ranged in age from 18 to over 70, with the majority aged over 65. Ten participants identified as Māori, two as ‘mixed with Māori heritage’ and seven as Pākehā (New Zealand European). An additional four visitors connected to the participants sat in on some of the discussion.

Most participants were known to one of the facilitators through their personal and professional roles within local Māori communities. Ethics approval was given by the University of Otago Human Ethics Committee (17/151). Here we use the participants’ preferred terms, pōua (older man) and tāua (older woman).

Focus groups
The discussions took place in 1-1.5-hour sessions. Each focus group was co-facilitated by a Māori registered nurse working as clinical assessor with older Māori and a Pākehā gerontology researcher. The discussions were primarily held in English, but as one of the facilitators was bilingual, discussion could be facilitated in te reo Māori (the Māori language) where it arose.

The primary aim of the focus groups was to describe and understand meanings and interpretations of frailty within a Māori worldview. The structure broadly followed a hui process framework:12

- Mihi and whakawhanaungatanga: welcome and establishing connection.
- Kaupapa: the main purpose of the focus group, with a semi-structured discussion guide focusing on what makes them think of a person as “frail” and exploration focusing on what makes frailty better or worse.
- Poroporoaki: wrapping up. Summary notes were made on a white-board or easel pad throughout the sessions, which enabled initial thematic clustering with the participants present. These were photographed and transcribed for further analysis.

The discussion was also audio-recorded for the supported living and community groups and professionally transcribed.

Analysis
The thematic qualitative analysis was based on the framework approach.13,14 Through the process of in-session summary and repeatedly reading the transcripts, the researchers became aware of key ideas and themes. These were used as the basis for an initial thematic framework to classify the data. The relevant content was charted verbatim into an Excel spreadsheet matrix, with the groups as the rows and the thematic elements as the columns. The matrix was reviewed, discussed and visually mapped in an iterative process. During the mapping and interpretation stage, the resonance with Waikare o te Waka o Meihana model15 was recognised, and this was used to structure the final mapping and presentation of the themes.

Results
Two interlinked, overarching themes in the participants’ understanding of the experience of frailty emerged from across all the groups:

1. Frailty is a multidimensional experience, encompassing physical and functional, social and whānau, psychological, environmental and macro-level factors.
2. The experience of frailty is a dynamic balance between challenges/deficits and strengths/resources.

In this paper we present the sub-themes within the structure of the Waikare o te Waka o Meihana model (the Meihana model), which was developed to guide health professionals’ interactions, assessments and care within a Māori worldview (Figure 1).15 The Meihana model uses the analogy of a double-hulled canoe, with the two hulls used to represent the interconnection between an individual and their whānau (support network). Five cross-beams strengthen the canoe and represent an individual’s physical, psychological and emotional wellbeing, their beliefs and connectedness, their physical environment...
and the services available to them. The journey of the waka (canoe) is influenced by winds and ocean currents that symbolise historical and social contexts and the influence of Māori worldviews. Navigation brings together the assessment of all these components to enable the health professionals and the individual and/or whānau to plot a course forward.

The two hulls: the interconnection between the individual and their whānau

Frailty was seen as a whānau experience. This included the challenges of frailty. For example, whānau wellbeing can be affected by “worrying” and being “tired”, and the older person may worry about this impact. It also included the balancing factors of “good support from whānau”. An example was ensuring access to health services:

“My daughter just barged in and said, ‘you are coming’, and took me over to the doctor. I ended up in hospital having a big operation. If it had been left to me—no, I wouldn’t have gone. So I do have good whānau supports.”

Frailty was seen as challenging social wellbeing and engagement. It was associated with being “withdrawn”, “going out less” and being “lonely”. The death of a life-long partner was highlighted as a powerful factor (“Grief and loss, it’s huge”) that could sometimes lead to the bereaved partner dying “soon after”.

Feeling engaged, useful and connected to other people was intertwined with positive mental wellbeing. “Being useful”, “having a purpose” and “manaaki” (giving support) were balancing factors. This could be expressed through their social networks and role as “the centre for our whānau”, and the bonds with “moko” (grandchild/grandchildren).

Figure 1: Summary of themes.
The five crossbeams

(i) Tinana: physical health and functioning

Participants from across the groups raised physical changes that echo the syndrome of physical frailty, such as changes in stature or “anua”, weight, muscles and balance. All the groups also raised a vulnerability to and/or presence of health issues and conditions. For example, a greater likelihood of hearing or vision issues, pain, getting sick, healing more slowly, having poor health, hospitalisation and death. The participants suggested nutrition, exercise, traditional remedies and western medications had a role in helping prevent or mitigate frailty.

There was a strong sub-theme around mobility and independence. For one of the participants, the question was simply, “can he push a lawnmower?” Frailty was associated with walking slower, needing help walking and reduced mobility. It was also associated with loss of independence and needing help, relying on others and increased use of services: “like, they need help going to appointments, or going to the grocery shop or just going out generally”.

The participants recognised that pride may stop some older Māori from accepting help or using aids. However, the discussion positioned accepting help as a positive balancing factor of adaptation. For example, one person with a tokotoko (walking stick) said, “if I need a stick, I don’t feel old. I just find it’s just a thing there that enables me to get around… I’ve got a walking stick as part of an aid”. Another advised that, if there were younger family members to help, “you make the most of it”. The discussion highlighted that it is important that help is offered proactively as, traditionally, asking for help may be seen as rude or shameful: “actually ask… because they’re too whakamā (ashamed) to say or they don’t want to put them out”.

(ii) Hinengaro: psychological and emotional

Cognitive changes were associated with frailty across all the groups. This included “forgetfulness” and “memory”; being slower and needing help with decisions and finances; being “confused” and “not up with the play”; and generally being slower cognitively.

Frailty was also associated with challenges to emotional wellbeing across all the groups. People living with frailty may be “frustrated” and “bored”, “a bit depressed”, “bad-tempered” or “grumpy”. People who were frail were seen as often being “not as confident” as they were in the past and being “nervous” and “worried”. There is likely a two-way relationship between (a) being physically frail as a risk factor for poor emotional wellbeing and (b) poor emotional wellbeing acting as a risk factor for physical frailty (eg, by decreasing motivation for self-care).

The participants raised the importance of “mindset”, “personality” and “inner strength” as balancing factors: “It depends what he thinks”. Mauri ora (inner strength, life force) is integral to understanding wellbeing and resilience. Having “autonomy”, “mana” (respect) and “confidence” were positive balancing factors. The discussions revealed how supporters can recognise and strengthen these self-concepts or erode them:

“Remember that they’re not deaf, dumb and blind… Sally says, ‘my name’s Sally, not silly’. She’ll say it right in front of them. And they just don’t get the message… and it quietens down and she goes into her little corner and folds and folds and folds… all these ones that think she can’t do anything are around her… I know she’s hōhā or bored.”

The health professionals discussed how safety concerns need to be balanced with maintaining independence, autonomy and “real choices”.

(iii) Taiao: the physical environment

In the context of frailty, transport was a salient aspect of the physical environment, particularly in rural group. There was a recognition that frailty often means giving up driving. For example: “eventually I won’t be able to drive and I will have to rely on my daughter and she works”. The availability and affordability of transport impacted on each participant’s ability to maintain engagement and access services:

“It’s transport, and being able to drive and being able to budget to be able to pay for that transport. So anything within the assistance of transport would be amazing and welcome.”
The participants, particularly the group of professionals, also expressed their awareness of regional differences and the impact of the Canterbury earthquakes.

(iv) *Iwi katoa: support services and systems*

The general practitioner was the first point of call for health matters: “that would be your first one, a doctor”. Services that came to them were appreciated, such as a nurse who “came round to make sure you were ok”, or a community pharmacist coming out to explain medications. Listening was the key to appropriate services:

“I think listening is a good key question. Listening to people, which they didn’t have the skills to listen to, they need to go to listening school.”

Pōua and tāua said they would sometimes provide feedback to the health professional when the interaction was unsatisfactory, but they would not return to a health professional who didn’t listen. Developing and maintaining trust was a key to appropriate services.

(v) *Wairua: beliefs regarding connectedness and spirituality*

Te oranga wairua (spiritual wellbeing) has been described as “a deeply spiritual and uniquely Māori experience of connectivity”. An underlying theme of manaakitanga (generosity and care) as an intrinsic and pervasive positive balancing factor was interwoven through the talk. The older participants had grown up with support for older members of the whānau as a given—“whether we like it or not”, one joked. Being integrated in the whānau involved support being available and needs known: “I think the connectors of the whānau do need to keep poking their noses in and checking up”.

A practical expression of manaakitanga was that the rūnanga (tribal authority) could provide practical health support, such as access to free health consultations, which could help provide a sense of security: “if I didn’t have the rūnanga I’d be scared”.

While kaupapa Māori and marae-based care can be highly successful for some, there was recognition that workforce capacity is not robust enough to provide this in all situations, and that it will not necessarily be preferred by all Māori, as there are “some faces you never see” at the marae.

Ngā *roma moana: ocean currents*

While Māori can have diverse relationships with te ao Māori, Māoritanga (Māori practices and beliefs) can be a source of inner strength and life force (mauri ora). Previous research has supported the link between having a connection with traditional cultural practices and places and having greater wellbeing. This was echoed in the comments of pōua and tāua about how “cultural identity”, “tikanga” and visiting the marae had a positive impact on the experience of frailty (eg. in providing a feeling of being “uplifted” and minimising depression).

Ngā hau e wha: the four winds

Past and current generations are interconnected within a Māori worldview, and there is increasing awareness of how the ongoing impacts of colonisation, racism, migration and marginalisation provide the context for current economic and health disparities. The four winds of colonisation, racism, migration and marginalisation provide the context for economic and health disparities. The group of health professionals discussed how funding models that provide access at age 65 are inappropriate, as Māori can need earlier access.

Pōua and tāua discussed that “money can be a huge issue” and the impact of the potential cost of doctor fees, prescription fees and transport costs to get to appointments and chemists: “If you don’t have the money, you don’t go”. Budgeting was a potential individual balancing factor, although the relative strength of impact was debated.

An impact of migration could be seen in the perceived barriers to approaching local rūnanga services:

“you’re lucky to belong to the local rūnanga, but there are other Māori there that come from other places, and I made one kuia (older woman) come with me... because she wouldn’t go because it wasn’t for other Māori.”

Whakatere: navigation and strengths

One of the salient messages to emerge across the focus groups is that a culturally appropriate understanding of frailty will not emerge from looking at deficits alone. A focus on deficits not only runs the risk of
providing an incomplete understanding of frailty, but also the risk of being perceived as disrespectful: “everyone around here seems to think she’s pakaru (broken)... she ain’t pakaru” and diminishing: “It’s an under-mining of them”. This may lead to resistance to the imposition of a label: “whose perception is it?... Yeah well is that my perception?” and following suggestions: “do you know what taringa mārō (stubbornness) means?... I don’t listen”. Among the health professionals, there were misgivings about assessment: “but does it measure wellbeing?”. The discussions provided reminders that at the heart of any approach to frailty must be the core value that “they are still the person” and “it’s about who they are and what they can still do”. Joint navigation for frailty with older Māori and their whānau may be facilitated by a sound foundation of a holistic, strength-based approach and good listening:

“Sometimes, some medical persons, they don’t listen to what you are telling them. They have got their own opinion and you will be going on this pathway not what you think...”

**Discussion**

The present study was a small exploratory study in a single region and was weighted towards individuals who were well-connected with te ao Māori, and as such it cannot fully explore nuances and diverse experiences of being Māori. However, it was the first study to specifically seek to understand Māori perspectives on frailty.

Participants talked about frailty as being multidimensional and the experience of frailty as being shaped by both deficits and strengths. This understanding of frailty resonates with previous work from other cultures, and yet it was also intrinsically Māori. These themes meshed with and reinforced the value of holistic Māori models of assessment and understanding, such as the Waikare o te Waka o Meihana, te Whare Tapa Whā (the Four Sided House), te Wheke (the Octopus) and te Pae Māhutonga (the Southern Cross Constellation).

In 2000, Markele-Reid and Browne criticised many of the current approaches to frailty for taking an objective approach that focuses on physical deficits and dependency in isolation from strengths, which they argued is not sufficient for understanding the holistic, complex and unique meaning of frailty for an individual. According to Markle-Reid and Browne, an understanding of frailty must recognise that the experience of frailty is multidimensional and determined by “the complex interplay of physical, psychological, social, and environment factors” and the perceptions and strengths of the individual. In some ways the decades of thinking around hauora (holistic health) can be seen as providing an example of the kind of approach that Markle-Reid found so lacking in the mainstream biomedical literature on frailty. A strength-based hauora approach that contextualises is more likely to be acceptable, meet needs and align with traditional models for Māori. Such an approach to culturally appropriate assessment to frailty is relevant to all health professionals, alongside taha Māori (those of Māori descent), as the Māori workforce capacity is not robust enough “to do it all”. As frailty becomes an increasingly dominant theme in services for older people, we hope that further kaupapa Māori work will help to articulate a hauora approach to frailty.
Competing interests

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Will access to COVID-19 vaccine in Aotearoa be equitable for priority populations?

Jesse Whitehead, Nina Scott, Polly Atatoa Carr, Ross Lawrenson

ABSTRACT

AIM: This research examines the equity implications of the geographic distribution of COVID-19 vaccine delivery locations in Aotearoa New Zealand under five potential scenarios: (1) stadium mega-clinics; (2) Community Based Assessment Centres; (3) GP clinics; (4) community pharmacies; and (5) schools.

METHOD: We mapped the distribution of Aotearoa New Zealand’s population and the location of potential vaccine delivery facilities under each scenario. Geostatistical techniques identified population clusters for Māori, Pacific peoples and people aged 65 years and over. We calculated travel times between all potential facilities and each Statistical Area 1 in the country. Descriptive statistics indicate the size and proportion of populations that could face significant travel barriers when accessing COVID-19 vaccinations.

RESULTS: Several areas with significant travel times to potential vaccine delivery sites were also communities identified as having an elevated risk of COVID-19 disease and severity. All potential scenarios for vaccine delivery, with the exception of schools, resulted in travel barriers for a substantial proportion of the population. Overall, these travel time barriers disproportionately burden Māori, older communities and people living in areas of high socioeconomic deprivation.

CONCLUSION: The equitable delivery of COVID-19 vaccines is key to an elimination strategy. However, if current health services and facilities are used without well-designed and supported outreach services, then access to vaccination is likely to be inequitable.

Aotearoa New Zealand has been following an elimination strategy in its fight against COVID-19, with the aim of saving lives and protecting our health services. This strategy has put our country in a relatively good position internationally, with few deaths, low levels of active COVID-19 cases (concentrated predominantly at the border) and only sporadic community transmission since May 2020.1 As we have seen recently, there is still the risk of an outbreak at any time, especially among communities living and working near international points of entry. However, now that vaccines are available and vaccination has started in Aotearoa New Zealand, we are increasingly relying on our vaccination delivery programme to support our elimination strategy and to reduce morbidity and mortality.

A key challenge in adding a vaccination approach will be achieving the equitable and universal delivery of a vaccine. There are various ways of conceptualising ‘fairness’ and prioritising vaccine delivery,2,3 which in turn can have different impacts on COVID-19-related deaths, hospitalisations and ICU admissions.4 The risk of severe COVID-19 infection, ICU admission and death increases with age and comorbidities.5,6 Recent international analyses determined that, compared to individuals younger than 54 years old, the risk of mortality is 8.1 times higher among 55–64-year-olds and 62 times higher among those aged 65 and older.7 Furthermore, data from the United Kingdom indicate that the risk of death from COVID-19 is also associated with lower socioeconomic status and being non-white.8 Given the stark, persistent and increasing health inequities in Aotearoa experienced particularly by Māori,9,10 it is essential to ensure that those most at risk of infection, and the members of the community most
vulnerable to COVID-19 severity, are prioritised for vaccine protection, and that every single person in the ‘team of five million’ has access to the vaccine. A major priority should be to immunise people who might die if they were to contract COVID-19. A secondary aim is to reduce admissions to hospital and to protect the health system. It has been argued that governments should first allocate COVID-19 vaccines not only according to individuals’ risk of infection and underlying conditions, but that social vulnerabilities—such as socioeconomic status, high-risk occupations, housing and living conditions, ethnicity and other factors that limit access to healthcare—must also be considered. Described priority populations include migrants, refugees, prisoners, those in residential facilities and people with disabilities. It is particularly important to prioritise Indigenous populations. The transmission of COVID-19 and associated health impacts are likely to be higher among Māori in Aotearoa New Zealand and Indigenous populations elsewhere. Furthermore, in Aotearoa New Zealand it has been estimated that COVID-19 infection fatality rates could be 2.5 times higher for Māori than New Zealand Europeans, and two times higher for Pacific people. Health inequities between Māori and non-Māori are unjust, large, persistent and occur across the life course. Between 1992 and 2016, the Ministry of Health published 107 reports on Māori health and the disparity between Māori and non-Māori outcomes. Māori are disproportionately impacted by poorer access to the social determinants of health, including housing and quality healthcare.

Achieving equitable immunisation necessarily involves balancing the logistical constraints of distributing and administering the time- and temperature-sensitive COVID-19 vaccine with minimisation of the barriers for those who wish to receive it. Vaccinations began in Aotearoa New Zealand with ‘Group 1’, who include border workers and managed isolation employees (as well as their whānau and close contacts) who are currently exposed to the greatest risk of infection. The next stage is currently targeting Group 2, which includes frontline health workers, older Māori and Pacific people, long-term residential care residents and people in the Counties Manukau District Health Board region aged 65 years and over who have an underlying health condition or disability. The wider rollout of the vaccine will focus on first protecting people at risk of contracting and dying from COVID-19, including all people aged 65 years and over, people with underlying health conditions and disabled people (Group 3), before being made available to the general population aged 16 and over (Group 4). COVID-19 Response Minister Chris Hipkins has previously signalled that the locations used in the vaccine rollout could involve ‘mega-clinics’ at stadiums, as well as immunisations at general practitioner (GP) clinics, pharmacies, large workplaces, schools and sports grounds. It has now been announced that the location of the vaccination rollout to Groups 2, 3 and 4 will include places of employment, pop-up clinics and usual vaccination services, such as Māori and Pacific providers, GP clinics and community pharmacies.

Internationally, there have been issues ensuring equitable delivery both on a global scale and within countries. The United Nations Secretary-General has called for vaccine equity—that is, ensuring that low-income countries have access to vaccine stocks—to be a moral test for the global community. Despite non-white residents of New York City being hardest hit by the virus, vaccination rates are much higher among white residents. There is a risk that a similar ‘white capture’ of resources and inequitable access to the vaccine will occur in Aotearoa New Zealand. Barriers to accessing the vaccine that disproportionately affect those who are at the most risk of COVID-19 severity, such as people with underlying conditions and those aged over 65 years old, as well as Māori, Pacific and socioeconomically deprived communities that experience higher levels of chronic disease, will exacerbate key inequities. In fact, the inequitable delivery of vaccines is likely if it is based upon the current configuration of health services and facilities. Access to healthcare in Aotearoa New Zealand is inequitable. This includes the inequitable geographic distribution of health services such as primary care services and musculoskeletal clinics. Spatial accessibility is not the only barrier to accessing healthcare, particularly for Māori.
table distribution of services is confounded by additional factors such as the (in)appropriateness, (un)availability, (in)acceptability and poorer quality care provided by many services. Māori and Pacific people are more likely to experience racism from healthcare providers and are also disproportionately affected by cost and transport as barriers to accessing GP services.\textsuperscript{37}

The health system will need to work differently to overcome these challenges and achieve equitable vaccine delivery rollout. This paper explores the impact that different scenarios for the location of population-wide vaccine rollout could have on access for geographic areas. We analyse potential accessibility for populations under different vaccine distribution scenarios and discuss the equity impacts.

Methods

Data

The population data used in this analysis is based on 2018 census data at the Statistical Area 1 (SA1) level. This includes information on the usually resident population, as well as the age and ethnicity of residents in each SA1.\textsuperscript{38} Ethnicity data in the 2018 census are not prioritised, so individuals who report multiple ethnicities are counted more than once.\textsuperscript{39} The 2018 New Zealand Index of Socioeconomic Deprivation (NZDep18) information was accessed from the University of Otago.\textsuperscript{38} Geographic data include SA1 address-weighted centroids, developed using the SA1 boundaries and address points datasets. The road network layer used in this analysis was developed by Beere.\textsuperscript{42} GPS coordinates were accessed for five types of facilities that could be used as sites of vaccine delivery: (1) stadium mega-clinics; (2) COVID-19 Community Based Assessment Centres (CBACs) as they were located at 24 February 2021; (3) GP clinics; (4) community pharmacies; and (5) schools.\textsuperscript{46} These facilities were selected based on recent media comments that they could be used as locations for vaccine delivery.

Analysis

The first stage of the analysis involved mapping the total population for each SA1 in Aotearoa New Zealand. We also mapped the Māori and Pacific populations as well as those aged 65 years and over. We then analysed the geographic distribution of these population subgroups using the Getis-Ord cluster analysis function in ArcGIS 10.7. This indicated where there were clusters of high numbers of a population, and whether those clusters were statistically significant. This approach was taken as it overcomes some issues around mapping of population subgroups, particularly that often large and significant subgroup communities are overlooked if they only make up a small proportion of an area’s total population. The second stage of analysis involved calculating the drive times between each SA1 and the nearest of each of the five facilities using Beere’s road network and the ArcGIS Origin-Destination Matrix function. Address-weighted centroids were used to represent the “average” location of populations within each SA1. Finally, we examined the sociodemographic composition of SA1s that were located more than 30 minutes’ drive-time from each of the facilities. Although there may be many people who are willing to travel significant distances to receive a vaccination, 30 minutes was selected as a commonly used threshold over which the time and financial burden of travel becomes a significant barrier. This is particularly true for individuals and families who face transport related barriers such as a lack of access to a private vehicle, low income to cover transport costs, poor public transport availability or an inability to easily travel due to age, personal mobility levels or other factors.

Results

Figure 1 indicates the geographic distribution of each of the population subgroups, as well as the geographic distribution of high area-level socioeconomic deprivation (NZDep18 quintiles 4 and 5). This indicates the locations of communities that are at risk of COVID-19 severity. These communities are also more likely to be disproportionately impacted by both spatial and non-spatial barriers to vaccine access. Figure 1 indicates that clusters of high Māori populations are mainly in the rural areas of Te Ika-a-Māui (North Island), while high numbers of people aged 65 years and over are spread across rural communities in both Te Ika-a-Māui and Te Waipounamu (South Island). Statistically significant clusters of high Pacific populations are
located in Tāmaki Makaurau (Auckland), Te Whanganui-a-Tara (Wellington), Tokoroa, Paharakeke (Flaxmere) and Kāmoana-haehae (Alexandra, Central Otago). High levels of area-level socioeconomic deprivation are found in both Te Tai Tokerau (Northland) and Tairāwhiti (East Coast), but also in other rural and remote areas of both Te Ika-a-Māui and Te Waipounamu.

Figure 2 displays the geographic distribution of SA1s within travel-time thresholds from the five scenarios of potential vaccine delivery facilities. Figure 2 shows that several areas with significant travel times to potential sites of vaccine delivery are the same areas (seen in Figure 1) that also have a high number of Māori, Pacific, older and socioeconomically constrained residents. Table 1 shows the total size and proportion of population groups who live 30 or more minutes from each of the five types of facilities. Although it is to be expected that almost one quarter of the total Aotearoa New Zealand population do not live within 30 minutes of a stadium, our analysis shows that travel barriers to the potential sites of these mega-clinics are likely to disproportionately affect Māori, Pacific people and those aged 65 years and older. Furthermore, similar barriers are likely exist if current CBAC sites were to be converted to vaccination centres. Delivering vaccines in community pharmacies would improve access for the total population, but Māori and older people would again face disproportionate travel burdens. GP clinics appear to provide better access to the total population. However, more than one quarter of the approximately 30,000 people who live 30 or more minutes from a clinic are Māori. The results in Table 1 suggest that delivery through schools would provide vaccine access within 30 minutes to almost all of the population, and that this would be equitable. However, there would likely be logistical challenges involved in delivering COVID-19 vaccines to the general public through all schools. Table 2 shows the socioeconomic composition of areas that are 30 or more minutes travel time from each of the five types of potential vaccine delivery sites. The results in Table 2 suggest that each of the scenarios examined in this research has the potential to disproportionately burden communities living in areas with high socioeconomic deprivation. However, of the people affected by travel burdens under scenarios of vaccine delivery via GP clinics or community pharmacies, more than half live in areas of high socioeconomic deprivation, while less than 10% live in the wealthiest areas of the country.

Discussion

This paper shows five hypothetical scenarios of how the wider public rollout of COVID-19 vaccines could be delivered, and how these different scenarios (if operating alone) may impact upon equity of access to vaccination. Our results suggest that a large proportion of the population could face geographic barriers to receiving a COVID-19 vaccine. Further, a disproportionate impact of vaccine delivery location was seen on access for Māori and older communities as well as people living in areas of high socioeconomic deprivation. Access barriers would likely be more than cumulative for older Māori living in areas of high socioeconomic deprivation. It is likely that, in order to achieve equitable vaccine delivery, outreach services that go beyond the current distribution of health facilities will be needed. Making vaccinations available in all schools would achieve very high levels of geographic coverage in places that local communities are familiar with. However, it is unclear whether all schools have the facilities and capacity to store vaccines. Furthermore, unless delivery is out-of-hours, public immunisations in schools could be disruptive to schooling. Although beginning vaccinations in South Auckland will make the vaccine accessible to some Pacific families, our analysis of population distribution (Figure 1) indicates that there are significant Pacific populations also across Tāmaki Makaurau and around Te Whanganui-a-Tara, as well as in rural areas including Tokoroa, Paharakeke and Kāmoana-haehae.

It is important to note some limitations. Since information on the exact locations of potential vaccination sites has not been made publicly available, this analysis is based on assumptions about where such sites could be located. For instance, the list of CBAC locations is regularly updated with ‘pop-up’ clinics, and so it is possible that pop-up vaccination centres that we have not
Figure 1: The geographic distribution of population groups and area-level socioeconomic deprivation.
### Table 1: The demographic composition of SA1s located 30 minutes or more from facilities that could potentially be used to deliver COVID-19 vaccines.

<table>
<thead>
<tr>
<th>Population</th>
<th>Total</th>
<th>(%)</th>
<th>≥30min stadium (%)</th>
<th>≥30min CBAC (%)</th>
<th>≥30min GP (%)</th>
<th>≥30min pharmacy (%)</th>
<th>≥30min school (%)</th>
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<tr>
<td>Māori</td>
<td>775,626</td>
<td>16.5</td>
<td>249,876</td>
<td>32.2</td>
<td>165,939</td>
<td>21.4</td>
<td>8,694</td>
</tr>
<tr>
<td>Pacific</td>
<td>381,618</td>
<td>8.1</td>
<td>35,670</td>
<td>9.3</td>
<td>29,931</td>
<td>7.8</td>
<td>639</td>
</tr>
<tr>
<td>Over 65</td>
<td>715,137</td>
<td>15.2</td>
<td>221,898</td>
<td>31.0</td>
<td>186,705</td>
<td>26.1</td>
<td>4,752</td>
</tr>
<tr>
<td>European</td>
<td>3,297,183</td>
<td>70.2</td>
<td>916,380</td>
<td>27.8</td>
<td>842,847</td>
<td>25.6</td>
<td>24,954</td>
</tr>
<tr>
<td>Asian</td>
<td>707,610</td>
<td>15.1</td>
<td>46,098</td>
<td>6.5</td>
<td>49,062</td>
<td>6.9</td>
<td>840</td>
</tr>
</tbody>
</table>

### Table 2: The socioeconomic composition of SA1s located 30 minutes or more from facilities that could potentially be used to deliver COVID-19 vaccines.

<table>
<thead>
<tr>
<th>NZDep18</th>
<th>Total</th>
<th>(%)</th>
<th>≥30min stadium (%)</th>
<th>≥30min CBAC (%)</th>
<th>≥30min GP (%)</th>
<th>≥30min pharmacy (%)</th>
<th>≥30min school (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>902,997</td>
<td>19.2</td>
<td>152,562</td>
<td>13.6</td>
<td>158,448</td>
<td>15.9</td>
<td>1,326</td>
</tr>
<tr>
<td>Q2</td>
<td>915,894</td>
<td>19.5</td>
<td>198,297</td>
<td>17.6</td>
<td>198,885</td>
<td>20.0</td>
<td>6,021</td>
</tr>
<tr>
<td>Q3</td>
<td>931,227</td>
<td>19.8</td>
<td>245,838</td>
<td>21.9</td>
<td>215,151</td>
<td>21.6</td>
<td>10,023</td>
</tr>
<tr>
<td>Q4</td>
<td>956,478</td>
<td>20.4</td>
<td>261,441</td>
<td>23.3</td>
<td>236,622</td>
<td>23.8</td>
<td>6,777</td>
</tr>
<tr>
<td>Q5</td>
<td>992,595</td>
<td>21.1</td>
<td>265,809</td>
<td>23.6</td>
<td>184,752</td>
<td>18.6</td>
<td>7,407</td>
</tr>
</tbody>
</table>
mapped may also be used. There are issues with population data from the 2018 census, and the quality of the ethnicity variable has been independently rated as ‘moderate’. This means that the results in this paper present population estimates. Furthermore, we were unable to map the geographic distribution of people with underlying medical conditions. However, we have used the best-quality publicly available data to carry out this analysis, and we have mapped the geographic distribution of population groups that have previously been shown to have higher levels of relevant underlying conditions. It should also be noted that some specificity around the locations of population concentrations is lost when data are presented at a national scale. Furthermore, if these geographic modelling approaches are to be applied when planning vaccine rollouts, it is essential to interpret the results within local contexts. Using local knowledge and experiences will help to overcome barriers, such as institutional racism, that would otherwise result in inequitable vaccine rollouts. These challenges mean that our approach is likely to be more appropriate when applied to a local or regional context by iwi, primary health organisations or district health boards (DHBs).

Despite these limitations, our approach highlights the contribution that geospatial analysis can provide to the planning and delivery of health services. Furthermore, it emphasises the need to proactively plan for the equitable provision of vaccination, since different scenarios of delivery, and their potential combinations, can either reduce or increase barriers to equitable access. A social justice approach to achieving vaccine equity within Aotearoa and protecting the health of vulnerable populations needs to be prioritised. Just as some approaches to improving health for the majority of the population can increase inequities,

Figure 2: Travel time to five types of potential vaccine delivery sites.
specific locations for vaccine provision will leave priority groups behind. Further, it is not just geographic barriers that will need to be overcome to ensure vaccination equity. As well as providing clear, culturally safe and effective information and support to reduce vaccine hesitancy, the health system will need to gain the trust of communities who have been impacted by racism, negative previous healthcare experiences and inequitably designed and delivered health services.\textsuperscript{31,37} The system to register for, access and receive a COVID-19 vaccine must be simple and safe for all. Furthermore, rather than top-down decision-making around how, when and where COVID-19 vaccines will be delivered, the Government must meet te Tiriti o Waitangi obligations (including for governance and decision-making), work in partnership with Māori and engage effectively with other communities. Frameworks such as He Pikinga Waiora\textsuperscript{51} can support the assurance of tino rangatiratanga over the design of programme delivery and the safe and effective provision of vaccines.\textsuperscript{2,11} During the first lockdown in 2020, high rates of influenza vaccination were achieved for Māori in several DHB regions—attributed to an approach led by Māori and iwi organisations.\textsuperscript{52} COVID-19 vaccine allocation must be transparent, participatory, prioritised according to need and free, in order to also align with international human rights law.\textsuperscript{3}

Aotearoa New Zealand’s COVID-19 vaccine rollout should be closely governed and monitored, with high-quality data on vaccination rates (by key sociodemographic indicators) collected at a suitable geographic scale to allow for an examination of any variations in coverage rates both within and across regions. If equitable vaccine delivery can be achieved, then the approaches that facilitated it should be used to ensure that all health services are delivered equitably. Although protecting the population from COVID-19 is clearly an urgent and essential goal, the persistent health inequities within Aotearoa New Zealand need to be addressed with the same urgency. If a vaccine can be delivered equitably and universally with the entire population able to access it, then so should all health services.

Competing interests:
Nil.

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URL:
www.nzma.org.nz/journal-articles/will-access-to-covid-19-vaccine-in-aotearoa-be-equitable-for-priority-populations-open-access

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Te Tiriti o Waitangi compliance in regulated health practitioner competency documents in Aotearoa

Heather Came, Jacque Kidd, Deborah Heke, Tim McCreanor

ABSTRACT

Within Aotearoa (New Zealand) there are systemic health inequities between Māori (the Indigenous people of Aotearoa) and other New Zealanders. These inequities are enabled in part by the failure of the health providers, policy and practitioners to fulfil treaty obligations to Māori as outlined in our foundational document, te Tiriti o Waitangi (te Tiriti).

Regulated health professionals have the potential to play a central role in upholding te Tiriti and addressing inequities. Competency documents define health professionals’ scope of practice and inform curriculum in health faculties. In this novel study, we critically examine 18 regulated health practitioners’ competency documents, which were sourced from the websites of their respective professional bodies. The competencies were reviewed using an adapted criterion from Critical te Tiriti Analysis, a five-phase analysis process, to determine their compliance with te Tiriti.

There was considerable variation in the quality of the competency documents reviewed. Most were not te Tiriti compliant. We identified a range of alternative competencies that could strengthen te Tiriti engagement. They focussed on (i) the importance of whanaungatanga (the active making of relationships with Māori), (ii) non-Māori consciously becoming an ally with Māori in the pursuit of racial justice and (iii) actively engaging in decolonisation or power-sharing.

In the context of Aotearoa, competency documents need to be te Tiriti compliant to fulfil treaty obligations and policy expectations about health equity. An adapted version of Critical te Tiriti Analysis might be useful for those interested in racial justice who want to review health competencies in other colonial settings.

The health of Māori is a taonga (something treasured and valuable). As with other Indigenous peoples, Māori experience a disproportionate burden of disease. These inequities are fuelled by the intergenerational legacies of colonisation and historical and contemporary manifestations of institutional racism. Alongside the Declaration on the Rights of Indigenous Peoples, which reaffirms the rights of Indigenous peoples to health, in Aotearoa there is also te Tiriti o Waitangi (te Tiriti), which was in part negotiated to protect Māori health.

Te Tiriti o Waitangi (Māori text), which was negotiated between the British Crown and hapū (Māori sub-tribes), is the founding document of the colonial state of New Zealand. This unique treaty granted the British the right to govern their people in Aotearoa, reaffirmed Māori tino rangatiratanga (absolute sovereignty), gave Māori equal citizenship rights and guaranteed religious freedom. This meant the protection of Māori domain over land, resources and aspirations. Te Tiriti was signed by William Hobson (the Queen's representative) and more than 500 rangatira (chiefs), and it is recognised under the legal doctrine of contra proferentem as the authoritative text.

The existence of the Treaty of Waitangi (the Treaty (English version)) has historically created confusion due to the widely
held interpretation that Māori ceded sovereignty, despite the Māori version clearly reaffirming Māori tino rangatiratanga. The authors maintain that repeated references by the Crown (the Government) to the English version and the unilateral development of “Treaty principles” has created a systematic process of disinformation that serves to protect the status quo and the Crown’s assumption of unitary parliamentary sovereignty. This confusion was institutionalised in the Treaty of Waitangi Act 1975, which enables investigation of breaches of both te Tiriti and the Treaty, undermining the definitive position of the Māori text.

Within the health sector, the New Zealand Public Health and Disability Act 2000 refers to the Treaty and, more specifically, to the Treaty principles of partnership, protection and participation. Most health policy refers to the Treaty and/or Treaty principles rather than te Tiriti. The disinformation continues with the recent Cabinet Office circular that affirmed the central place of the Treaty rather than te Tiriti in contemporary public policy.

In clear deference to the Māori text, the Waitangi Tribunal in 2014 (WAI 1040) ruled that, by signing te Tiriti, Ngāpuhi (a major northern tribal confederation) did not cede sovereignty. More recently the Waitangi Tribunal ruled (WAI 2575) that key health legislation and policy were not Treaty and/or te Tiriti compliant. With a major review of the health sector underway, it is timely to re-examine regulated health professionals’ competency documents in relation to their compliance with te Tiriti.

Methods
Regulated health professionals are identified within the Health Practitioners Competence Assurance Act 2003, the Medical Practitioners Act 2007 and the Social Workers Registration Legislation Act 2019. Under this legislation, practitioners are expected to be accountable to their professional authorities and be competent to practice. Annual practising certificates are issued to ensure practitioners work within their professional scope of practice. The 18 professional groups covered by these Acts are chiropractors, dental practitioners, dietitians, medical practitioners, medical radiation technologists, medical technicians, midwives, nurses, occupational therapists, optometrists and dispensing opticians, osteopaths, physiotherapists, pharmacists, podiatrists, psychologists, social workers and psychotherapists.

Following up on Heke, Wilson and Came’s examination of regulated health practitioners’ cultural competencies, this paper examined more deeply their engagement specifically with te Tiriti. Core competency documents for the database were collected from the websites of regulated health professional bodies in November–December 2019.

We adopted a five-phase Critical te Tiriti Analysis (CTA) to assess te Tiriti compliance of the regulated competency documents. The first phase involved orientating how the competencies address Māori health with reference to priorities, language and epistemologies and how they reflect tino rangatiratanga, Māori citizenship and ōritetanga (equity). The second phase was a close examination on engagement with the five domains (preamble and four articles) of te Tiriti (Table 1).

Phase three involved a determination of competency development, performance and evaluation on a Likert-type five-point rating scale (poor, uncertain, fair, good, excellent) across each of the five domains. Phase four involved identifying how the competencies could be strengthened. Phase five involved a final Māori critique.

In terms of competency documents, we prioritised using core competency documents rather than any peripherally positioned cultural competency/safety or Māori health documents.

Results
Phase one: competency orientation
The collection of competencies we reviewed were published between 2003 and 2019. There was diverse usage of the terms ‘the Treaty’, ‘te Tiriti’ and/or ‘the Treaty principles’. The core competency documents of optometrists/opticians and dentistry make no mention of te Tiriti, the Treaty or Treaty principles. Fifteen professions, including the medical profession, mention only the Treaty and/or the arguably non-Tiriti compliant Treaty principles. This Crown construction
effectively fails to address the actual undertakings embodied in te Tiriti. Only one profession, occupational therapy, orients to both te Tiriti and the Treaty of Waitangi and does not default to Treaty principles.

Phase two: competency close examination
In a CTA, each of the five te Tiriti domains has an indicator to help assess compliance. These domains are explored more fully elsewhere. They are adapted here to relate specifically to competencies.

Preamble
*Te Tiriti is central and Māori are equal or lead parties*

Several of the competency documents acknowledged Māori as tangata whenua—people of the land. The Dieticians Board noted: “Māori as Tangata Whenua hold a unique place in our country.” Some competencies referenced the importance of relationships with Māori, and others extended their reference to include relationships with iwi (tribes), hapū and whānau (extended family). The Occupational Therapy Board explicitly refer to the identification of OT’s role in “in building and sustaining relationships with whānau, hapū, iwi, Māori organisations and tangata whenua as a whole.”

**Article 1**
*Mechanisms to ensure equitable participation and/or leadership*

It was often unclear from the core competency documents how Māori were involved in competency development and/or in leadership of professional bodies.

**Article 2**
*Evidence of Māori values influencing the competencies*

Some of the competency documents specifically referenced the importance of tikanga (Māori protocol) and Māori health models. The competency documents rarely included key Māori concepts such as manaakitanga (to care for), tika (doing things the right way), pono (to act with integrity) or aroha (love). Some recognised the importance of whānau groupings to Māori.

**Article 3**
*Evidence of Māori exercising their citizenship as Māori*

The Occupational Therapy Board recognised the “history, cultures, and social structures influencing health.” Several competency documents noted a requirement to be committed to the pursuit of positive Māori health outcomes.

**Article 4**
*Acknowledgement of the importance of wairua, rongoā and wellbeing*

Wairua and spiritual wellbeing were mentioned in the context of the Māori health model Te Whare Tapa Whā. Rongoā was rarely mentioned.

**Phase three: competency determination**

The CTA determination (Table 2) was based on the information presented in the

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**Table 1: Critical te Tiriti Analysis indicators**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Critical te Tiriti Analysis indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preamble</td>
<td>Elements showing that te Tiriti is central and Māori are equal or lead parties</td>
</tr>
<tr>
<td>Article 1:</td>
<td>Mechanisms to ensure equitable Māori participation and/or leadership in setting priorities, resourcing, implementing and evaluating</td>
</tr>
<tr>
<td>Kāwanatanga</td>
<td></td>
</tr>
<tr>
<td>Article 2:</td>
<td>Māori are able to express their tino rangatiratanga; have influence and hold authority</td>
</tr>
<tr>
<td>Tino rangatiratanga</td>
<td></td>
</tr>
<tr>
<td>Article 3:</td>
<td>Evidence of Māori values influencing and holding authority</td>
</tr>
<tr>
<td>Īritetanga</td>
<td></td>
</tr>
<tr>
<td>Article 4:</td>
<td>Acknowledgement of the importance of wairua (spirit), rongoā (Māori medicine) and wellness</td>
</tr>
<tr>
<td>Wairuatanga</td>
<td></td>
</tr>
</tbody>
</table>
competency documents. We applied the CTA assessment criteria in the following ways:

- **Poor**: The competency documented substantially failed to transparently address the indicator.
- **Fair**: The core competencies have vague engagement with the indicator (eg, acknowledgement of culture).
- **Good**: The competencies appear to deliberately and consciously address the criteria (eg, acknowledgement of tikanga).
- **Excellent**: The core competencies clearly achieve the indicator (eg, acknowledgement of power-sharing).

The chiropractic, medical radiation technology, and physiotherapy core competencies cover both Australia and Aotearoa and contain no evidence of Māori input into their development. Similarly, the osteopathic competencies were developed by Australian academics. Te Ao Mārama (the Māori Dental Association) is mentioned in the dental competencies but without clarification of their input. The core competencies of the dietitians were developed by an expert working group with Māori representation. Likewise, a designated committee of the Psychologists Board developed their competencies, although Māori input into that process is unclear. The Medical Sciences Council and the Medical Council regularly review competencies they administer, which includes an undefined public consultation process. The Midwifery Council, Nursing Council, Optometrist and Dispensing Opticians Board, Social Workers Registration Board, Podiatry Board, Psychologists Board, Pharmacy Council and Occupational Therapy Board offer no detail of how they developed their competencies.

Those practitioner competencies that scored ‘excellent’ when assessed against the preamble did so due to in part to the requirement for practitioners to demonstrate relevant application of te Tiriti/Treaty in their practice. Each also acknowledged Māori as partners. The Pharmacy Council integrated into their competencies the importance of understanding and being able to describe the relevance of te Tiriti to practitioners, by emphasising that:

> “Learning about the impact of pre-and post-Te Tiriti o Waitangi events on the health of New Zealanders and developing working relationships with key Māori stakeholders e.g. Iwi / Hapū / Whānau / Māori organisations, where appropriate, will provide background to help improve Māri health outcomes. This extends to understanding the contemporary application of Te Tiriti o Waitangi.”

The Pharmacy Council also provided a clear acknowledgement of the importance of Māori models of health and practices, such as tikanga and kawa, in contributing to improved relationships and health outcomes, which contributed to their excellent score for the Article 4 indicator.

**Discussion**

**Phase four: strengthening practice**

The WAI 2575 report gave the health sector a collective ‘D grade’ for our failure to perform in relation to Māori health. To deliver health services effectively, health practitioners need to have the necessary clinical, cultural and political skills to engage effectively with whānau. Following on from the work of Heke, Wilson and Came, which highlighted the need to strengthen and synthesise cultural competencies, this study suggests that existing professional competency documents are not yet fit for purpose as frameworks for upholding te Tiriti.

A te Tiriti-compliant health sector requires legislation, policy, competency documents, standards, codes of ethics and relevant supplementary documents to explicitly uphold te Tiriti. Individuals, teams, disciplines and organisations would all be held accountable for their inaction and action. Competencies could have explicit statements about knowledge and understanding of the cultural, historical, political and social context of Aotearoa, including the importance of te Tiriti o Waitangi and He Whakaputanga o te Rangatiratanga o Nū Tīreni (the New Zealand Declaration of Independence). The Pharmacy Council integrated into their competencies the importance of understanding and being able to describe the relevance of te Tiriti while also understanding Māori perspectives of health and the ability to incorporate strategies to address disparities. Similarly, the Physiotherapy Board requires the ability to “demonstrate contemporary application
Table 2: Regulated health professions mapped against articles of the Māori text (te Tiriti).

<table>
<thead>
<tr>
<th>Occupational group</th>
<th>Preamble</th>
<th>Article 1: Kāwanatanga (governance)</th>
<th>Article 2: Tino rangatiratanga</th>
<th>Article 3: Ōritetanga</th>
<th>Article 4: Wairuatanga</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing</td>
<td>Excellent</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>12</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>Excellent</td>
<td>Fair</td>
<td>Good</td>
<td>Fair</td>
<td>Excellent</td>
<td>10</td>
</tr>
<tr>
<td>Social workers</td>
<td>Good</td>
<td>Poor</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>10</td>
</tr>
<tr>
<td>Physiotherapy</td>
<td>Excellent</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Fair</td>
<td>9</td>
</tr>
<tr>
<td>Psychology</td>
<td>Excellent</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>8</td>
</tr>
<tr>
<td>Midwifery</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>8</td>
</tr>
<tr>
<td>Dietitians</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Poor</td>
<td>Good</td>
<td>7</td>
</tr>
<tr>
<td>Occupational therapy</td>
<td>Excellent</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>7</td>
</tr>
<tr>
<td>Dentistry</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
<td>Good</td>
<td>Fair</td>
<td>6</td>
</tr>
<tr>
<td>Podiatry</td>
<td>Good</td>
<td>Poor</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>5</td>
</tr>
<tr>
<td>Medical science technicians</td>
<td>Good</td>
<td>Poor</td>
<td>Fair</td>
<td>Poor</td>
<td>Fair</td>
<td>4</td>
</tr>
<tr>
<td>Medical radiation technologists</td>
<td>Fair</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td>Medicine</td>
<td>Poor</td>
<td>Fair</td>
<td>Poor</td>
<td>Poor</td>
<td>Fair</td>
<td>2</td>
</tr>
<tr>
<td>Psychotherapy</td>
<td>Fair</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Fair</td>
<td>2</td>
</tr>
<tr>
<td>Chiropractic</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Fair</td>
<td>1</td>
</tr>
<tr>
<td>Osteopath</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>0</td>
</tr>
<tr>
<td>Optometrists/ dispensing opticians</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>0</td>
</tr>
</tbody>
</table>

of te Tiriti principles and the incorporation into practice of the four cornerstones of health.” Berghan, Came, Doole, Coupe, Fay, McCreanor and Simpson have argued that upholding te Tiriti requires three key elements: (i) whakawhanaungatanga (the active making of relationships with Māori), (ii) tauiwi (settler people) consciously becoming an ally with Māori in the pursuit of racial justice and (iii) actively engaging in decolonisation or power-sharing. The Occupational Therapy Board and Pharmacy Council both begin to articulate these elements in statements that detail meeting and developing relationships with the Māori health, welfare and education workforce and practising whanaungatanga to build relationships and trust with key partners. These complex processes may not be captured seamlessly in a traditional competency document. However, this difficulty doesn’t mean that competency development shouldn’t attempt a deeper engagement with the five domains of the Māori text.

Table 3 offers some specific ideas for te Tiriti competencies that could be refined and integrated into core competency documents. These competencies could be tailored into professional development plans for individual practitioners or teams, recognising pre-existing expertise. The competencies could be staircased into preliminary, secondary and advanced competencies, similarly to the Pharmacy Council’s competency structure, which includes a continuum of professional development.

As a methodological note, we acknowledge that the decision to use only core competency documents in our analysis may not reflect well for those professions who handle te Tiriti and/or the Treaty and/or Treaty principles differently. We note that all reviewed professions, except social workers, have separate cultural competencies where references to te Tiriti and/or the Treaty might have been more prolific. However, we argue that the rightful position of te Tiriti in health is at the core, not on the periphery.

Phase five: Māori final word

For Māori, health is a complex concept that incorporates elements of health, vitality and wellbeing as well as illness, disease and malaise. These all occur within the contexts of connection to each other, ancestors and the environment, with the whole package being acknowledged as taonga. Māori health aspirations are effectively captured within the text of te Tiriti o Waitangi, including Māori leadership and agency, practices that centre the Māori worldview and the valuing of Māori approaches to health and wellbeing.

Health professionals occupy intimate spaces in Māori lives, as they do with all citizens, whether they are promoting good health, protecting communities and individuals from poor health or caring for the sick. It is vital that the work of health professionals is aligned with the full health aspirations of Māori as outlined in te Tiriti.

This analysis of competency documents of regulated health professionals has highlighted the various ways different professional groups have incorporated te Tiriti into their practice. The majority of the professions are not meeting their obligations as a Crown Tiriti partner. It is not a stretch to posit that this is a contributing factor to the poor health outcomes and racism that Māori experience when seeking healthcare. The current competency documents clearly show that Māori health aspirations and te Tiriti obligations are not being considered, much less achieved, in Aotearoa.
Table 3: Possible te Tiriti o Waitangi competencies for tauiwi.3

<table>
<thead>
<tr>
<th>Domain</th>
<th>Knowledge</th>
<th>Skill</th>
</tr>
</thead>
</table>
| Preamble        | • Be familiar with mana whenua (local hapū/iwi), mātāwaka (kinship group not mana whenua), hapū and iwi in your rohe (district) and their history.  
• Understand the cultural lens (and/or white privilege) that you bring to your professional life. | • Be proficient in whakawhanaungatanga (active relationship building).  
• Have a positive collegial relationship with Māori colleagues in your profession/workplace.  
• Have a warm professional collaboration with Māori health providers in your district and/or field.  
• Be proficient in building and maintaining mutually beneficial power-sharing relationships. |
| Article 1:      | Kāwanatanga                                                              |                                                                      |
  |                  | • Be familiar with te Tiriti o Waitangi and He Whakaputanga o te Rangatiratanga o Nū Tireni.  
• Be familiar with WAI 2575.12  
• Understand the principles of structural (power) analysis. | • Be proficient in reflective practice and active listening.  
• Tautoko (support) Māori leadership.  
• Prioritise Māori voices. |
| Article 2:      | Tino rangatiratanga                                                      |                                                                      |
  |                  | • Understand the importance of kaumātua (elders).  
• Be familiar with Māori health leaders, Māori health history and contemporary literature.  
• Be familiar with Māori aspirations in relation to health.  
• Have a basic/intermediate understanding kaupapa Māori (Māori philosophical) approaches. | • Be primed to challenge racism and unconscious bias.  
• Advocate for te Tiriti compliance at all levels.  
• Trust Māori intelligence. |
| Article 3:      | Ōritetanga                                                                |                                                                      |
  |                  | • Understand the historical and contemporary determinants of Māori health.  
• Understand the intergenerational impact of historical trauma. | • Be clinically and culturally confident to work with Māori whānau  
• Be proficient in strengths-based practice.  
• Be proficient with equity analysis.  
• Critically monitor the effectiveness of your work with Māori. |
| Article 4:      | Wairuatanga                                                              |                                                                      |
  |                  | • Have a basic/intermediate understanding of te reo Māori (Māori language).  
• Have a basic/intermediate understanding of the tikanga and the application of tapu (sacred) and noa (made ordinary).  
• Be familiar with Māori health models such as Te Pae Mahutonga37 and Te Ara Tika.38  
• Have a basic/intermediate understanding of marae (community meeting house) protocol.  
• Understand your own whakapapa (genealogy and connections). | • Practice cultural humility.  
• Be confident to perform waiata tautoko (support song).  
• Integrate tika (correct), pono (truth), aroha and manaakitanga into your practice.  
• Be open-hearted. |
Competing interests:
Nil.

Acknowledgements:
Thanks to the hard-working practitioners who pulled together their professional competency documents. We wish you well in the ongoing efforts to refine and improve these documents so te Tiriti o Waitangi can be upheld and anti-racism praxis be normalised.

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Meeting the Crown’s te Tiriti o Waitangi commitments and obligations to Māori with lived experience of disability through the Health and Disability System Review

Gabrielle Baker, Paula Toko King, Bernadette Jones, Tristram R Ingham

ABSTRACT

BACKGROUND: The Health and Disability System Review (the Review) was meant to guide once-in-a-generation change for New Zealand’s health and disability system. However, when its Final Report was released, the inclusion of an ‘alternative’ view on key Māori health recommendations, and the accompanying media commentary, indicated that the Review has not provided ambitious-enough direction, particularly when it comes to improving the health and wellbeing of Māori, including Māori with lived experience of disability (tāngata whaikaha).

METHODS: An indigeneity grounded analysis (IGA) of the Review’s final proposals was conducted using a framework centred on five principles of te Tiriti o Waitangi/the Treaty of Waitangi coupled with key themes from Waitangi Tribunal-commissioned research on Māori with lived experience of disability.

RESULTS: The IGA found the Review’s proposals only go part way to complying with the Crown’s commitments to te Tiriti o Waitangi/the Treaty of Waitangi principles, and that tāngata whaikaha are largely invisible in the Review’s proposals.

CONCLUSION: As responsibility for implementing the Review moves to the Government, the lost opportunities must be addressed in partnership with Māori, especially tāngata whaikaha, to truly deliver an equitable, anti-racist health and disability system that delivers on the Crown’s te Tiriti o Waitangi/the Treaty of Waitangi obligations.

New Zealand’s health and disability system does not serve the country’s Indigenous population well. On average, Māori have the poorest health outcomes of any population group. Inequities for Māori with lived experience of disability (tāngata whaikaha), who are impacted by the intersection of racism and ableism, are especially pronounced in comparison to non-Māori. However, this is not always reported on, due to poor data collection and a lack of analysis by Crown health and disability agencies.

Despite unambiguous Māori health and disability obligations on the Crown under te Tiriti o Waitangi/the Treaty of Waitangi (te Tiriti/the Treaty, used here to cover both the te reo Māori/legitimate version of the agreement signed in 1840 and the English-language version, an approach that is in line with the Waitangi Tribunal’s legislated requirements to take both versions into account) and international human rights instruments, there has been variable action by successive governments. At different points in history, New Zealand’s...
government agencies and ministers have indicated some level of support for prioritising Māori health and wellbeing by considering changes to roles and structures of the health and disability system.\(^5,6\) However, attempted structural solutions, such as the Māori Health Commission or the Health Funding Authority in the 1990s,\(^7\) were set up without substantial influence and were easily dismantled. Additionally, government rhetoric about the importance of improving Māori health and disability outcomes and the need to address the impact of racism has not been matched with tangible action.\(^8\) Outside of the health and disability sector, Whānau Ora commissioning agencies, established in 2014, have had reported success with whānau, but it was observed in 2019 that it is too early to determine whether this arrangement is enduring.\(^9\)

The current iteration of the health and disability system was established through the New Zealand Public Health and Disability Act 2000. The legislation established district health boards (DHBs) with the responsibility to promote the health and wellbeing of people within a defined geographic location by providing or purchasing health and disability services. Under section 22(1)(d) and (e) of the Act, DHBs have specific objectives to “promote the inclusion and participation in society and independence of people with disabilities” and “reduce health disparities by improving health outcomes for Māori and other population groups.” The legislation also envisaged the eventual devolution of disability support services (DSS) from the Ministry of Health (the Ministry) to DHBs. However, for reasons that are not transparent, this never eventuated and the majority of health-funded DSS (usually for people aged under 65 years) are still directly contracted by the Ministry,\(^3\) except in rare instances like the Enabling Good Lives demonstration sites in Christchurch and Waikato and the MidCentral Mana Whaikaha prototype, which aim to give people with lived experience of disability and their whānau more direct control over the supports they need.\(^10\)

Nevertheless, the legislation has shaped most of today’s health and disability system, including having paved the way for the introduction of the New Zealand Primary Health Care Strategy and the establishment of primary health organisations (PHOs).

Three sets of primary healthcare claims, dating back to at least 2005, have recently prompted the Waitangi Tribunal (the Tribunal) to investigate the primary healthcare elements of the health and disability system as part of the first stage of the Wai 2575 Kaupapa Inquiry into Health Services and Outcomes (the Inquiry). In its 2019 report on the Inquiry, the Tribunal found numerous breaches of the principles of te Tiriti/the Treaty in primary healthcare, breaches underpinned by the evidence of pervasive and persistent inequities between Māori and non-Māori.\(^1\)

Although consistent calls for change to the health and disability system have, over decades, come from Māori communities including tāngata whaiwhai and their whānau—who have argued that te Tiriti/the Treaty and Indigenous rights of Māori need to be honoured and that Māori health status demanded urgent attention—it was a change in government following the 2017 election that led to questions of the health and disability system being taken seriously by government. This began with a focused look at mental health,\(^11\) but over the first few months in government, the Labour party-led coalition appeared to widen its focus. In May 2018, the previous Minister of Health, Hon Dr David Clark, announced the major Health and Disability System Review (the Review).\(^21\) The Review sought to “identify opportunities to improve the performance, structure, and sustainability of the system with a goal of achieving equity of outcomes, and contributing to wellness for all, particularly Māori and Pacific peoples.”\(^13\) The Review’s terms of reference specifically stated that “the Review will investigate where the system is not currently achieving this core equity goal, and understand the drivers of this.”\(^13\)

However, it also stated that the Accident Compensation Corporation (ACC) scheme was out of scope, as was the currently underway MidCentral Prototype for DSS. The Review process included a public consultation period, which resulted in the release of an Interim Report summarising public feedback,\(^14\) followed by the Final Report, released in 2020.\(^15\)
The Final Report touches on most aspects of the health and disability system in some way. For this reason, it is impossible to summarise all the proposals recommended by the Review. However, the key features of the Final Report include splitting many of the functions currently carried out by the Ministry across three central agencies—the Ministry and two new entities (Health NZ and the Māori Health Authority). The proposed purpose of the Māori Health Authority would be to advise the Minister of Health on all aspects of Māori health policy, as well as to partner with other health- and disability-sector agencies to ensure that mātauranga Māori (Māori knowledge) and Māori health issues are appropriately incorporated and that racism is addressed. There are also proposed changes to DHBs (including reducing the number of DHBs from 20 to between 8 and 12).

Methods

An indigeneity grounded analysis (IGA) of the Final Report was conducted using a framework centred on te Tiriti/the Treaty. IGA is an approach to policy analysis that acknowledges “[n]either policy nor policy making are neutral or value free. Rather, as socially constructed conventions, policy and policy-making are loaded with dominant values, Eurocentric ideals, and vested interests.”16 An IGA approach thus challenges the “policy(-making) myth of value neutrality” by recognising and acknowledging that “even evidence-based policy(-making) may prove systemically biasing since a commitment to race neutrality bolsters white Eurocentricity as the norm, while discrediting the legitimacy of Indigenous peoples claims to sovereignty status...”16

Five principles of te Tiriti/the Treaty, derived from Tribunal jurisprudence, were applied as a framework to guide the IGA. The Tribunal is the Crown’s mandated authority on te Tiriti/the Treaty principles as they apply to specific issues. In 2019, the Tribunal articulated five principles applying to primary healthcare that must be considered in the formation of government policy.1,17 A te Tiriti/Treaty-centred approach was selected because of the status of te Tiriti/the Treaty as a founding document for New Zealand that sets out a relationship between tāngata whenua and the British Crown (currently represented by the Government). Such an approach is consistent with the Review’s assertion that te Tiriti/the Treaty needed to be fully incorporated as “a framework for meaningful and substantive relationships between iwi, Māori and the Crown.”14

Other frameworks incorporating te Tiriti/the Treaty do exist. For instance, the guidelines agreed by Cabinet in 2019 for policymakers to consider te Tiriti/the Treaty in policy development and implementation,18 and a ‘critical Tiriti analysis’ framework developed by Pākehā academics.19 However, these te Tiriti/Treaty principles were applied to the IGA instead, because this was considered a useful process by which the authors could assess the content of the Final Report against whether or not it meets the Crown’s own interpretation of te Tiriti/the Treaty, as articulated by the Tribunal and incorporated into the Ministry’s Te Tiriti o Waitangi Framework.20 Table 1 provides a description of the five principles.

Key themes of a report commissioned and published by the Tribunal in 2019 (Māori with lived experience of disability – Part I: Wai 2575), were used as supplementary material to assess the consideration given by the Final Report to tāngata whaikaha. The themes were: equity for tāngata whaikaha; data, monitoring and evaluation in relation to disability; the participation of tāngata whaikaha in the health and disability system; and cultural safety and disability responsiveness. The Final Report was reviewed multiple times by the authors and proposals specific to Māori and/or to disability were mapped to the five principles, with the adequacy of these proposals assessed against each of the principles.

Results

Table 2 summarises the proposals of the Final Report against the five principles of te Tiriti/the Treaty. The table also notes where the Final Report explicitly refers to a relevant principle or where the connection to a principle can be inferred. The table also provides commentary on the adequacy of each proposal. There were some proposals that had the potential to impact on health equity but were not included. For instance, the proposal that DHBs no longer be...
required to contract PHOs for primary healthcare services has the potential to impact on kaupapa Māori primary health providers. However, as the specific impacts of such proposals are not mentioned in the Final Report, the authors could not consider them in the IGA.

**Discussion**

The results of the IGA demonstrate that the Review’s Final Report fails to give full expression to any of the five principles of te Tiriti/the Treaty or provide clearly articulated mechanisms to demonstrate Crown commitment to Māori. For instance, the essential concept of self-determination, which is inherent in a discussion on rangatiratanga, is absent from under the guarantee of tino rangatiratanga, despite the Final Report stating it has three ways of demonstrating rangatiratanga and mana motuhake. Self-determination in this context should be seen as exercised by a collective and as endorsing Māori and iwi authority over decisions that impact on Māori health and wellbeing.

Instead of expressing self-determination through the proposed Māori Health Authority, the Review proposes an independent departmental agency with a role limited to the existing functions of the Māori Health Directorate within the Ministry—including administering an annual provider development funding round and providing policy advice. Critically, independence in this context is not about being separate from the Crown. Instead, the term ‘independent’ is used to describe being free from ministerial and departmental direction while still being based in a government department.

Similarly, although the proposed governance arrangements for DHBs and Health NZ reflect increased participation of Māori in decision-making, the appointment process is the responsibility of ministers of the Crown, who will make their decisions on the basis of who has the skills and expertise to be in governance positions. There is also no discussion on addressing the sparse representation of tāngata whaikaha on current health- and disability-sector governance arrangements.

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**Table 1: Five principles of te Tiriti o Waitangi/the Treaty of Waitangi articulated by the Waitangi Tribunal.**

<table>
<thead>
<tr>
<th>Te Tiriti principles</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The guarantee of tino rangatiratanga</td>
<td>Provides for self-determination and mana motuhake in the design, delivery and monitoring of primary healthcare.</td>
</tr>
<tr>
<td>The principle of equity</td>
<td>Requires the Crown to commit to achieving equitable health outcomes for Māori.</td>
</tr>
<tr>
<td>The principle of active protection</td>
<td>Requires the Crown to act, to the fullest extent practicable, to achieve equitable health outcomes for Māori. This includes ensuring that it, its agents and its Treaty partner are well informed on the extent, and nature of, both Māori health outcomes and efforts to achieve Māori health equity.</td>
</tr>
<tr>
<td>The principle of options</td>
<td>Requires the Crown to provide for and properly resource kaupapa Māori primary healthcare services. Furthermore, the Crown is obliged to ensure that all primary healthcare services are provided in a culturally appropriate way that recognises and supports the expression of hauora Māori models of care.</td>
</tr>
<tr>
<td>The principle of partnership</td>
<td>Requires the Crown and Māori to work in partnership in the governance, design, delivery and monitoring of primary healthcare services. Māori must be the co-designers, with the Crown, of the primary health system for Māori.</td>
</tr>
</tbody>
</table>

Table 2: Findings of IGA of Final Report proposals pertaining to Māori and to tāngata whaihaka.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Relevant Review report finding or recommendation</th>
<th>IGA finding pertaining to Māori and to tāngata whaihaka</th>
</tr>
</thead>
</table>
| The guarantee of tino rangatiratanga | The Review report states that rangatiratanga and mana motuhake will be enhanced through three of its proposals:  
• A Māori Health Authority, which would be an independent departmental agency and carry out a largely policy function.  
• Changes to governance arrangements that remove DHB elections and introduction of 50:50 Māori/non-Māori governance for a new entity (Health NZ) and board appointments that “reflect te Tiriti/the Treaty partnership” at a DHB level (p63).  
• Proposals for equitable funding formulae, incorporating ethnicity, deprivation and age. | Rhetorical expression of the principle but substance of findings risk “non-performativity”.21 Substantial improvements required. |
| Equity | The report recommends “an increased emphasis on health equity” (p32). This includes updating equity clauses in legislation. The health and disability system (including DHBs) would be fully accountable for achieving equitable health outcomes. Unclear whether new accountability mechanisms are proposed, but some new requirements (such as the introduction of a Health Charter) are indicated. | Some expression of the equity principle and moving beyond rhetoric, with proposals that contribute to improved Crown commitment to te Tiriti/the Treaty and action. Improvements still required. |
| Active protection | When it comes to putting in place tangible systems and processes to achieve equity, the report talks about:  
• Proposals for equitable funding formulae “to reflect the higher needs of Māori communities” (p26), the detail of which is to be worked out, but will include adding ethnicity and deprivation. This is coupled with findings that primary healthcare funding formulae need to be reviewed to account for higher needs of people aged over 75 and the “concentration of complexity in certain areas” (p121).  
• Proposals for better use of data, information and research, including requiring Māori equity-focused insights from Health NZ and the Ministry of Health requirements of all health sector agencies to use Māori health and disability data routinely in their policy advice, systems design and service delivery (p28).  
• The development of principles and rules (by Health NZ) for health service commissioning as it relates to Māori equity and wellbeing.  
• Removing barriers to access for health services through changes to funding and commissioning practices (p75). | For funding proposals, rhetorical expression of active protection principle but substance of proposals could increase inequities.  
For other proposals, there is some expression of the principle, moving beyond rhetoric, with the potential to contribute to improved Crown commitment to te Tiriti/the Treaty and action. Improvements still required. |
Table 2: Findings of IGA of Final Report proposals pertaining to Māori and to tāngata whaikaha (continued).

<table>
<thead>
<tr>
<th>Principle</th>
<th>Relevant Review report finding or recommendation</th>
<th>IGA finding pertaining to Māori and to tāngata whaikaha</th>
</tr>
</thead>
</table>
| **Options** | The Review acknowledges the importance of kaupapa Māori health services and recommends investing in these services. This is positioned as the role of the Māori Health Authority, although it looks to be expected to do this by partnering with Health NZ and DHBs. The Review also recommends:  
  • The “respectful use of Mātauranga Māori” should be incorporated into the health and disability system, driven by the Māori Health Authority. This would include investment in “mātauranga Māori ways of working,” such as tikanga guidelines for hospitals (p 29).  
  • Acknowledged that, in order for mātuaranga Māori and kaupapa Māori solutions to be incorporated into the health and disability system, there would need to be “appropriate levels of funding and strong organisational leadership.” There are no specific recommendations on how to ensure this (p29).  
  • The Māori Health Authority would be responsible for ensuring policy is developed on mātauranga Māori practices (p30).  
There is also recognition that the health workforce needs to operate in a culturally safe way, which would be supported by a proposed health sector charter. The Review recommends a legislated Health NZ charter that articulates the expected culture and behaviours of the health workforce (p48). | Some expression of the principle of options, moving beyond rhetoric, with the potential to contribute to improved Crown commitment to te Tiriti/the Treaty and action. Improvements still required. |
| **Partnership** | The Review envisages that the Māori Health Authority would be a partner to the Ministry and other Crown agencies at a national level. At a locality level (that is, a sub-DHB level), the report suggests that “[r]esponsibility for locality planning and monitoring outcomes could… be the shared responsibility of the DHB and the Rūnanga.” | Rhetorical expression of the principle but substance of findings risk non-performativity. Substantial improvements required. |
motuhake asserted by the Review is the creation of equitable funding formulae. The adequacy of these proposals in terms of achieving equity is discussed in the next paragraph, but at this point it is worth noting that, although equitable health sector funding has been championed by Māori, it is not an expression of mana motuhake.

The principle of equity, which requires an unequivocal commitment to achieving equitable outcomes for Māori (including tāngata whaikaha) compared with non-Māori, is expressed by the Review with proposals for legislative change (to the New Zealand Public Health and Disability Act 2000) to make it explicit that equity, not mere improvement in outcomes, is the goal of the health and disability system. This is also a recommendation in the Tribunal’s 2019 report¹ and appears to give at least some expression to the principle. However, there is limited detail in the Final Report on the consequences of this clearer commitment for DHBs and no detail on how this would impact the Ministry, which is not governed by this piece of legislation.

The principle of active protection requires specific systems and processes be put in place to deliver on equity goals and commitments. One of the most high-profile proposals from the Review is to reassess health funding formulae for funding DHBs and PHOs to better ensure that they account for the impact of ethnicity, deprivation, age and “complexity.”¹¹ Existing population-based funding formulae to some extent already include ethnicity and deprivation adjustors. However, allocations are flawed in part because previous service utilisation is used to determine the funding allocations for different populations, and therefore unmet need is not accounted for.¹¹ This disproportionately impacts Māori populations, including tāngata whaikaha with higher levels of unmet need.² Furthermore, the Final Report acknowledges higher service utilisation by people with lived experience of disability,¹¹ but it does not interrogate the ability of funding to achieve equity for tāngata whaikaha either in relation to health or DSS.

Proposals for amending population-based funding also assume good-quality data are available through the national census. With the most recent census failing Māori,²⁴ this is likely to mean formulae are based on data that undercount Māori. The likely result is that of an underfunding of health and disability services for Māori and an exacerbation of inequities. The silence of the Final Report on the critical issue of data quality for Māori generally, and tāngata whaikaha specifically, highlights that the principle of active protection is not fully realised.

Furthermore, the Final Report fails to acknowledge that an age-adjustor of over 75 years privileges the non-Māori population over Māori, due to a lower life expectancy for Māori.

The principle of options is primarily expressed through proposals to strengthen support for kaupapa Māori health providers and recognition that Māori communities need to have access to a wider range of kaupapa Māori services. The recognition is positive overall, reflecting views prominent among Māori since at least the 1980s and particularly in the early 1990s.²⁵ It is also positive to see acknowledgement that funding levels need to increase for kaupapa Māori services, given that the most recent data from the Ministry show that all Māori health providers combined received funding equivalent to approximately 1.86% of the total Vote Health Budget for 2015/16.²⁶ However, the Review does not identify or investigate specific issues for kaupapa Māori providers in the area of DSS, despite very low numbers of kaupapa Māori DSS available to tāngata whaikaha. In 2018 only 3.4% of DSS providers (33 out of a total of 980 providers nationwide) were Māori owned and governed.³ Further, the aspirations of kaupapa Māori providers appear to be limited to the provision of ‘tier 1’ services—that is, those services and other activities that take place in homes and communities. The implication is that kaupapa Māori providers are unable to provide anything currently considered tier 2 (including “public and private hospital (excluding aged residential care) and specialist treatment and diagnostic services”).¹¹ This appears to perpetuate a paternalistic assumption that Māori ambitions should be constrained by the current configuration of the health and disability system, effectively placing boundaries on Māori aspirations and self-determination in health and disability services.
The Final Report also addresses mātauranga Māori in its proposals. Mātauranga Māori can be described as knowledge embedded in Māori worldviews. However, by positioning it as something to be embedded within the health and disability system, the Review appears to view mātauranga Māori as something that can be mined for the benefit of an otherwise Western medical model. Although the intentions of this may be to build culturally safe services that resonate with Māori and give legitimacy to Māori ways of knowing and being, the extractive approach outlined in the Final Report instead tends to suggest that the parameters of where and how Māori knowledge can be used is still controlled by a government agency (in this case the Māori Health Authority). The inclusion of Māori governors, advisors and staff may be argued as a means of ensuring Māori guardianship over Māori knowledge. But a compelling argument that Māori expertise and knowledge have been sidelined in favour of non-Māori priorities is the fact that the Final Report's content pertaining to the Māori Health Authority conflicts with the views of all the Māori advisors and the one Māori member of the Review Panel.

Partnership is mentioned throughout the Final Report, but at a national level this is limited to discussions of how one government organisation (the Māori Health Authority) is able to partner with other segments of the health and disability sector. This is not the type of partnership envisaged by the principle, which acknowledges Māori “have the right as a Treaty partner to choose how they organise themselves, and how or through what organisations they express their tino rangatiratanga.” On a community-by-community basis (referred to as ‘localities’), the Final Report proposes a type of partnership between a rūnanga and the relevant DHB. Notwithstanding the limitations of equating local Māori interests with a single rūnanga, this proposal could potentially align with the principle of partnership if it were embedded within a health and disability system that incorporates Māori control throughout and recognises Māori diversity, including the need to prioritise tāngata whaikaha voices in health and disability decision-making.

Responses to the Final Report from Māori health experts have highlighted many of the same flaws as this analysis. For example, Māori scholars have stated the “recommendations will fail to realise the transformation that’s needed to achieve equity in our health and disability system.” The specific proposals for a Māori Health Authority have had mixed responses from Māori, with support for the general idea but criticisms of its narrow role and lack of true independence.

The Final Report unusually featured an alternative view on the Māori Health Authority endorsed by a majority of the Review panel members and all members of the Review's Māori advisory group. This alternative view argued for the Māori Health Authority to be provided with greater tools to affect change for Māori health, and specifically because the Māori Health Authority, as envisaged by the Final Report's proposals, has “only a limited commissioning role and holds what is, relatively speaking, a small and marginal budget.” There has been significant support for the alternative view, including a petition to parliament. However, even within this support, there is acknowledgement that the bigger question of how Māori overall are able to exercise tino rangatiratanga and control has not been answered.

Disability advocacy groups have also expressed disappointment in the Review. For instance, they stated that “the final report was about as far away from what we’d hoped for as you could get.” Criticisms stem from what is seen as the Review treating health and disability issues as homogenous and a failure to adequately understand the aspirations and needs of people with lived experience of disability. For tāngata whaikaha, this is amplified as a result of the population being invisible in the Final Report. For example, in the Final Report (a 264-page long document), tāngata whaikaha Māori are referred to four times. This compares to 146 references to Māori and 45 references to disabled people. The apparent and incorrect assumption is that tāngata whaikaha aspirations and issues are covered either by approaches to Māori or by universal approaches to disability.

The nature of the Final Report means that its proposals will only be implemented
on the agreement of Cabinet and with the support of government agencies. The current Minister of Health, Hon Andrew Little, has indicated this will begin in the first half of 2021, providing the Crown with an opportunity to address many of the shortcomings of the Final Report and demonstrate commitment to te Tiriti/the Treaty. This would necessarily begin with a stronger and more explicit partnership with Māori, including tāngata whaikaha, that extends to Māori having explicit decision-making roles in the ongoing decisions in the Final Report. This includes regular engagement with the Minister of Health and Associate Ministers of Health (with portfolios responsible for disability issues and Māori health) as they consider the Final Report. This may also involve establishing a technical advisory group that includes tāngata whaikaha and Māori with expertise in Māori health and equity to support the ministers as they consider the Final Report.

In responding to the Final Report recommendations, it is also important that the Crown and its agents continue to focus on how the health and disability system can eliminate health inequities and improve Māori health and wellbeing outcomes, as this will not be achieved solely through the Māori Health Authority. Specific actions the Crown could take include using a te Tiriti/the Treaty-based framework to commission an additional public review that focuses on the aspirations and needs of tāngata whaikaha. This review should be led by tāngata whaikaha to ensure partnership throughout the entire review process. Also, it should have terms of reference that includes ACC within its scope, given the recognised impacts of the inequities for people with lived experience of disability driven by the variation between the ACC scheme and Ministry-funded DSS and the ability to draw on the Enabling Good Lives approach.

**Conclusion**

The Review was a response to consistent calls for health and disability system change and improvement. However, despite many of the failures of the health and disability system for Māori being widely reported, including through a recent Tribunal report, the Review’s proposals fall short of creating a health and disability system that honours te Tiriti/the Treaty. The Final Report itself now becomes advice to government ministers who have the task of deciding what aspects of the Final Report are implemented and what requires further work. Central to this undertaking must be an understanding of the requirement to demonstrate genuine partnership with Māori in policy development. At a minimum this will require an approach that adopts Māori health and disability expertise and advice that should not be side-lined and presented as an alternative view.
Competing interests:
Ms Jones reports personal fees from University of Otago during the conduct of the study. Dr King reports personal fees from Baker Consulting Ltd during the conduct of the study. Dr Ingham reports personal fees from University of Otago during the conduct of the study. Ms Baker reports personal fees from Baker Consulting Ltd during the conduct of this study.

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Hearing loss and hearing service experiences among older Māori and whānau: a scoping review

Alehandrea Raiha Manuel, Grant Searchfield, Elana Curtis

ABSTRACT

AIM: Older Māori have higher rates of self-reported disabling hearing loss in Aotearoa New Zealand (NZ). However, have greater unmet need for special equipment than non-Māori. This review aims to analyse current literature on the experiences of hearing loss and hearing services among older Māori and whānau.

METHOD: This scoping review was undertaken using a Kaupapa Māori approach and PRISMA guidelines. Databases were explored to identify literature focused on older Māori and whānau experiences of hearing loss and hearing services. Inclusion criteria included: literature set in the NZ context; published between 1985 and 2020; English language; focus on hard-of-hearing Māori and whānau experiencing sensorineural hearing loss.

RESULTS: A total of eight sources were identified. Hearing loss is a detriment to daily functioning, partaking in conversations and retaining Māori culture. Cost and poor patient–provider interactions created barriers to hearing services for Māori with hearing loss and whānau.

CONCLUSION: The last analysis of literature regarding hearing loss and hearing services for Māori was written in 1989. Inequities in hearing loss and access to hearing services remain. Research that is Māori-led and uses a Kaupapa Māori approach is needed to further understand the realities of hearing loss and hearing services for older Māori and whānau.

Hearing loss is a critical public health concern for older Māori. Based on the 2013 census, 32% of Māori aged 65 years and over reported experiencing hearing loss, compared with 28% of the total 65+ Aotearoa New Zealand (NZ) population. Despite having higher rates of ‘self-reported’ hearing loss, Māori have more unmet need for special equipment (30.4%) in comparison to older non-Māori (17.4%). This is concerning, with evidence revealing an increased risk of accelerated cognitive decline in older adults with untreated hearing loss.

The last report to the NZ government concerning hearing loss among Māori, Whakarongo Mai, was documented in 1989. To reduce the high level of hearing loss among Māori adults, the Whakarongo Mai Review Team (the Review Team) recommended routine collection of ethnic-specific diagnosed hearing loss data, appointment of a senior Māori Hearing Officer, coordination between government agencies, further subsidy for adult hearing aids and the building of hearing services through active Māori participation. Over thirty years later, these recommendations are yet to be actioned.

Many older Māori have extensive roles and functions in society. It is within these roles as well as relationality that older Māori find reciprocal involvement both demanding and rewarding. However, hearing loss may impede Indigenous elders’ communication abilities that are required to be involved. In 2002, for example, Castleden, a non-Indigenous Canadian researcher, reported that hearing loss among Echuse elders limited their capacity to share knowledge through traditional oral histories. Addressing gaps in accessibility to hearing services and information may be required to help hard-of-hearing older Māori maintain culture, local knowledge and quality relationships.
with whānau (immediate and extended family network) and communities.

This scoping review sought to synthesise knowledge on older Māori and whānau experiences of hearing loss and hearing services within the NZ context and identify knowledge gaps for future research. The literature will be analysed through a Kaupapa Māori lens, a critical approach to sharing whose reality is being reported and by whom. The findings will be used to guide Kaupapa Māori research on hearing loss and hearing services among older Māori and whānau.

Positioning

This study was informed through a Kaupapa Māori positioning. According to Linda Tuhiwai Smith, researchers should be involved in retrieving spaces for Māori voices and perspectives in which Māori realities are seen as legitimate and transformation occurs. This is what underpins Kaupapa Māori.

Curtis articulates a set of key principles that Kaupapa Māori research should consider to be effective. That is, Kaupapa Māori research should have transformative meaning for Māori; be beneficial to Māori; be under Māori control; be informed by mātauranga Māori (Māori knowledge systems); be accepting of multiple Māori realities; align with a structural determinants approach to critique issues of power, privilege and racism; support social justice and decolonisation; and be non-victim blaming and reject cultural-deficit theories.

Methods

The PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) checklist (Appendix Table 1) was adopted to ensure thorough selection, reporting and mapping of literature. Two search strings using key words and Boolean logic were developed to find literature on older Māori and whānau experiences of (1) hearing loss and (2) hearing services:

- (“hearing health” OR “hearing loss” OR “hearing impairment” OR “hearing disability” OR “hard-of-hearing”) AND (M?ori OR wh?nau OR kaum?tua OR kuia OR elders);


(The * and ? symbols are wildcards for alternate word endings and replacing characters respectively (eg, ‘wh?nau’ was used for ‘whanau’ and ‘whānau’).)

AM identified records through database searching: Cochrane SR, EBSCOhost, Google Scholar, Informit, Index New Zealand, PsycINFO, PubMed, ScienceDirect, Scopus, Web of Science and Wiley Online Library. Duplicate records were removed and the remaining records were screened. Non-English papers and irrelevant research topics were excluded. The final full-text sources were selected for analysis if they addressed the aim in question and fit the inclusion criteria: set within the NZ context; articles, book chapters and grey literature published between January 1985 and June 2020; and sensorineural hearing loss and hearing service experiences of hard-of-hearing Māori and whānau of Māori with sensorineural hearing loss across all ages.

Both GS and EC reviewed the content credibility of the final literature identified. Data charting (a data extraction process in a scoping review) was used to extract information from the literature. The data on study characteristics (eg, author, year of publication, type of publication and study aim), population characteristics and key findings (eg, methods and methodology used and experiences of hearing loss and hearing services) were extracted, tabulated and summarised narratively.

Results

The search process is illustrated through a PRISMA flow diagram (Figure 1). A total of eight primary sources were considered eligible for this review. These included: five articles, a conference abstract, a government report and a Master of Audiology thesis. All sources presented information on experiences of hearing loss among Māori. Two sources provided information on experiences of hearing services among hard-of-hearing Māori. Only one source discussed whānau experiences of hearing loss and hearing services across NZ. See Appendix Table 2 for a summary of the literature.
Figure 1: Modified PRISMA flow diagram of the literature search.

**Search string (1):**
"hearing health" OR "hearing loss" OR "hearing impairment" OR "hearing disability" OR "hard-of-hearing"
AND (M?ori OR wh?nau OR kaum?tua OR kuia OR elders)

**Database searches:**
Cochrane SR, EBSCOhost, Google Scholar, Informit, Index New Zealand, PsycINFO, PubMed, ScienceDirect, Scopus, Web of Science, Wiley Online Library.

**Records identified**
(n = 1873)

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**Search string (2):**
"hearing servic*" OR "hearing care" OR audiolog*
AND (M?ori OR wh?nau OR kaum?tua OR kuia OR elders)

**Database searches:**
Cochrane SR, EBSCOhost, Google Scholar, Informit, Index New Zealand, PsycINFO, PubMed, ScienceDirect, Scopus, Web of Science, Wiley Online Library.

**Records identified**
(n = 1434)

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**Records after duplicates removed**
(n = 817) (n = 1290)

**Records excluded**
(n = 755) (n = 1239)

**Records excluded**
(n = 1239)

---

**Full-text sources excluded, did not meet eligibility criteria and aim of review**
(n = 56) (n = 48)

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**Sources to be included in the review**
(n = 6) (n = 3)

Sources identified in both search string 1 and 2 (n = 1)
No additional records were identified in primary sources

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**Total number of sources included in scoping review**
(n = 8)
There is a paucity of research concerning older Māori and whānau experiences of hearing loss and hearing services within NZ. Although there were small fragments on the experiences of hearing loss and/or hearing services among Māori in each of the sources, zero sources had a sole focus on hearing loss and hearing service experiences among older Māori and their whānau.

Four main themes emerged from the literature:

1. Hearing loss disrupts day-to-day functioning.
2. Māori and whānau impacted by hearing loss are at a disadvantage.
3. Hearing healthcare is unaffordable.
4. Support of hearing healthcare professionals and other key players is essential.

Hearing loss disrupts daily activities

Older Māori experiences of hearing loss were identified in four sources. In 2011, Dyall et al. recruited a total of 33 kaumātua (Māori elders) aged 75–79 years in the Bay of Plenty and Lakes districts for a feasibility study. They investigated whether Māori of advanced age would be interested, and able to take part, in a questionnaire and assessments involving vision and hearing screening. The study found that 16% of participants reported hearing loss as being disruptive to their daily activities.

The feasibility study led to Life and Living in Advanced Age, a cohort study in New Zealand (LiLACS NZ). Kaupapa Māori methods were adopted in the initial stages of engaging with and recruiting participants. Authors of the study did not clarify whether the LiLACS NZ study was grounded in Kaupapa Māori methodology. A total of 421 Māori aged 80–90 years, and 516 non-Māori aged 85 years, were recruited at baseline. A third of Māori participants reported having significant hearing loss that interfered with their day-to-day functioning (31%; 38% for men and 26% for women), which is greater than that reported by non-Māori participants (26%; 32% for men and 21% for women).

More recently, McAuliffe, Schluter and Jamieson’s 2018 cross-sectional study investigated the prevalence and extent of communication disability in NZ. From a total of 71,859 adults aged ≥65 years (89.2% European/other; 5.4% Māori; 3.1% Pasifika; and 2.3% Asian), 30.6% of participants exhibited at least some expression disability, and 36.2% stated having at least some difficulties with comprehension. McAuliffe and colleagues also noted that Māori, Pasifika and Asian peoples, males and those who were older were more likely to experience expressive or comprehension disability, in comparison to their European/other, female and younger counterparts. Gender differences may be owed to faster hearing decline among males and the over-representation of Māori men in many industries where noise exposure is higher.

Zhang et al.’s cross-sectional study investigated the associations between sensory-related disability and quality of life. Table 1 in their study presents prevalence data of self-reported hearing and vision difficulties against age, sex, ethnicity and level of education. The results revealed 17% (29/170) of Māori and 21% (740/3,547) of non-Māori expressed having moderate-severe hearing difficulties with daily tasks.

We interpreted Zhang et al.’s results with caution. Although they had access to such data, the researchers did not delve into the relationships between these factors. As an example, the degree of hearing difficulty experienced by Māori men and/or women aged between 61 and 79 was not available. Age-specific data for each ethnicity could be useful in understanding Māori hearing health outcomes and the distribution of and access to resources. Although McAuliffe and colleagues provided representative data for older Māori aged 65 years and above, Zhang et al. did not provide a representative sample size of NZ’s Māori resident population—Māori participation in the Zhang et al study (4.6%) fell short of the 6.5% of Māori aged above 60 years in the 2013 census data. Inaccurate estimations can be problematic as poor Māori representation in research can create inequitable distribution of resources and inequitable health outcomes.

Hearing loss creates disadvantages

Four studies highlighted several disadvantages that Māori experience due to hearing loss. Perkins and Coombes presented their research at the 2006 Conference of the Australian and New Zealand Psychological Societies. The qualitative study
documented how hearing loss impacts the lives of Māori women via a focus group of seven Māori women (no specified ages). Participants reported feeling isolated with a hearing loss and consequently withdrew from activities important for cultural identity, including conversations, learning te reo Māori (Māori language) and participation in cultural events.

Drawbacks were also discussed in Williams’ viewpoint article.15 The Kaupapa Māori researcher discussed her experience as a woman with severe-to-profound hearing loss and its impacts on her various daily roles and functions in society. Williams stated having difficulties with undertaking work that relies on oral methods of communication and function, participating in te reo Māori classes, keeping safe and attending meetings, conferences and events.

Whānau of hard-of-hearing Māori children also expressed their concerns that hearing loss creates personal, social and cultural disadvantages for their children.16 Māori audiologist Aroha Crisp interviewed 12 Māori whānau from five different areas within NZ (Auckland, Huntly, Tokoroa, Rotorua and Napier).16 Whānau reported hearing as an important sense to have so their children can access their Māori culture through learning Māori tikanga and interacting with people in te reo Māori. From the voices of whānau: opportunities for hard-of-hearing children to actively participate in Māori society are necessary.16

In the Whakarongo Mai report, very few accounts of hearing loss among Māori adults were shared.3 Of those reported, hearing loss impacted on the conditions of daily life and access to socioeconomic determinants. More specifically, untreated loss contributed to poor educational achievement, difficulties adjusting to societal demands, low incomes, job instability and high rates of unemployment.

Cost of hearing services and technology

Out-of-pocket expenses, including consultation costs, fitting services, travel costs, hearing aid batteries and repairs, were reported as a barrier to hearing services for hard-of-hearing Māori315 and whānau.16 The national subsidy for hearing aids was introduced in 1947 and covered the full cost of a hearing aid and earmould. In the 1980s, the hearing aid subsidy of $89.10 covered 15–20% of the total cost of a hearing aid, so for many elderly people aids were well beyond their resources.7 The Whakarongo Mai Review Team3 commented that the subsidy “barely covers the cost of the visit to the Ear, Nose and Throat consultant necessary to claim the subsidy” (p.41). Consequently, many older Māori were left with little option but to endure their hearing loss.3

Two decades later, the cost of technology and services remain unaffordable for hard-of-hearing Māori. Williams15 stated affordability of a cochlear implant for many adults is marginal and eligible recipients are on average expected to wait 2–6 years. Strict eligibility criteria, financial barriers, location of audiology clinics and transportation to and from appointments were several challenges whānau experienced from getting a diagnosis or rehabilitation for their child’s hearing loss.16

Relationships in hearing healthcare

Little is known about the interactions and relationships between Māori and hearing healthcare professionals. Crisp16 further explored this space and found the majority of whānau relied on their audiologist to provide them with information on hearing loss, treatment, communication and educational options. However, a number of whānau reported that their audiologist would dismiss their observations without follow-up, attribute their child’s unresponsiveness to factors other than a hearing loss and not explain all viable hearing technology options. Whānau also had to proactively ask the audiologist about other options (eg, cochlear implants) for their children.

Other key persons have assisted in navigating hearing services. Whānau reported Advisors on Deaf Children (AoDC), and other families who have been through similar experiences, as useful in making decisions about their child’s journey. Very few Māori parents met up with other parents; those who did meet with other parents found it to be beneficial and assuring.

Discussion

In this review, we aimed to explore and analyse current evidence on the experiences of hearing loss and hearing services among
older Māori and whānau. Only eight sources were eligible for analysis.

In summary, hearing loss has held back the lives of many older Māori. Hard-of-hearing Māori and whānau have reported difficulties with gaining control over the circumstances necessary for their health, wellbeing and cultural identity. Because access to hearing services and technology is limited by factors such as cost and poor relationships with hearing healthcare professionals, hard-of-hearing Māori and whānau may need more support along their hearing healthcare journeys. To date, no researchers have specifically focused on hearing loss and hearing service experiences among older Māori and whānau in NZ. This illustrates the paucity of research and information in this area, especially the lack of Māori-led research and research using a Kaupapa Māori philosophy that re-centers Māori ways of being, doing and knowing. This is a public health concern for older Māori, and given the number of older Māori aged 60 years and over is projected to increase from 7.4% in 2018 to 10.2% in 2038, there is a need for Kaupapa Māori research in this area.

Hearing loss limitations

Issues with hearing loss and access to services have particular implications for Māori, as theirs is an oral-based society. Untreated hearing loss disadvantages Māori in building and maintaining te reo Māori and in their connections with all things—connections and relationships deemed by hard-of-hearing Māori and whānau as vital for cultural identity.15,16

Hearing loss restricts access to the built environment, housing to education and healthcare (ie, the social determinants of health).1 This—alongside their loss of land, displacement from their homes and disruptions to Māori culture—restricts older Māori with hearing loss from reconnecting to and relearning their roots.1 Consequently, Māori with untreated hearing loss may be more likely to experience significant disparities in health and wellbeing than their non-Māori counterparts.

The consequences of hearing loss are likely to extend beyond the individual to whānau, who may have limited resources and capacity to provide necessary support. Currently, no evidence is available for us to understand whānau experiences of older Māori living with hearing loss. It is likely that whānau of hard-of-hearing Māori adults are suffering from a ‘third-party disability’. That is, family members are likely to experience participation restrictions and activity limitations as a result of the health condition of a family member or significant other.20–21

A third-party disability was identified among spouses of older adults with hearing loss in Australia.21 Using the International Classification of Functioning, Disability and Health (ICF) framework, Scarinci, Worrall and Hickson21 found that spouses experience a range of activity limitations and participation restrictions due to their partner’s hearing loss. If whānau are also impacted by hearing loss, increasing whānau engagement in hearing services should also be recommended.

Many allied health professionals utilise the ICF framework, but it has its drawbacks in explaining Indigenous experiences of disability.22 Hollinsworth argues that, by overlooking ancestral connectivity, community collectivity and the impacts of colonisation and institutional racism, the ICF framework ignores cultural context as a significant aspect of health and wellbeing of Indigenous peoples by overlooking ancestral connectivity, community collectivity, and impacts of colonisation and institutional racism on Indigenous peoples.22 Due to the diverse Indigenous contexts, realities and understandings of disability, the use of the ICF framework for explaining Māori and whānau realities of hearing loss may need to be reconsidered. Without re-evaluation of current frameworks, the status quo is maintained and may lead to further oppression of Māori with hearing loss.

Service provision barriers

Māori and whānau have voiced their concerns around the cost of hearing services and hearing technology and the limited access to funding.3,15–16 While entitlements to disability support services and other state support exist, they are not often utilised by older Māori, because the support and funding systems are complex and difficult to understand.21 Cunningham and colleagues21 recommend transforming these systems with older Māori engagement for better utilisation of funds and support services.
Other factors, such as poor health literacy, systemic racism and discrimination, have impacted on Māori hearing healthcare provision and outcomes.1,24 Whānau in Crisp's study often faced cost barriers and felt they were not being listened to by their professional.16 It is possible the latter barrier could be in part due to the under-representation of Māori hearing healthcare professionals, a lack of cultural safety practice standards for NZ hearing healthcare professionals25 and systemic racism and power imbalance in hearing healthcare, which has been reported in research overseas.26

The proportion of Māori audiologists (kaimātai ororongo) at 2% and audiometrists (kaimātau ororongo) at 0% is not representative of NZ's resident population.25 Ethnic statistics of NZ's hearing therapists are yet to be published. The low representation of Māori in the hearing healthcare workforce could halt the profession from moving forward, particularly in a context where resources are already scarce for those who need it the most. To achieve success for Māori health- and disability-workforce development, researchers highlight the importance of incorporating a comprehensive pipeline or pathway model (from secondary to postgraduate education) that is framed from within Indigenous world-views and addresses barriers to Indigenous student engagement.27,28

With the shortage of Māori in the hearing healthcare workforce, the vast majority of interactions hard-of-hearing Māori and whānau have are with non-Māori hearing healthcare professionals. Jansen et al14 stated that problems can arise when non-Māori staff have attitudes and perceptions to healthcare delivery that do not reflect Māori realities and cultural values. Cumulative effects of prejudice and injustice have harmful impacts on the quality of people’s lives, health and ageing. They deflect the responsibility of health professionals, hide power relations and reduce the visibility of Pākehā privilege—"a preferential benefit accrued by Pākehā from the systems they introduced and built and continue to redefine and control."29(p.5) Culturally safe practice has the potential to expand into the hearing healthcare profession, where healthcare professionals recognise they are bearers of their own culture and attitudes and that their power can be transferred to their patient/client to establish trust.30

Education and support should not conclude in the clinical setting. Community support networks have been identified as beneficial for some Māori parents16 and may prove useful in older Māori and their whānau hearing healthcare journeys. An increased emphasis on community connections may also mean community-based support resources dedicated to hearing loss, technology and services are required.

**Strengths and limitations**

This review is the first Māori-led analysis of literature on hearing loss and hearing service issues for Māori since the 1980s. Strict inclusion criteria focusing on Māori limited the number of resources available for examination. However, this reflects the dearth of literature, even when grey literature is included. Although inclusion of grey literature presents potential challenges, such as the quality of information, it has provided more context to the research question being examined, especially with the limited state of peer-reviewed articles. Thorough PRISMA-ScR report processes were used and literature were critically evaluated through a Kaupapa Māori lens, which we believe are noted strengths of this review.

**Conclusion**

Hearing loss remains a public health concern for older Māori and whānau. The findings from this literature review are concerning. Across generations, Māori have been suffering from untreated hearing loss with debilitating outcomes on health and wellbeing. This review highlights the limited availability of evidence on the experiences of hearing loss and hearing services among Māori adults and whānau. Māori-led research that sits within a Kaupapa Māori framework is needed to better understand and inform policy relating to the lived experiences of hearing loss and hearing services among older Māori and whānau.

**Funding**

AM completed this review as part of her PhD for which she has received funding from Brain Research New Zealand, Eisdell Moore Centre and the Ministry of Health. The funders had no role in the preparation of this manuscript.
Appendix

**Appendix Table 1: PRISMA-ScR Checklist**

<table>
<thead>
<tr>
<th>Section</th>
<th>Item</th>
<th>PRISMA-ScR checklist item</th>
<th>Section reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>1</td>
<td>Identify the report as a scoping review.</td>
<td>Title</td>
</tr>
<tr>
<td>Structured summary</td>
<td>2</td>
<td>Provide a structured summary that includes (as applicable) background, objectives, eligibility criteria, sources of evidence, charting methods, results and conclusions that relate to the review questions and objectives.</td>
<td>Abstract</td>
</tr>
<tr>
<td>Rationale</td>
<td>3</td>
<td>Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.</td>
<td>Introduction</td>
</tr>
<tr>
<td>Objectives</td>
<td>4</td>
<td>Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (eg, population or participants, concepts and context) or other relevant key elements used to conceptualise the review questions and/or objectives.</td>
<td>Introduction</td>
</tr>
<tr>
<td>Protocol and registration</td>
<td>5</td>
<td>Indicate whether a review protocol exists; state whether and where it can be accessed (eg, a web address); and if available, provide registration information, including the registration number.</td>
<td>N/A</td>
</tr>
<tr>
<td>Eligibility criteria</td>
<td>6</td>
<td>Specify characteristics of the sources of evidence used as eligibility criteria (eg, years considered, language and publication status), and provide a rationale.</td>
<td>Methods</td>
</tr>
<tr>
<td>Information sources*</td>
<td>7</td>
<td>Describe all information sources in the search (eg, databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.</td>
<td>Methods</td>
</tr>
<tr>
<td>Search</td>
<td>8</td>
<td>Present the full electronic search strategy for at least one database, including any limits used, such that it could be repeated.</td>
<td>Methods</td>
</tr>
<tr>
<td>Selection and sources of evidence†</td>
<td>9</td>
<td>State the process for selecting sources of evidence (ie, screening and eligibility) included in the scoping review.</td>
<td>Methods</td>
</tr>
<tr>
<td>Data charting process‡</td>
<td>10</td>
<td>Describe the methods of charting data from the included sources of evidence (eg, calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.</td>
<td>Methods</td>
</tr>
<tr>
<td>Data items</td>
<td>11</td>
<td>List and define all variables for which data were sought and any assumptions and simplifications made.</td>
<td>Methods</td>
</tr>
<tr>
<td>Critical appraisal of individual sources of evidence§</td>
<td>12</td>
<td>If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).</td>
<td>N/A</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>13</td>
<td>Describe the methods of handling and summarising the data that were charted.</td>
<td>Methods</td>
</tr>
<tr>
<td>Selection of sources of evidence</td>
<td>14</td>
<td>Give numbers of sources of evidence screened, assessed for eligibility and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.</td>
<td>Results, Figure 1</td>
</tr>
</tbody>
</table>
**Appendix Table 1: PRISMA-ScR Checklist (continued).**

<table>
<thead>
<tr>
<th>Section</th>
<th>Item</th>
<th>PRISMA-ScR checklist item</th>
<th>Section reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics of sources of evidence</td>
<td>15</td>
<td>For each source of evidence, present characteristics for which data were charted and provide the citations.</td>
<td>Results, Appendix Table 2</td>
</tr>
<tr>
<td>Critical appraisal within sources of evidence</td>
<td>16</td>
<td>If done, present data on critical appraisal of included sources of evidence (see item 12).</td>
<td>N/A</td>
</tr>
<tr>
<td>Results of individual sources of evidence</td>
<td>17</td>
<td>For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.</td>
<td>Appendix Table 2</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>18</td>
<td>Summarize and/or present the charting results as they relate to the review questions and objectives.</td>
<td>Results</td>
</tr>
<tr>
<td>Summary of evidence</td>
<td>19</td>
<td>Summarise the main results (including an overview of concepts, themes and types of evidence available), link to the review questions and objectives and consider the relevance to key groups.</td>
<td>Discussion</td>
</tr>
<tr>
<td>Limitations</td>
<td>20</td>
<td>Discuss the limitations of the scoping review process.</td>
<td>Discussion</td>
</tr>
<tr>
<td>Conclusions</td>
<td>21</td>
<td>Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.</td>
<td>Conclusion</td>
</tr>
<tr>
<td>Funding</td>
<td>22</td>
<td>Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.</td>
<td>Funding</td>
</tr>
</tbody>
</table>

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews.

* Where sources of evidence are compiled from, such as bibliographic databases, social media platforms, and websites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (eg, quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with information sources.
‡ The frameworks by Arksey and O’Malley and Levac and colleagues and the JBI guidance refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of “risk of bias” (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (eg, quantitative and/or qualitative research, expert opinion and policy documents).
Appendix Table 2: Literature review summary.

<table>
<thead>
<tr>
<th>Author; Year; Type</th>
<th>SS1* / SS2*</th>
<th>Aim</th>
<th>Population</th>
<th>Methodology and methods</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Review Team; 1989.</td>
<td>SS2* Report</td>
<td>To advise the Minister of Māori Affairs on the most appropriate means to achieve the needs of Māori people in policy planning and service delivery for the hearing impaired.</td>
<td>Māori population in New Zealand (NZ) with a focus on Māori children.</td>
<td>The report <em>Whakarongo Mai</em> was written in both English and Māori comprising of eight sections. The written report was prepared for the Minister of Māori affairs and reported to the Minister in August 1989. The first meeting of inquiry was held in March 1989. The report was informed through publications, discussions with members of the D/deaf community, representatives of organisations, government departments and Māori community groups, and through written submissions.</td>
<td>Hearing loss is creating personal and social disadvantage. Those experiencing hearing loss are often without access to their own heritage with reduced opportunities to actively participate in society as a whole, or Māori social and cultural life in particular. Thus, hearing-impaired adults can become isolated and severely disabled if they do not have access to social, technical, education and cultural facilities. Cost of services and hearing technology is high. Hearing disability imposes additional economic burdens such as consultant visit fees, hearing aids and earmoulds. The Review Team reported the cost of hearing aids have left many older Māori with little option but to suffer with their hearing impairment.</td>
</tr>
<tr>
<td>Dyall et al; 2011.</td>
<td>SS1* Journal article</td>
<td>To investigate whether Māori of advanced age would be interested in and able to take part in a questionnaire and several assessments for the LiLACS NZ study.</td>
<td>A total of 33 Kaumātua (75–79 years old) living in the Bay of Plenty and Lakes district health board (DHB) areas were recruited.</td>
<td>Māori led feasibility study. Kaupapa Māori methods used for recruitment and kaitiaki group of Māori elders was formed to provide tikanga Māori support for methods used. No specific methodology mentioned. Interviewer-administered questionnaire and physical assessments were conducted.</td>
<td>Hearing loss was found to be disruptive for participants but less than vision. This study supported the development of the LiLACS NZ large cohort study.</td>
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</table>
### Appendix Table 2: Literature review summary (continued).

<table>
<thead>
<tr>
<th>Author; Year</th>
<th>SS1* / SS2*</th>
<th>Type</th>
<th>Aim</th>
<th>Population</th>
<th>Methodology and methods</th>
<th>Key findings</th>
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</thead>
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<tr>
<td>Teh et al; 2014</td>
<td>SS1*</td>
<td>Journal article</td>
<td>To establish self-rated health, health-related behaviours and health conditions of Māori and non-Māori in advanced age.</td>
<td>Baseline data was obtained from 421 Māori (80–90 years old) and 516 non-Māori aged 85 years living in the Bay of Plenty and Rotorua districts.</td>
<td>Guidance sought from Māori oversight kaitiaki rōpu. Kaupapa Māori methods used for recruitment. No specific methodology mentioned. Within self-rated health, hearing disability was asked using a modified question from the 1989 Cognitive Function and Ageing Studies (CFAS I): ‘How much does your hearing interfere with your day-to-day functioning?’</td>
<td>A third of Māori participants had a significant hearing loss (31%; 38% for men and 26% for women). Statistically significant gender differences in hearing loss were identified between Māori men and Māori women (P-value = 0.011). Significant hearing loss was identified as less for non-Māori participants (26%; 32% for men and 21% for women). Statistically significant gender differences were noted between non-Māori men and women (P-value = 0.005), with more men suffering from hearing loss.</td>
</tr>
<tr>
<td>McAuliffe et al; 2019</td>
<td>SS1*</td>
<td>Journal article</td>
<td>To profile the prevalence and extent of expressive and receptive communication disability associated with age, sex and ethnic groups through the database of Home Care International Residential Assessment Instrument (interRAI-HC) assessment between 1 September 2012 and 31 January 2016. It further aimed to determine whether Māori, Pasifika and Asian were disproportionately represented within these data.</td>
<td>Of the 72193 interRAI-HC assessments done, 16 were repeat assessments and 318 had invalid encrypted National Health Index (NHI) numbers, leaving a number of 71,859 adults ≥65 years old (89.2% European/other; 5.4% Māori; 3.1% Pasifika; and 2.3% Asian eligible.</td>
<td>Non-Māori led cross-sectional study using national cohort data of older adults who underwent the standardised interRAI-HC. No specific methodology mentioned. Within interRAI-HC older adults were asked about their ability to make themselves understood (expression), and their ability to understand verbal content with hearing aid normally used (comprehension).</td>
<td>Communication disability was identified as common among older adults. It was found 30.6% participants exhibited at least some expression disability, and 36.2% stated having at least some difficulties with comprehension. Māori, Pasifika and Asian peoples, males and those who were older were more likely to experience at least some expressive or comprehension disability relative to their European/other, female and younger counterpart. The ethnic differences identified may reflect cultural differences in language and expression, or systemic differences in healthcare access or socioeconomic position. This is yet to be explored. Gender differences in communication could be due to hearing sensitivity.</td>
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</table>
### Appendix Table 2: Literature review summary (continued).

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<tr>
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<th>Population</th>
<th>Methodology and methods</th>
<th>Key findings</th>
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<tr>
<td>Zhang et al; 2016</td>
<td>SS1*</td>
<td>Journal article</td>
<td>To establish associations between sensory-related disability and quality of life (QOL) using the Brief Risk Identification of Geriatric Health Tool (BRIGHT) trial database.</td>
<td>A total of 3817 older adults (1,710 men, 2,081 women, 26 sex not identified) residing in the Bay of Plenty, Capital and Coast and Canterbury DHBs. Non-Māori aged 75 years and older were included in the study. Māori over 60 years of age were included in the study, in view of lower life expectancy.</td>
<td>Non-Māori led cross-sectional study analysing baseline data of the BRIGHT trial. Participants were asked about their health including hearing and vision difficulties through interviews, followed by a questionnaire posted out to participants. No specific methodology mentioned. Hearing difficulties were assessed as part of the interviewer-administered questionnaire: ‘How well do you hear?’ and ‘Do you use a hearing aid at all?’ to assess use of hearing aids.</td>
<td>Moderate-severe hearing difficulties with daily tasks were reported by 17% of Māori (29/170) and 21% of non-Māori (740/3,547). Minimal hearing difficulties were reported by 19% of Māori (33/170) compared to 22% of non-Māori (794/3,547) participants, while no difficulties with hearing were reported by 64% of Māori (108/170) and 57% of non-Māori participants (2013/2,547). Ethnic-specific gender rates were not available. In the study, 26% of participants (974/3,761) reported wearing hearing aids, with 64% reporting hearing difficulty using hearing aids and 35% not using hearing aids. In regards to these latter results, Zhang et al reported there was a miscommunication in asking participants to report difficulty with hearing aids on and as a result explained that their hearing difficulty results may have been overestimated among participants using hearing aids. Furthermore, Zhang et al did not discuss ethnic-specific hearing aid use data.</td>
</tr>
<tr>
<td>Perkins, V., &amp; Coombes, L. 2006</td>
<td>SS1*</td>
<td>Conference abstract</td>
<td>To draw attention to some inadequacies of the experience of cultural identity and hearing loss for Māori women so they can be addressed.</td>
<td>Seven Māori women with hearing loss. No ages available.</td>
<td>Māori led qualitative study consisting of one focus group. No specific methodology mentioned.</td>
<td>Themes that emerged from the focus group were feelings of isolation and withdrawal due to hearing loss. This made it difficult for the participants to take part in culturally significant events. Language was also noted to be vital to their cultural identity however learning of te reo Māori was mentioned as challenging for participants.</td>
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</table>
### Appendix Table 2: Literature review summary (continued).

<table>
<thead>
<tr>
<th>Author; Year;</th>
<th>SS1* / SS2*</th>
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<th>Aim</th>
<th>Population</th>
<th>Methodology and methods</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Williams, L;</td>
<td>SS1* SS2*</td>
<td>Viewpoint article</td>
<td>To describe the author’s direct experience as a person with severe-to-profound hearing loss.</td>
<td>Senior Māori researcher and social scientist in her 50s. Diagnosed with a progressive hearing loss 22 years prior while undertaking her PhD studies.</td>
<td>Māori self-case study. Used a Kaupapa Māori approach to research.</td>
<td>Difficulties with untreated hearing loss: having a telephone conversation, undertaking professional training that rely on oral methods of communication and function, participating fully in te reo Māori classes, facilitating qualitative research in the community, participating in virtual and face-to-face meetings with more than one person, explaining her deafness and communication strategies, attending work events and social events as they can be stressful, chairing a panel at research conferences and participating on boards, communicating with ease within her day-to-day living situation and keeping safe from moving vehicles. Affordability of cochlear implant/s for adults is unattainable. For those with severe-to-profound hearing loss who can afford generally elect to receive privately funded CIs.</td>
</tr>
<tr>
<td>Author; Year</td>
<td>SS1* / SS2*</td>
<td>Type</td>
<td>Aim</td>
<td>Population</td>
<td>Methodology and methods</td>
<td>Key findings</td>
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<tr>
<td>Crisp A; 2010</td>
<td>SS2*</td>
<td>Master's thesis</td>
<td>To examine the decisions Māori families make after the diagnosis of a hearing loss in the whānau.</td>
<td>Twelve Māori whānau from five areas within NZ (Auckland, Huntly, Tokoroa, Rotorua and Napier). These included seven mothers and one father with children who have hearing loss, two Māori men (50 and 63 years old) with hearing loss, and two Māori women (24 and 42 years old) with hearing loss.</td>
<td>Māori led research. No specific methodology mentioned. Participants were recruited through word of mouth and an advert sent to health professionals in the areas of audiology and advisors on deaf children. Semi-structured interviews were conducted. Families shared their experiences of hearing loss, searching for appropriate interventions and making choices regarding rehabilitation, communication and education.</td>
<td>All whānau interviewed communicated through English, six whānau utilised basic terms or fully immersed in te reo Māori and three whānau communicated through sign language at home. Majority of whānau expressed the importance of their child to know te reo Māori and some whānau expressed interest in communicating via sign-language. Māori whānau experienced much of the same difficulties in obtaining a diagnosis and hearing aids/cochlear implants as non-Māori families. Problems, however, are emphasised by socioeconomic factors such as limited access to healthcare, transportation and location and financial issues. Many whānau relied solely on hearing health professionals to provide them with information. A number of the parents reported problems of professionals being dismissive of observations without follow-up or their child’s unresponsiveness was due to other factors than hearing loss. Professionals also did not often discuss the option of cochlear implants but rather the parents themselves asked further into cochlear implants as an option for their child. Alternative-ly obtaining information from deaf adults and other families of deaf children was well received.</td>
</tr>
</tbody>
</table>
Competing interests:
Alehandrea Raiha Manuel reports scholarship grants from Brain Research New Zealand and Ministry of Health during the conduct of the study.

Acknowledgements:
Thank you to Brain Research NZ, Eisdell Moore Centre and the Ministry of Health for funding towards Alehandrea's PhD project, Taringa Whakarongo, which looks into hearing loss and provision of hearing services among older Māori and whānau. The authors would like to acknowledge the project advisory board members for assisting with the development of Kaupapa Māori hard-of-hearing research in NZ: Dr Waiora Port, Dr Kirsten Smiler, Ms Celia Hotene, Ms Cathy Broughton, Ms Therese Leach, Ms Olivia Keepa, Ms Sarah Daye, Dr Andrea Kelly and Dr Ravi Reddy.

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Bowel cancer screening has been shown to be effective at preventing bowel cancer and improving survival from bowel cancers by diagnosing them at an earlier stage. In New Zealand, bowel cancer screening modelling studies have shown that screening is likely to improve health for Māori and non-Māori and be cost-effective. For these reasons, in 2017 New Zealand began a staged rollout of bowel cancer screening, with all district health boards (DHBs) expected to be involved by late 2021 (depending on the impact of the COVID-19 pandemic). At the time of writing, bowel cancer screening had been implemented in 13 of 21 DHBs.

There are some important inequities in bowel cancer survival and treatment for Māori compared to non-Māori, and problems with the New Zealand bowel cancer screening programme (known as the Bowel Screening Programme (BSP)) with respect to health equity and health justice for Māori. Improving screening coverage for Māori and an adjustment to the eligible age range for Māori and Pacific peoples are two of a number of strategies proposed to address what is currently a discriminatory programme.

In this viewpoint, we review the current epidemiology of colorectal cancer with respect to an extension of the eligible age range for Māori, in the hope that we can help to demystify the numbers and encourage a broader, informed discussion on this important issue. We take a kaupapa Māori epidemiological approach, where we understand epidemiology as one of the tools that can be used to ensure the Government meets their responsibilities under te Tiriti o Waitangi.

The current BSP invites New Zealanders aged between 60 and 74 years to participate in screening every two years. This differs from the bowel screening pilot (undertaken in Waitematā DHB from 2012–2018) that invited those aged 50–74 years and is a narrower age range than that offered safely (an acceptable balance of benefits/harms) in a number of other countries. This includes countries with a lower incidence of bowel cancer in the 50–59-years-old group, compared to Māori in the same age range. The narrowing of the age range of the programme compared to the pilot was largely due to funding and colonoscopy capacity in New Zealand. There are longstanding and ongoing calls for an extension of the BSP's eligible age range for Māori and Pacific peoples, as a mechanism to address the current inequities in the programme. However, in 2020 Te Aho o Te Kahu (Cancer Control Agency) and the Ministry of Health
advised the Minister of Health to delay any decision on extending the age range until after the programme has been rolled-out in full. Many Māori and non-Māori health leaders and providers were unhappy with the decision to continue to rollout a programme that is knowingly inequitable and discriminatory, and they are frustrated by the lack of timely action to address inequities in the BSP.11,12

The argument for extending the age range down to 50 years for Māori is extremely simple—in comparison to non-Māori, a greater percentage of bowel cancers in Māori occur before the age of 60 (when screening starts). Commencing the BSP at 50 years will fix this inequity.

Māori and non-Māori have a similar chance of getting bowel cancer at any given age, but because Māori are a younger population than non-Māori, more of our bowel cancers occur before the current screening age. There has been some confusion about what the bowel cancer numbers show. This confusion partly stems from the different ways that the same data can be presented and interpreted. To demonstrate this point, we present bowel cancer data in three different ways. We begin with the number of new bowel cancers diagnosed by age for Māori and non-Māori between 2013 and 2017 (Figure 1). This figure excludes cancers detected in Waitematā DHB’s screening pilot, so that we can examine the age distribution of cancer diagnosed outside of the screening pathway. In Figure 1, the greatest number of cancers are found at the top of the curve, which for Māori is around the age of 60–70 years and for non-Māori a bit later, around 70–80 years. Because screening aims to detect cancers earlier than they would normally be diagnosed and before symptoms develop, the ideal age range for screening would be before the number of bowel cancers peak. Therefore, from the simple count data presented in Figure 1, we could conclude that the start of current screening age range (60 years) might be appropriate for non-Māori but slightly too late for Māori.

Another way of looking at the number of bowel cancers is to look at the cumulative count of bowel cancers as age increases (Figure 2). Presenting the data in this way allows you to see how many Māori bowel cancers (as a percentage of all cancers diagnosed in Māori) are diagnosed within and outside of the current age range for screening. This is the graph that most clearly demonstrates the reason for the current debate about the age range. In this figure we can see that 58% of bowel cancers in Māori females and 52% in Māori males present...
before the age of 60 years, whereas just under a third of bowel cancers in non-Māori are diagnosed before the same age (27% in females and 29% in males). The advice to start screening Māori at 50 years of age (while retaining the current age range for non-Māori) is largely based on this graph, because if Māori were screened from age 50, a similar proportion of cancers (30% in Māori females and 25% in Māori males) would occur in age groups younger than those eligible to participate in bowel screening for both Māori and non-Māori. The main reason for a greater proportion of bowel cancers occurring at younger ages for Māori is because Māori have a younger population age structure. Figure 3 shows the percentage of the Māori and non-Māori populations in each age group, and also the cumulative percentage with increasing age from the 2018 population census. It shows that 50% of the Māori population are younger than 25 years of age, whereas 50% of the non-Māori population are older than 40 years of age.

A limitation of Figure 1 (number of cancers by age) and Figure 2 (cumulative percentage of cancers) is that neither of these graphs take into account how many Māori and non-Māori there are in each age group in the population, which is accounted for in the third example, the incidence rates of disease by age group (Figure 4). The incidence rates take the number of cancers diagnosed in each age group (as shown in Figure 1) and divide these numbers by the size of the population in each age group. In Figure 4 we can see that in 2017 the rates of bowel cancer were similar for Māori and non-Māori in each age group, and the highest rates occur at age 60–74 years in both Māori and non-Māori, males and females. We are also able to see how the incidence rates have changed over time. Up until 2017, Māori had lower rates of bowel cancer in the presented age groups. However, because non-Māori rates have dropped over time, in 2017 the rates of bowel cancer in Māori and non-Māori became similar. A recent report, The State of Cancer in New Zealand 2020, had similar findings, showing that the age-standardised Māori bowel cancer rates for all age groups combined have been consistently increasing since 1996, while non-Māori bowel cancer rates have been consistently decreasing over the same time period. If these time trends continue, it is very likely that in the next few years we will face a new inequity in health for Māori: a higher incidence of bowel cancer. The incidence rates provide important information about which population age groups are at the greatest risk of bowel cancer. These rates imply that the age group most at risk for both Māori and

Figure 2: Bowel cancer cumulative registrations (%) by age group, sex and ethnic grouping, 2011–2020. Data sourced from National Screening Unit, Ministry of Health 2020. Categories are presented as provided in the data.
non-Māori is 60–74 years. This suggests that the current programme appropriately targets the age group with the highest current risk of bowel cancers. However, in this data the majority of bowel cancers have been diagnosed as a result of people presenting with symptoms, and therefore, in order for the screening programme to identify bowel cancers before symptoms develop, a younger age of initiation could be considered for both Māori and non-Māori.

**Discussion and conclusion**

The justification for correcting the bowel cancer screening age range is simple. Māori have a higher proportion of bowel cancers being missed because the current age range does not account for Māori being a younger population. Fortunately, the solution is also very simple: an adjustment to the age range for bowel cancer screening. The most commonly discussed option is to start the age range for Māori at 50 years. However, in light of the current colonoscopy capacity issues and COVID-19, an alternative solution to work within existing resources is to instead narrow the age range of the bowel screening programme for non-Māori, or some combination of both.

The inequities in the eligible age range for bowel cancer screening should be addressed in the same way as other quality-improvement issues. At a minimum this requires an immediate commitment to an age range extension for Māori (or a narrowing for non-Māori) along with a work plan to begin preparing and testing bowel screening systems for such a change. This will include examination of system capabilities for accurately identifying and inviting Māori participants and piloting in a small number of willing DHBs with existing colonoscopy capacity (a number of DHBs have already indicated their interest in and capacity for extending the age range for Māori). In addition, actions to improve bowel screening coverage for Māori need to be rapidly implemented. Historical trends in bowel cancer incidence, alongside the currently inequitable bowel screening programme (screening coverage and cancers missed), mean that it is likely that within the next five years Māori will face a new inequity in cancer—that is, a higher bowel cancer incidence than non-Māori—and a worsening of the existing inequities in bowel cancer mortality, which the Ministry of Health and Te Aho o Te Kahu will have directly contributed to through their lack of timely action on this issue. If they fail to respond with urgency, the Ministry of Health and Te Aho o Te Kahu’s stated commitments to health equity and te Tiriti o Waitangi will be called into serious doubt.

**Figure 3:** Percentage of Māori and non-Māori populations by age group from 2018 census data. Data sourced from National Screening Unit, Ministry of Health 2020. Categories are presented as provided in the data.
Figure 4: Colorectal cancer registrations by age, sex and ethnic grouping, 2013–2017 (excluding Waitematā DHB).
Competing interests:
Dr Crengle reports personal fees from Chair of Te Waipounamu Māori Cancer Leadership Group (Southern Cancer Network (now Southern Hub, Te Aho o te Kahu)) and grants from Co-Director of Cancer Society Research Collaboration, University of Otago, outside the submitted work. She is also Medical Advisor, Bowel Cancer New Zealand, and a Member He Ahuru Mowai (National Māori Cancer Leadership Group). Dr Robson reports other contracts from Ministry of Health, outside the submitted work, and is Member of Hei Ahuru Mowai. Dr Paine reports grants from Health Research Council of New Zealand during the conduct of the study. Dr Scott reports personal fees from Te Aho o Te Kahu Advisory Council member outside the submitted work and is member of Bowel Screening Advisory Committee, Ministry of Health, and Co-Chair of He Ahuru Mowai—Māori Cancer Leadership Aotearoa. Dr Harris reports grants from Health Research Council of New Zealand during the conduct of the study and personal fees from Ministry of Health outside the submitted work. Dr McLeod reports grants from Health Research Council of New Zealand during the conduct of the study, personal fees from Waitematā and Auckland DHBs outside the submitted work and is a member of the Bowel Screening Advisory Group and the COVID expert advisory group, Ministry of Health.

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We would like to thank the National Screening Unit, Ministry of Health, for providing the data. This research was supported (in part) by a contract from the Health Research Council of New Zealand (HRC 20/152). Researchers are independent from funders. The study funders/sponsors had no role in the study design, collection, analysis or interpretation of data.

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9. IARC. Estimated age-standardized incidence rates (World) in 2020, all cancers, both sexes, ages 50–59. International Agency for Research on Cancer; 2020 [31 March 2021]. Available from: https://gco.iarc.fr/today/online-analysis-map?v=2020&mode=population&mode_population=continents&population=900&population=900&key=asr&sex=0&cancer=39&type=0&statistic=5&prevalence=0&population_group=0&age_group%5B%5D=10&age_group%5B%5D=11&nb_items=10&group_cancer=1&include_nmsc=1&include_nmsc_other=1&projection=natural-earth&color_palette=default&amp;map_scale=quantile&amp;map_nb_colors=5&continent=0&show_ranking=0&rotate=%255B10%25202C0%25205D accessed 31 March 2021.


**Mycobacterium mantenii: a rare cause of chronic ulceration in an immunocompetent female in the southern hemisphere**

Julia (Xiaoyu) Zhu, Caroline Mahon, Simon C Dalton

*Mycobacterium mantenii* (*M. man-tenii*) is a slow-growing non-tuberculous mycobacterial (NTM) species first described as a human pathogen in 2009. Information regarding the spectrum of clinical presentation, pathogenicity and geographic distribution of this rare mycobacterial species is scarce. *M. mantenii* has not previously been reported to be a cause of human disease in the southern hemisphere. We therefore report the case of a woman with a chronic non-healing ulcer due to *M. mantenii* infection.

**Case report**

A 43-year-old, immunocompetent woman presented with an eight-month history of a non-healing ulcer on her right and dominant hand. Twelve months earlier she sustained a flap-laceration to the dorsal surface of the hand while drying a glass tumbler. The wound was sutured in the emergency department on the day of the injury. No radio-opaque foreign body or bony injury was evident on plain X-ray. The wound repair failed within a week. The patient left the wound open but dressed until she was seen by her general practitioner, who re-sutured the wound one month later. Once again the sutures broke down. Multiple courses of beta-lactam antibiotics were prescribed, which all failed to result in healing. Four months later she underwent excision of the ulcer and transposition flap repair. Despite initial complete healing of the surgical wound, a new ulcer appeared at the wound edge several weeks after the surgery.

Twelve months after the initial injury, assessment in a dermatology clinic revealed a deep inflammatory ulcer characterised by exquisite tenderness and significant limitation of movement of the hand (Figure 1). The clinical impression was of an atypical mycobacterial or deep fungal infection. Foreign body retention was excluded by repeat plain X-ray of the hand, ultrasound and cone beam CT. Skin biopsy revealed ulceration with a chronic mixed inflammatory cell infiltrate. There were no granulomata. No organisms were identified on Ziehl–Nielsen, Wade–Fite or periodic acid–Schiff staining.

**Figure 1:** Ulcerated lesion with significant inflammatory response at presentation.
Biopsy tissue was concurrently sent for mycobacterial PCR (Anyplex plus MTB/NTM, Seegene Incorporated, Korea). This detected non-tuberculous mycobacterial DNA. After five weeks, culture (MGIT 960 system, Becton-Dickinson and Company, Sparks, USA) growth of a yellow pigmented organism was observed. The isolate was identified by sequencing of the 16S ribosomal RNA gene, which revealed a 488/489 (99%) base pair match to Mycobacterium mantenii strain NLA004001474 (NR_116538.1) in GenBank (accessed 22.09.2020).

Based on previously reported antimicrobial susceptibility testing, oral therapy with clarithromycin 500mg BD and rifampicin 450mg BD was commenced. This resulted in dramatic improvement and complete healing of the ulceration at three months.

**Figure 2:** Significant healing of ulcerated lesion following three months of treatment with oral clarithromycin and rifampicin.

**Discussion**

Non-tuberculous mycobacterial species occur ubiquitously in the environment. Brackish water and soil are frequent reservoirs. Mycobacterial species causing skin infections include both rapidly growing mycobacteria (RGM), such as *M. abscessus*, and slow-growing mycobacteria (SGM), such as *M. avium* complex (MAC) and *M. marinum*. In contrast to RGM, the slower growing mycobacteria take longer than seven days to form colonies visible to the naked eye on subculture media. Approximately 50 mycobacterial species are now recognised as opportunistic human pathogens. Many species have a geographical predilection. *Mycobacterium ulcerans*, for example, is endemic to regions of Africa and Australia.

*M. mantenii* belongs to the scotochromogenic (producers of pigment in the absence of light) SGM group and matures beyond 28 days of incubation. It was first identified in 2009 by van Ingen et al, who described five isolates: four in patients residing in the Netherlands and one environmental isolate. The clinical isolates were identified from two cases of cervical lymphadenitis (both immunocompetent children) and from respiratory secretions in two adults (considered clinically insignificant). *M. mantenii* was also cultured by the authors from a water sample taken from the Zambezi River.

Since then, a handful of reports of *M. mantenii* environmental isolates and cases of human infection occurring in the northern hemisphere have been published (Table 1). This organism has not, as far as the authors are aware, been identified as a pathogen in humans in the southern hemisphere. Cases of cutaneous infection have been reported in only two further patients since 2009. In the first case, extensive *M. mantenii* skin infection was reported in 2015 by Honda et al in an immunosuppressed Japanese patient with a history of Castleman’s disease and previous pulmonary multi-species NTM. The second case occurred in a 65-year-old Japanese patient and involved disseminated systemic infection (bone, bronchus, lymph nodes) with chronic skin ulceration. The patient was subsequently discovered to have anti-interferon gamma neutralising auto-antibodies and was therefore immunocompromised.

The diagnosis of NTM skin infection can be very difficult given the wide variation in morphologic skin findings (pustules, deep abscesses, ulcerations, nodules) as well as often non-specific histopathologic findings. Our case highlights this clinical challenge.
Table 1: Reported occurrences of *Mycobacterium mantenii* (environment and clinical isolates).

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Location</th>
<th>Age Group</th>
<th>Gender</th>
<th>Comorbidity</th>
<th>Immunocompromised</th>
<th>Presentation</th>
<th>Outcome and treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Ingen et al</td>
<td>2004</td>
<td>Netherlands</td>
<td>2 years</td>
<td>Female</td>
<td>None</td>
<td>No</td>
<td>Cervicofacial lymphangitis</td>
<td>Cured (clarithromycin, rifabutin)</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>Netherlands</td>
<td>18 months</td>
<td>Female</td>
<td>None</td>
<td>No</td>
<td>Cervicofacial lymphangitis</td>
<td>Cured (incision and drainage only)</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>Zambia</td>
<td>Not applicable</td>
<td></td>
<td></td>
<td>No</td>
<td>Environmental isolate from Zambezi river water</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>Netherlands</td>
<td>92 years</td>
<td>Female</td>
<td>Bronchiectasis</td>
<td>No</td>
<td>Respiratory tract isolate–not thought to be clinically relevant</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>Netherlands</td>
<td>68 years</td>
<td>Male</td>
<td>Alpha 1 anti-trypsin deficiency/Pulmonary emphysema</td>
<td>No</td>
<td>Respiratory tract isolate–not thought to be clinically relevant</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Aboagye et al</td>
<td>2012</td>
<td>Ghana</td>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td>Environmental isolate from soil and moss</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Slany et al</td>
<td>2012</td>
<td>Czech Republic</td>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td>Environmental isolate from aquarium water</td>
<td>Not applicable</td>
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<tr>
<td>Hase et al</td>
<td>2014</td>
<td>Japan</td>
<td>65 years</td>
<td>Male</td>
<td>Anti-interferon-gamma antibodies</td>
<td>Yes</td>
<td>Disseminated systemic infection with cutaneous lesions</td>
<td>Cured (clarithromycin, rifampicin, ethambutol)</td>
</tr>
<tr>
<td>Honda et al</td>
<td>2015</td>
<td>Japan</td>
<td>70 years</td>
<td>Male</td>
<td>Castleman's disease</td>
<td>Yes</td>
<td>Disseminated systemic infection with cutaneous lesions</td>
<td>Cured (levofloxacin, rifampicin, ethambutol, amikacin)</td>
</tr>
<tr>
<td>Nebreda Mayoral et al</td>
<td>2017</td>
<td>Spain</td>
<td>5 years</td>
<td>Female</td>
<td>None</td>
<td>No</td>
<td>Cervicofacial lymphangitis</td>
<td>Partial response (clarithromycin)</td>
</tr>
<tr>
<td>Nebreda Mayoral et al</td>
<td>2017</td>
<td>Spain</td>
<td>3 years</td>
<td>Female</td>
<td>None</td>
<td>No</td>
<td>Cervicofacial lymphangitis</td>
<td>Partial response (azithromycin)</td>
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</table>
Tissue culture eventually led to the correct diagnosis following initial detection of mycobacterial DNA on PCR testing.

Treatment of SGM can be particularly challenging, requiring antibiotic regimens that are long and often arduous. No single susceptibility method is recommended for all species and treatment recommendations are often made on the basis of only a few reported cases. Indeed, for *M. mantenii*, comprehensive drug susceptibility testing using the agar dilution method has been conducted on only four clinical isolates. Those four isolates were only susceptible *in vitro* to rifampicin, rifabutin, clarithromycin, cycloserine, clofazimine and prothionamide. The drug susceptibility pattern is similar to that of *M. scrofulaceum* and members of the MAC, except for the remarkable *in vitro* susceptibility to rifamycins (ie, rifampicin and rifabutin). In contrast, Nebreda Mayoral et al undertook drug susceptibility testing on the MGIT 960 (Becton-Dickinson and Company, Sparks, USA) following the manufacturer’s recommendations. The strain from their first patient was sensitive to cycloserine and clarithromycin, and the strain from the second patient was sensitive only to clarithromycin. As outlined in Table 1, only a partial clinical response was noted despite at least three months of macrolide monotherapy. It seems probable then that successful treatment of *M. mantenii*-associated infection requires a combination antibiotic approach, ideally with the inclusion of a rifamycin. At a more general level, atypical mycobacterial skin and soft tissue infections in immunocompetent patients are usually treated for many months and outcomes are mostly favourable, as in this case.

**Conclusion**

We have described a patient with a chronic ulcer due to *M. mantenii* occurring in the southern hemisphere. This novel case demonstrates the pathogenicity of this species and its ability to cause serious chronic skin infection in an immunocompetent patient. The successful clinical outcome supports the use of empiric treatment of *Mycobacterium mantenii* with the combination of clarithromycin and rifampicin.

**Ethical statement**

Consent was obtained from the patient described in this case report.

**Competing interests:**

Nil.

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A qualitative analysis of how people who smoke and manage lower incomes perceive the Smokefree 2025 goal

Janet Hoek, Ivana Barbalich, Richard Edwards, Coral Gartner

A decade has passed since the then National-led government accepted the Māori Affairs Select Committee (MASC) Inquiry recommendation that New Zealand set a “longer-term goal of reducing smoking prevalence and tobacco availability to minimal levels, thereby [becoming] essentially a smokefree nation by 2025.” Three years after the goal’s announcement, a survey found widespread misunderstanding of the 2025 goal, particularly among people who smoke daily; once the goal was explained, support increased, a finding that led to calls for an urgent and comprehensive communications campaign. However, the Government did not implement measures to increase understanding of the goal; indeed, investment in smokefree communications decreased and, with some notable exceptions, politicians responsible for realising the goal did little to communicate it.

Given the lack of investment in communication, evidence that the 2025 goal will not be realised for key population groups, and the fact 2025 is fast approaching, it is timely to revisit how people who smoke interpret the goal. Smoking prevalence peaks among people living in neighbourhoods that experience high material deprivation; these people are less likely to quit smoking successfully, even though their desire to quit is similar to that of people living in more affluent areas. Because attaining the Smokefree 2025 goal will have potentially profound effects on people from these communities, it is crucial to probe how they interpret and respond to the goal.

To address this question, we undertook in-depth interviews with 20 people aged between 21 and 53 who smoked daily. Eligible participants earned less than the median income (NZ$33,900) and had marginal or inadequate income sufficiency (ie, those who answered “Only just enough” or “Not enough” to the question: “Do you have enough money to meet every day needs?”). Among other topics, we explored participants’ unprompted and prompted perceptions of the Smokefree 2025 goal and their views on its implications. A delegated authority from the University of Otago’s Human Ethics Committee reviewed and approved the project (reference D20/383). Participants received a $40 gift voucher (not redeemable for tobacco) to recognise any costs they incurred by participating in the study.

Interviews took place between November and December 2020 and lasted between 42 and 66 minutes; interviewing ceased when data saturation had been reached (defined as no new idea elements identified in two consecutive interviews). We dual coded the data, interpreted these using a ‘codebook thematic analysis’ approach and described key themes using participants’ words (all participants have been assigned pseudonyms).

We first probed participants’ unprompted interpretation of the goal. Most felt unclear what the goal meant, though many mistakenly believed sales of tobacco products would end in 2025. Alan commented: “I think they’re going to stop cigarettes in New Zealand. That’s what
I think... you won't be able to get them anywhere... but I'm not too sure what actually, what it means” (Alan). Quinn reiterated this point: “I’m guessing by then [2025] they’re planning on making it [tobacco] like illegal, or something, yeah? Um, maybe do it so that, you know, retail places, that they can’t sell them anymore” (Quinn). As well as stopping tobacco sales, others thought smokefree spaces would expand and greatly limit where smoking could occur: “There’s some place overseas... you’re not allowed to smoke within like two and a half metres of like a business door... it basically means that the only place you could smoke would be right in the centre of a busy road... I’ve heard of other places like whole cities just being smokefree... I don’t mind if I’ve just gotta smoke at home [but] I don’t know how that would work if I’m out and about” (Ian). Bans featured strongly in participants’ interpretations and a minority thought the goal aimed to eradicate smoking: “they want to wipe out smoking altogether; that's what I've heard” (Olivia), and “they want smokers... don’t exist in 2025... That's what I believe they want. Um, I believe they might even make cigarettes illegal” (Gavin). Katie drew these perspectives together in her interpretation of the goal: “I think the Government wants to not have any cigarettes whatsoever or tobacco to be able to be accessed in New Zealand whatsoever. And that people will not be smoking in 2025” (Katie).

Most participants had strong negative reactions to these scenarios; they envisaged angry and violent responses: “There are gonna be riots, there gonna be... Yeah, that's gonna be crazy” (Gavin). They anticipated people would circumvent the bans they assumed would be introduced: “people are going to find a way to get it. Whether it’s growing your own or whatever. Um, I don’t see the government preventing people from getting it. I don’t see that stopping it. People are too clever for that” (Fran). Several predicted black markets would develop, which could potentially increase crime and social tensions and lead people desperate for tobacco into dangerous situations: “I know that there’s a massive black market for it... Like, I’ve heard that you can get counterfeit smokes... but I’ve never actually come across any of that yet. But I can see that there being another way that the gangs will make their money... I don’t wanna associate with the gangs, but if I want a cigarette, I will” (Ian).

We explained the goal’s commonly accepted definition as reducing smoking prevalence to 5% or below alongside large reductions in tobacco supply. Many participants viewed this definition positively: “I think that them having this goal is great, because that’s what we need to do. Like, we need to look at people’s health and the pollution and stuff as well” (Quinn). Despite information reframing the goal as a large reduction in smoking prevalence and availability, several participants nonetheless supported banning tobacco sales. For some, their support recognised the limitations of earlier measures. Tom noted that, despite restrictions on tobacco retail displays, tobacco’s easy availability compromised quit attempts: “It would make it so much easier to quit. I wouldn’t have, yeah... I know they’ve got the cabinets behind them now and you can’t see what’s in them. But you know what’s in there... And you walk into a shop and they’re always right behind the counter. Like they’re right there as soon as you walk in the door... It’s like, ‘Oh, fuck. I need a pack of smokes’” (Tom).

Even if they thought people would circumvent measures to continue smoking, several participants still supported the goal. Thus, while Holly thought that “if they get rid of smoking, then people will still find a way to grow tobacco, smoke, whatever, you know,” she supported banning sales of tobacco products, which she thought would help her quit: “I’d be stoked. (laughs) ‘Cause it would help... it would just mean, boom. It’s done. I can’t smoke any more. So, yeah, it wouldn’t really bother me. It’d be quite a bit good thing I reckon” (Holly). Others also thought banning tobacco sales would support them to become smokefree: “...’cause it would make me stop... If it wasn’t available, I wouldn’t... I wouldn’t be doing it. Pretty much” (Nick), and “I wouldn’t mind, because like I say, I don’t want to smoke forever, and obviously that would probably be the best motivator” (Samantha).

The minority who did not anticipate quitting felt relieved to learn the goal aimed to reduce smoking prevalence and tobacco supply rather than ban either smoking or
tobacco sales. Megan noted: “It puts me more at ease. Yeah. The last thing we need is more volatile people in the world. (laughs) But yeah, that’s... you know, tobacco can still be bought. Yeah, make things a lot easier” (Megan). Others felt more secure and saw themselves among the 5% who would continue smoking: “See, when I see that I get a bit happy and I see hope and I think, ‘Yes, I’ll be in the 5%.’ (laughs) ‘Cause I will be” (Katie).

However, when reflecting on what continuing to smoke would mean when few people smoked, some saw new tensions. Charlotte explained: “…If it was less than 5%, you’d just feel like such a, I don’t know, a weirdo smoking, really, being such a small group of the population and you were still doing it, (laughs) and you know?... Yeah. That, the less and less it gets the worse and worse you feel, like, yeah” (Charlotte). Nonetheless, others dismissed the likely impact: “I don’t think it would impact my smoking at all... I’m quite happy to be part of that 5%, if need be... I just don’t think that’s going to affect me... I mean, you’d still feel a little bit shitty about yourself. But I, I don’t view myself under those stereotypes, so I still don’t think it would touch me really” (Laura).

In summary, even ten years after the Smokefree 2025 goal was set, our study highlights some sustained misperceptions associated with negative responses to the goal. These findings raise questions about what might have been achieved had successive governments made the goal a political priority. Even today, improving understanding of the goal remains urgent, given confusion may lead to resistance and opposition.

We suggest three priorities to address misunderstandings about the goal and negative reactions that follow.

First, develop a communications plan to ensure people, particularly people who smoke, understand the goal, its rationale and its benefits, and are encouraged to quit. Addressing the confusion we and others have detected, and that earlier studies have reported, may decrease negative reactions towards the goal and reduce opportunities for tobacco companies to create doubt and concern. New Zealand’s response to COVID-19 included a comprehensive media strategy that showed the power of government communications to support health priorities. Second, use revenue from tobacco excise tax to fund high-quality cessation support that people who smoke find authentic, accessible and helpful. Finally, respond to participants’ comments about the likely positive impacts of reducing tobacco products’ availability and visibility, and to the many studies documenting associations between tobacco availability and smoking prevalence by developing and swiftly implementing a plan to reduce the number of tobacco retail outlets as part of a comprehensive strategy to achieve the Smokefree 2025 goal.
Competing interests: Janet Hoek, Richard Edwards and Ivana Barbalich declare support from the Health Research Council of New Zealand paid to the University of Otago since the initial planning of this research. Richard Edwards also declares a project grant (HRC 15/072) paid to the University of Otago; an honoraria received personally as Deputy Editor of the journal Nicotine & Tobacco Research; payments received personally for expenses to travel to expert advisory groups (eg, Hāpai te Hauora Tobacco Advisory Group) and conferences (eg, Oceania Tobacco Control Conference and Australasian and New Zealand Thoracic Society conferences); and being a member of Project Sunset Oceania and the Global Project Sunset, all during the past 36 months. Janet Hoek also declares a project grant (19/327) and a Cancer Society Research Collaboration programme grant paid to the University of Otago; personally receiving travel funding to attend Health Promotion Agency advisory group meetings; and being a member of Project Sunset Oceania and the Global Project Sunset, all during the past 36 months. Coral Gartner declares support from the National Health and Medical Research Council (GNT1198301) paid to the Centre of Research Excellence on Achieving the Tobacco Endgame since the initial planning of this research and, during the past 36 months, being a member of Project Sunset Oceania and the Global Project Sunset, all during the past 36 months.

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Manatu ki waaheke
in nursing education:
a legend for an example

Sandra McDonald

As described by Selak et al., systemic racism exists in New Zealand healthcare. However, there are programmes specifically established to address this issue. For example, at Manukau Institute of Technology (MIT) a newly developed programme, Te Tohu Paetahi Tikanga Rangatira aa-Tapuhi—Bachelor Nursing Māori, is in its third semester of delivery this year. (The programme has adopted the use of double vowels rather than macrons to be consistent with Waikato Tainui dialect.)

Manatu ki waaheke—looking back in order to move forward—is part of the ethos of this programme. Specifically, the legacy of Princess Te Puea provides the vision from the past to inform the future of nursing with the tauira (students) enrolled in the degree. “Mahia te mahi, hei painga moo te iwi—do the work for the health and wellbeing of the people,” said Te Puea Herangi. Princess Te Puea was a beloved and esteemed leader of the Waikato Tainui people and her life story underpins and is intertwined throughout Te Tohu Paetahi Tikanga Rangatira aa-Tapuhi. The backdrop to the development of the programme is reflected in the description of Selak et al.

Overcoming the unconscious bias described in the honest and open reflection by Selak et al. is not a new challenge to nursing, and tauira on our programme can attest to this. In class discussions, tauira often share examples of racism as they work through what racism means to them and their whanau, and as they embark on this journey making them part of the very same health system. They want to be the difference, and Princess Te Puea provides the example for the way forward.

Ethnically inappropriate medical care impacts Māori and Māori have poorer health measures than non-indigenous New Zealanders. Māori are an under-represented group in healthcare services. For example, in Counties Manukau Health (CMH), 5% of registered nurses are Māori, yet they serve a 16% Māori population. The incidence of inferior treatment experienced by Māori rose from twice to three times as likely in the period between 2006 and 2011. This disparity in care for indigenous populations is not isolated to New Zealand, with other countries such as Canada reporting similar challenges.

This type of experience exacerbates unmet health needs in our indigenous community. Because of this disparity, CMH have partnered with MIT and other community stakeholders to develop and deliver this Māori-specific nursing programme and address Māori health inequities.

Because MIT is in the Tainui region of Māori people, it is fitting that the programme has been designed and developed on the basis of the values of a Waikato Tainui Māori woman, Princess Te Puea, who was born in 1883. Princess Te Puea’s legacy is of absolute dedication to the leadership of her people. She ceaselessly worked to improve their wellbeing and reduce the impact of colonisation by encouraging Māori to take the best from all cultures and remember who they are.

Four principles from Princess Te Puea inspire the programme’s approach:
1. Kia Tupu: to grow and develop.
2. Kia Hua: to flourish and prosper.
3. Kia Puawai: to nourish and sustain.
4. Kia Tau Te Rangimarie: to gain transparency through equality.

Incorporating these principles and values in the programme resulted in a nursing degree that is fundamentally different from all other nursing programmes in Aotearoa.
New Zealand. The academic rigour of this nursing degree is set in a Māori pedagogical framework—inclusive of key Māori values and learning experiences specific to the Waikato Tainui people and Princess Te Puea. Marae-based teaching is critical to the programme. Clinical placements for the tauira focus on health priorities for Māori and, where practical, are with Māori health providers.

The philosophy and principles of Princess Te Puea provide the framework for making sense of life and learning within course delivery. For example, if anti-Pākehā discussions arise, kaikāo (lecturers) are able to discuss the Te Puea Herangi quote: “I am not anti-Pākehā, I am pro Māori,” and the context of this statement and how Princess Te Puea was focused on maximising support for her people to make them a “self-reliant people.” She was very clear that the future had to include Paakehaa and that meant Māori had to “strengthen their roots so they could cope and not stop being Māori.”

Therefore the role of Te Tohu Paetahi Tikanga Rangatira aa-Tapuhi is to grow Māori and non-Māori tauira within the programme to be strong in who they are and how to work together as Tikanga Rangatira aa-Tapuhi registered nurses and reduce the health inequities experienced by Māori.

Through their example and leadership, Māori cannot be “framed as being to blame for their own inferior health outcomes compared to Pākehā.” Rather, the colleagues our graduates work beside as nurses will see an example of the difference they can make through the moemoea (vision).

A research project is currently being finalised that will run alongside the programme delivery, provide data about the engagement of tauira with their educational programme and make recommendations for addressing disparities across, education, health, healthcare and more. It is expected that the results will affirm and inform the intrinsic value of an approach that is fundamentally different to any other in Aotearoa New Zealand. This is not just a Māori-based programme, but rather a programme where our courses are all tied to a woven theme within Waikato Tainui around wellness and strength-based approaches to health and wellbeing.

It is this kaupapa whaanau approach that enables another Princess Te Puea whakatauki, “Mehemea ka moemoeā ahau, ko ahau anake. Mehemea ka moemoeā tātou, ka taea e tatou,” to be realised. Specifically, “If I am to dream I dream alone. If we all dream together then we shall achieve.”

Competing interests:
Sandra McDonald declares strategic working relationships with Counties Manukau Health in the development of Te Tohu Paetahi Tikanga Rangatira aa-Tapuhi—Bachelor Nursing Māori, and with Waikato Tainui Kingitanga in supporting the kaupapa.

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It’s time to end racism in our profession: an open letter to the New Zealand medical community

Wil Harrison

ABSTRACT
This is an open letter to all medical professionals in Aotearoa/New Zealand in response to a recently publicised incident at a medical conference held in late 2020, where racist and offensive remarks were made about Māori to an audience of medical professionals and an invited Māori delegate. The incident brings to light cultural flaws in our profession that implicitly allow this type of behaviour to exist and negatively impact Māori patients. The challenge to our profession is to be honest, reflect on what we can learn from this incident, and bring about cultural change through personal reflection and collective action.

Tēnā koutou katoa,

I am writing this open letter to all medical professionals in Aotearoa/New Zealand in response to an incident at a meeting of the Urological Society of Australia and New Zealand (USANZ) held in Queenstown in November 2020 during a debate on why Māori men were reluctant to undergo rectal examination for prostate cancer screening. What was said is publicly known. Like many others, I found out about this event through the media. I feel compelled to say something, both from the perspective of a Māori doctor and a Māori man.

This incident brings to light cultural flaws in our profession that, despite years of advocacy, education, and health policy development, still allow biased and racist behaviour to occur in our ranks. A few things stand out:

• A colleague failed to recognise their remarks were offensive, ignorant, and racist, followed by showing of an inappropriate image.

• A colleague felt comfortable enough to make those remarks in a medical forum and in front of an invited Māori delegate.

• An audience of colleagues apparently responded with laughter.

• Society leadership recognised the indiscretion but did not inform the relevant board of this serious event in a timely manner.

It is foolish to think this was merely an individual error of judgement. Neither should this error be attributed to one subgroup of clinicians. The collegial environment permitted this speaker to make those comments without thought or fear of immediate consequence. Some might trivialise such incidents as a joke, not meant to be taken seriously. The audience response might even appear to endorse what was said. The real concern is that these are colleagues who deliver medical care to Māori, and it is disingenuous to believe that clinicians can harbour this duality of perspective without it negatively impacting on Māori patients.

Māori understand this behaviour. Māori have been subjected to racism since this country was colonised. Māori doctors see this kind of behaviour routinely during training and clinical practice, across many different disciplines in medicine. Māori patients easily detect these behaviours in clinicians. For Māori, receiving healthcare is not just a transaction, it is a sharing of trust and mana with a system that maintains a large power imbalance over them.
When Māori patients see these behaviours going on, trust is severely eroded, and the response is disengagement.

The question posed during the debate was in fact answered through the conduct of both speaker and audience. The effect was to diminish the mana of Māori patients and Māori men.

Our profession needs to rapidly come to terms with this incident. We need to look beyond the details to the underlying causes. It is hypocritical of us to claim we are addressing systemic inequity and racism when we perpetuate a medical culture that implicitly allows behaviour like this to occur. Policies alone do not change hearts and minds, and it is pointless performing culturally enlightening tasks without meaningful self-reflection into our own biases and world views that are often closely tied to our values, culture, and identity. This is our collective problem, but the collective response begins with a personal challenge to us all.

We need to be honest. We must acknowledge that bias and racism exist in our house. Whether we like it or not, they are truths we all must accept. We need to talk to one another about these uncomfortable issues. We have to accept that our patients may have different worldviews to us, and that it is our job as clinicians to bridge the gap. We need to understand how our individual biases can negatively affect the care we provide. We have to accept the need for change. We must unite to foster a medical culture that demands equity and respect towards patients and colleagues. We need to develop systems, policies, and leadership practices that allow no room for racism to be expressed. We must hold one another accountable. We must learn from our mistakes.

We all need to own this. We all need to be better than this. Our Māori patients should not be made to wait for the individual catharsis of doctors to receive fair and equitable treatment.

Competing interests:
Nil.

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Acute rheumatic fever—a preventable, inequitable disease: a call for action


Acute rheumatic fever (ARF) is a preventable autoimmune response to group A Streptococcus (GAS) infection. In an estimated 60% of ARF cases, carditis progresses to chronic rheumatic heart disease (RHD) and permanent heart valve damage. Unless treated with intramuscular injections of benzathine penicillin G (BPG) every 28 days for a minimum of 10 years, ARF patients are likely to experience worsening cardiac damage and increasing chances of heart failure, stroke and early death. ARF and RHD have all but disappeared from high-income countries. Yet here in Aotearoa New Zealand they remain an alarming and inequitable cause of preventable suffering and death for Māori and Pacific peoples. Over the 2000-2018 period, Pacific children (5–14 years of age) were 80 times more likely, and Māori children were 36 times more likely, to develop ARF compared with European/other children (based on initial ARF hospitalisations). The ethnic inequity of distribution continues to drive elevated rates of RHD and premature death across the lifespans of Māori and Pacific peoples.

In April 2018, member states of the World Health Organization unanimously adopted the Global Resolution (A71/25) on Rheumatic Fever and Rheumatic Heart Disease—which is a call for national, regional and global actions to prevent and control ARF and RHD. The New Zealand Ministry of Health were world leaders in this achievement, initiating the drafting process to develop the Resolution and setting out the case for taking action. However, despite this global success and a 2020 pre-election promise for a national ARF/RHD patient register, the New Zealand government has not yet taken action to fund or implement such a register that could help monitor and reduce ARF/RHD.

By supporting the health workforce to maximise the likelihood of adherence with long-term antibiotic therapy, patient registers are instrumental in helping to organise the medical care of patients with ARF/RHD. Registers facilitate monitoring of disease burden and progression, providing epidemiological data that can be used for planning prevention and control programmes. The World Heart Federation (an association of international heart foundations and medical societies) recommend the use of comprehensive register-based ARF/RHD control programmes, and the New Zealand ARF/RHD sector have called for a national register numerous times over the last two decades.

Pū Manawa, a recently formed, sector-wide network of health practitioners, researchers and key stakeholders, including ARF/RHD patients, whānau and non-governmental organisations, is advocating for the immediate establishment of a long-overdue national ARF/RHD register as an important step towards disease control and the reduction of ethnic inequities in New Zealand. The inequitable rates of ARF and RHD in Aotearoa are shameful. They clearly breach of te Tiriti o Waitangi and demand a strong government response. There is an urgent need for leadership, coordination and an adequately resourced national strategy for the prevention and control of ARF/RHD. As a core component of such a strategy, an immediate action that the Government can take is to support and fund the implementation of the national ARF/RHD register as promised.
Competing interests: Nil.

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Partial endothelial nitric oxide synthase deficiency exacerbates Alzheimer's pathology in a murine model

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Increasing evidence implicates endothelial nitric oxide synthase (eNOS) dysfunction in the pathogenesis of Alzheimer's disease (AD). Complete eNOS deficient (eNOS−/−) mice have increased amyloid beta (Aβ) levels and tau phosphorylation in the brain and cognitive decline. APPswe/PSdE1 (APP/PS1) mice display age-related Aβ accumulation and memory deficits. In this study, APP/PS1 and eNOS−/− mice were crossed to produce APP/PS1/eNOS−/− mice in order to add an element of eNOS dysfunction to the model. At eight months of age, APP/PS1/eNOS−/− mice performed poorly relative to their age-matched APP/PS1 mice in a water maze test. This study aimed to compare AD-like pathology in the hippocampus of APP/PS1 and APP/PS1/eNOS−/− mice using immunofluorescence.

Male and female eight-months-old wild-type (WT), eNOS−/−, APP/PS1 and APP/PS1/eNOS−/− mice (n = 3–5/genotype/sex) were perfused transcardially and the brains were fixed by 4% paraformaldehyde. Coronal sections of anterior and posterior hippocampus from each animal were double-labelled with 6E10 (for Aβ) and Iba-1 (for microglia) antibodies using immunofluorescence. The Aβ load (the percentage area covered by plaques) in the hippocampus was quantified using the ImageJ under blind conditions.

Aβ plaques (6E10 immunoreactivity) were evident in the anterior and posterior hippocampus in both APP/PS1 and APP/PS1/eNOS−/− mice, but not in WT and eNOS−/− mice. While Iba-1 immunoreactivity was seen in the hippocampus in all four genotype groups, there were intensely stained microglia forming clusters in APP/PS1 and APP/PS1/eNOS−/− mice. The ImageJ analysis and one sample t-test revealed that the APP/PS1/eNOS−/− group had significantly higher plaque load in the hippocampus at both the anterior and posterior levels (all p < 0.01; 1.7-fold increases) relative to the APP/PS1 group.

These preliminary findings demonstrate that partial eNOS deficiency exacerbates AD pathology in APP/PS1 mice, which may account for poor spatial learning observed in APP/PS1/eNOS−/− mice in previous studies. The underlying mechanisms remain to be explored in the future.

Biodistribution and toxicological assessment of carbon nano-onions in female BALB/c mice

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Carbon nano-onions (CNOs) are multi-layered fullerenes comprising of concentric, quasi-spherical, carbon shells. In order for these nanomaterials to be used as biosensors, imaging tools or drug-delivery vehicles, the systemic safety of CNOs must first be confirmed. Previous toxicological assessment has only been conducted in freshwater polyps and zebrafish. Therefore, this study investigated the biodistribution and toxicity of CNOs following intravenous administration in mice.

CNOs were dispersed in a biologically compatible dispersant (50:50 ddH2O: PEG-200) and injected intravenously into female BALB/c mice. Mice were administered a single dose of CNO (125, 250 or 500 μg/mouse) or vehicle (n=5 per group) and monitored for seven days. Mice were then euthanised by CO2 inhalation, with blood and organs collected for analysis. Changes to physiological parameters were analysed using a one-way ANOVA coupled with Tukey’s multiple comparisons post hoc.

Daily monitoring of body weight showed no significant differences between treatment groups across the seven days. There were also no significant differences observed in organ weight between treatments. Furthermore, evaluation of
Inflammation and scarring in an ex vivo model of spinal cord injury

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Traumatic spinal cord injury (SCI) is followed by a marked inflammatory response that greatly exacerbates damage and generates scar tissue which prevents axonal regeneration. Recently, an ex vivo SCI model was developed to reduce highly invasive and costly in vivo testing. However, it is unknown whether this model can mimic processes that occur following SCI. This study investigated whether the ex vivo SCI model can generate an inflammatory response and fibrotic and glial scarring following SCI.

Spinal cords obtained from euthanised male Sprague Dawley rats (6–7 weeks postnatal) were dissected into six segments then cultured for 24 hours. Segments received a compression injury and then were cultured for another 24 hours or seven days (n = 3 rats per group). Tissue viability was assessed using a TUNEL assay and quantitative PCR was used to measure mRNA levels of pro-inflammatory cytokines interleukin (IL)-1β, IL-6 and tumour necrosis factor (TNF). Immunohistochemistry was used to detect glial fibrillary acidic protein (GFAP) and collagen IV, markers of glial and fibrotic scarring, respectively. Compression injury induced a 2.5-fold increase in cell death at 24 hours post-injury compared to uninjured controls (P < 0.05, Wilcoxon test), but no increase in cell death was detectable at seven days. No significant differences in expression of IL-6, TNF or IL-1β were identified between uninjured and injured groups at either time-point. GFAP-staining suggested the initiation of glial scar formation, while collagen IV-staining indicated no fibrotic scarring.

These findings suggest that SCI was unable to trigger inflammation or fibrotic scarring in the ex vivo model. Optimisation of model parameters, such as longer culture duration and co-culturing with lymphocytes, may be needed to more accurately emulate the inflammatory and scarring responses seen in live animals. These steps will be required before the ex vivo model can be used for preclinical testing of SCI therapies.

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Oleoylthanolamide cubosomes exert potent anti-inflammatory effects on lipopolysaccharide-induced dendritic cells and human brain endothelial cells

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Oleoylthanolamide (OEA) is an endogenous lipid found in vertebrates with reported anti-inflammatory effects in animal models of brain disorders but is currently unavailable as a therapy due to poor solubility and in vivo enzymatic degradation. To circumvent these issues, OEA has been successfully formulated into lipid nanoparticles (cubosomes). However, their biological effects on viable cells have yet to be investigated. This study aimed to determine whether OEA cubosomes exert anti-inflammatory effects on bone-marrow derived dendritic cells (DCs), the primary mediators of inflammation and human cerebral microvascular endothelial cells (hCMEC/D3) that line the blood–brain barrier.

OEA cubosomes were prepared by solvent precursor dilution and their size was determined using dynamic light scattering (DLS). Inflammation in murine DCs and hCMEC/D3 cells was stimulated with lipopolysaccharide (LPS) for one hour and incubated with a range of OEA cubosome concentrations for 12 hours. Flow cytometry was used to quantify cytotoxicity and co-stimulatory molecule expression by DCs as well as cytokine concentrations produced by DCs and hCMEC/D3 cells (via Cytometric Bead Array) in response to LPS-induced inflammation.

Cubosomes produced were 120 to 140 nm. OEA cubosomes were non-toxic to DC and hCMEC/D3 cells up to a total lipid concentration of 15 µg/mL. A marked dose-dependent reduction of CD40 and CD86 expression was observed in DCs. In contrast, an elevation in CD80 expression across all total lipid concentrations was observed. Compared to untreated controls, TNF-α and IL-6 concentrations decreased by 10-fold and 1,000-fold, respectively, for LPS-induced DCs, while IL-6 levels decreased by 10-fold for hCMEC/D3 cells.

These preliminary results show, for the first time, that OEA cubosomes exert anti-in-
flamatory effects on DCs and hCMC/D3 cells by modulating co-stimulatory molecule expression and cytokine production. This study highlights the potential of OEA cubosomes as an anti-inflammatory agent and warrants further investigation into mechanisms involved in its cellular uptake and anti-inflammatory effects.

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Secreted amyloid precursor protein alpha (sAPPα) regulates surface expression of GluA1-containing glutamate receptors in primary hippocampal neurons

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Precise molecular changes at synapses underlie the processes of learning and memory. A central component of synapse strengthening is synthesis and trafficking of excitatory glutamate receptors. GluA1-containing receptors are plasticity-promoting through the ability to permit calcium influx, a key event in initiation of many intracellular mechanisms that underpin synaptic plasticity. Recently, we have shown that secreted amyloid precursor protein-alpha (sAPPα), a neuroprotective and memory-enhancing molecule, promotes synthesis of GluA1 specifically. We hypothesised that these receptors are rapidly trafficked to the cell surface and contribute to the enhancement of synaptic plasticity. We aimed to determine the level of GluA1 surface expression in response to sAPPα.

Primary hippocampal cell cultures were prepared from postnatal day 0–1 Sprague Dawley rats. Neurons (DIV20-22) were treated with sAPP (1 nM) for 30 minutes, two hours or four hours. Utilising a primary antibody (Merck; #MAB2263) targeted to an extracellular epitope of GluA1 and detergent-free conditions allowed for detection of solely surface expressed receptors. Fluorophore conjugated secondary antibodies (Alexa Fluor 647nm; Invitrogen; #A21236) allowed for signal visualisation and measurement of total cell fluorescence for ten cells/dish. Values were averaged and converted to fold changes relative to no treatment controls. Significance was determined by two-tailed Mann-Whitney t-tests.

We found that sAPPα (1 nM) significantly enhanced cell surface expression of GluA1 in the dendrites at 30 mins (2.37 ± 0.37 SEM; \(P = 0.0141\), N = 3 experiments; N = 31 cells), two hrs (3.01 ± 0.44 SEM; \(P = 0.0003\), N = 3 experiments; N = 31 cells) and four hrs (2.51 ± 0.40 SEM; \(P = 0.0043\); N = 3 experiments; N = 28 cells).

These findings suggest that sAPPα potentially exerts memory-enhancing effects through mechanisms involving insertion of GluA1-containing receptors into the synaptic membrane, occurring as early as 30 minutes after treatment. As Alzheimer’s disease is initially characterised by memory impairment, understanding the biological mechanisms harnessed by sAPPα presents an opportunity to develop novel memory-enhancing therapies.

Can carbon monoxide protect hypertrophic hearts against ischaemia-reperfusion injury?

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The imposition of ischaemia-reperfusion episodes in frequently used cardiac surgery interventions involving cardio-pulmonary bypass can induce peri-operative complications, such as myocardial injury, arrhythmias and end-organ injury. The presence of pre-existing cardiac pathologies, such as hypertrophic cardiomyopathy, potentiates these peri-operative complications and results in reduced outcome benefits. A new class of carbon monoxide delivery molecules (oComs) have been developed as potential anti-ischaemic agents. The present study investigated the cardio-protective potential of oCom-21 in hypertrophic hearts subjected to an acute ischaemia-reperfusion episode.

Hypertension induced in male, 10-week-old Cyp1a1-Ren2 rats fed indole-3-carbinol (0.167%; eight-weeks) resulted in larger heart weights (\(P < 0.001\)) and increased myocardial fibrosis (\(P < 0.001\)) against control littermates. Hearts were isolated and perfused using the Langendorff technique. oCom-21 (1–10 µM) or vehicle control was infused (10 minutes) prior to a 30-minute warm global ischaemic episode followed by a 60-minute reperfusion period. In normotrophic hearts (\(N = 4–5\) group), oCom-21 (1 and 3 µM) improved left ventricular developed pressure (LVPD) recovery (\(P < 0.01\) and \(P < 0.001\) respectively against vehicle control). In hypertrophic hearts (\(N = 8–10\) group), LVPD recovery to pre-ischaemic baselines was only significantly improved when higher concentrations (3 and 10 µM) of oCom-21 were applied. Furthermore, oCom-21 (3 and 10 µM) decreased myocardial injury as seen by the reduction of lactate dehydrogenase leakage upon reperfusion in the hypertrophic hearts compared to control, and a reduction in apoptotic cell death at 60 minutes of reperfusion with oCom-21 (1 and 3 µM; \(P < 0.01\)).

This study provides valuable evidence supporting oCom-21 use as a pre-conditioning agent in acute cardiovascular interventions in hearts burdened with hypertrophic cardiomyopathy.
Investigating the wound healing capacity of subcutaneous adipose tissue

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Surgical wound complications, such as seroma formation, dehiscence and infection, that occur during recovery represent a significant health burden occurring in 5–10% of patients. As obese patients have the greatest incidence of wound breakdown, we hypothesised that ineffective healing of the subcutaneous adipose tissue may be a predisposing factor. Therefore, this study investigated the healing capacity of cells derived from adipose tissue, in conditions simulating the ‘normal’ and ‘obese’ microenvironment of surgical wounds.

The healing capacities of pre-adipocyte and mature adipocyte cells derived from human subcutaneous adipose tissue were investigated using in vitro wound assays. To mimic different wound conditions, cells were pre-treated with standard growth media, pro-fibrotic cytokine transforming growth factor-β (TGFβ), or conditioned media from a human macrophage cell-line stimulated with interferon-γ and lipo polysaccharide, containing pro-inflammatory cytokines. To mimic a wound, cell monolayers were scratched to create a wound area, and the migration of cells was monitored over time using image capture. Results are reported as mean percentage reduction in wound area after 20 hours (SD, N = 3).

Pre-adipocytes showed significantly greater healing capacity than mature adipocytes, with 86 ± 2% and 38 ± 7% reductions in wound area, respectively (P < 0.01, 2-way ANOVA). In the presence of macrophage-conditioned media, pre-adipocyte wound area only reduced by 42 ± 11% (P < 0.05), indicating an impaired healing response.

A similar inhibitory effect was also seen in the presence of TGFβ (20ng/ml), with pre-adipocyte wound area reducing by 42 ± 6% (P < 0.01).

The inhibitory effects of pro-inflammatory and fibrotic cytokines on pre-adipocyte healing align with clear clinical evidence showing an increased risk of surgical wound complications with obesity or prolonged inflammation. Biological therapies targeting these cytokines may therefore improve the adipose tissue microenvironment, leading to a state that is more conducive to healing for the patient.

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Patient perspectives of a neuroscience-informed physiotherapy programme for persistent rotator cuff-related shoulder pain

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Rotator cuff-related shoulder pain (RCRSP) is the most common shoulder disorder in middle- to older-aged people. Health costs for this persistent disorder are rising and can lead to decreasing quality of life and increased care dependency. Physiotherapy is the primary treatment, and in individuals with persistent pain, a holistic biopsychosocial approach is warranted. Besides directing treatment to the shoulder, patient pain education and general health issues also need to be considered. Pain neuroscience education (PNE) is such an approach. The Otago Shoulder Health Study developed such a programme, providing patient pain education resources. This study explored the perspective of patients with persistent RCRSP of this programme of PNE integrated with pragmatic physiotherapy.

Five men and five women from Christchurch and Dunedin, aged 43–75 years, with persistent RCRSP (<3 months) underwent a three-month PNE physiotherapy programme. Individual semi-structured interviews were recorded and transcribed verbatim and analysed using the general inductive approach.

Four themes emerged: (1) ‘Patient beliefs’ related to the pathoanatomic cause of their pain and influenced their expectations of the programme. (2) Patients’ experiences were enhanced by a strong, supportive ‘rapport and relationship’ with their physiotherapist. (3) ‘Perspective and understanding of the programme’ described the diverse levels of patients’ acceptability and application of the programme. (4) Despite diverse perspectives, ‘empowerment: my shoulder into the future’ reflected reassurance, hope and decreased fear of their pain, with enhanced self-management strategies.

Most patients were able to change their pain beliefs, enhanced by an individualised treatment delivery and a strong therapeutic relationship. Discussions emanating from the provided resources allowed patients to be partners with the physiotherapists and apply new understanding of pain to their lives. Physiotherapists integrating PNE into treatment should invest time in understanding patients’ pain beliefs and embrace their role as facilitators to help patients reconceptualise persistent RCRSP and to enhance self-efficacy and confidence.

Altered architecture of the cerebellar cortex circuitry in mouse models of human spinocerebellar ataxia type 2
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Spinocerebellar ataxias (SCA) are a family of human neurodegenerative movement disorders that impair the cerebellar circuitry and results from dysfunction of the Purkinje neuron, the sole output of the cerebellar cortex. Ataxias are progressive with severe consequences, and there is no cure. SCA2 is one of many types of SCAs, but how the cerebellar circuitry is impaired in SCA2 remains unknown. Using a mouse model that recapitulates the human condition, we aimed to investigate the nature of changes to the cerebellar cortex architecture and synaptic circuitry both early and late in the disease.

In sagittal brain slices from eight- and twenty-week-old wild-type (WT) and SCA2 mice (N = 5 per group), we performed fluorescence immunohistochemistry and confocal imaging to identify Purkinje neuron shape and the location and morphology of their synaptic circuitry. Analysis used ImageJ and statistical comparison by one-way ANOVA.

Purkinje neurons from SCA2 mice displayed atrophy of their dendrites and soma in all regions of the cerebellum at both early and late stages of disease progression (P < 0.0001, ANOVA). Interestingly, we identified normal synaptic circuitry in the early stages of the disease in the anterior regions of the cerebellum, but not the posterior regions (P < 0.0001, ANOVA). At the later disease stages, we observed disrupted synaptic circuitry (P < 0.0001, ANOVA) in all cerebellar areas.

Understanding why the anterior cerebellar circuitry remains robust for longer during disease progression, or why the posterior regions are more vulnerable, could help identify and guide new approaches to effectively treat SCA2 and other SCAs.

URL:
Dr Barry Malcolm Colls
15 February 1932–10 March 2021

Barry Malcolm Colls was Auckland born and bred and studied medicine at the University of Otago in Dunedin, graduating MBChB (Otago) in 1955. After houseman roles in Napier, he was the senior registrar at Greenlane Chest Unit, before moving in 1962 to Fulham Hospital, Charing Cross Medical School, London, as senior medical registrar. He achieved his MRCAP in 1961 and MRCP in 1964 (with FRCP in 1980), and completed his postgraduate qualification as a physician. He worked as a physician in Chichester and East Anglia. Barry returned to New Zealand in 1967, taking up the role of physician and medical tutor in Christchurch Hospital. However, his appointment at Charing Cross had brought him into contact with Kenneth Bagshawe, a world-leading oncologist credited with finding the cure for choriocarcinoma. Tony Goldstein was a charismatic radiation oncologist already administering chemotherapy sporadically in Christchurch. Knowing of Barry's experience at Charing Cross, he sought Barry's assistance in administering methotrexate to patients with choriocarcinoma. This was the start of Barry working alongside his radiation oncology colleagues and steadily increasing the use of chemotherapy in more types of cancer. Quite rapidly Barry became, in his own words, 'a general physician who functioned as a cancer physician'. And the specialty of medical oncology was born in New Zealand, with Barry appointed as a Medical Oncologist at Christchurch Hospital in 1972, a forward thinking action by the management at the time.

Barry continued to work as both a hugely respected general physician and as the spearhead driving the new specialty of medical oncology locally and nationally. He developed an enduring link with the eminent, New Zealand-born UK medical oncologist Tim McElwain, who was at The Royal Marsden Hospital in London. This started a pathway for New Zealand's advanced trainees, in both medical and radiation oncology, to undergo postgraduate training in London. Many of these doctors returned to be the leaders in the then six cancer centres in New Zealand. In 1974 Barry became the chairperson of the Specialist Advisory Committee in Medical Oncology for the Royal Australasian College
of Physicians (RACP), which developed the framework for New Zealand's medical oncology service and oversaw the training of New Zealand's first-generation medical oncologists.

Not only an astute clinician, Barry was also a dedicated medical educator and from 1967 made a major contribution to the training of medical students for over 30 years, with a commitment over and above that of his contemporaries. In 1973 the University of Otago's Christchurch Clinical School took its first intake of fourth-year medical students, and Barry took up a joint appointment with the university and the hospital. He also had a leading role for over 30 years in the training of specialist physicians in medicine in Christchurch, particularly as they prepared for the FRACP clinical examinations. Barry founded the excellent record that Christchurch trainees have continued to enjoy. It was said that if you could pass a practice exam with Barry, you were likely to succeed in the real exam, and it would be much less fearsome.

Barry was outwardly sometimes gruff, but cared deeply for his patients, most of whom saw through his exterior. Barry went the extra mile, with extra medical reviews and visits, when his patients faced difficult medical situations. He also took other interests very seriously and could be seen walking in to Lancaster Park to watch cricket or rugby, in his work clothes and with his hat, newspaper and pager, and he parried vigorously with colleagues over the outcomes. He was also a very determined squash opponent.

Barry Colls has made very significant contributions, both to the practice of medicine and to the practice of medical oncology in New Zealand. He was a member of a number of committees of the Royal Australasian College of Physicians (RACP) starting in 1970, including the Committee for Physician Training from 1986 and chairing the first RACP Specialist Advisory Committee (SAC) for Medical Oncology trainees for 12 years. Ministry of Health appointments included the Pharmacology and Therapeutics Advisory Committee for 10 years, the Hospitals Advisory Committee on Radiotherapy Services and Cancer Treatment (1978–1979) and the National Advisory Committee on Cancer Services (1981–1988).

In Christchurch, as a joint university–CDHB appointment for 31 years from 1967, he was head of University of Otago Department of Medicine for six years alongside its associated roles, and served on many committees relating to teaching, courses and examinations. He was also active in the hospital, on the Physicians Executive for 16 years and as Chair of Oncology Services from 1984, and he was a member of several Canterbury Area Health Board (which became CDHB) committees. He also served on several committees for postgraduate affairs. He managed to find time to contribute to the community, serving on the executive committee of the Canterbury-West Coast Division of the Cancer Society for 10 years from 1979.

Barry Colls set the stage for the development of the specialty of medical oncology in New Zealand, participating in the first meetings of the specialty, including as co-founder of the Clinical Oncology group in 1983 and the New Zealand Society for Oncology (NZSO). He foresaw the importance of research and science alongside clinical practice, which remains the mission of the NZSO today. Barry trained junior doctors in the value of audit, and research, reviewing outcome of cancers and also safe monitoring of chemotherapy regimens, and also mentored trainees in publication of their findings. Barry Colls published 60 articles relevant to the care of patients, analysing cohorts of patients and reviewing care, and reporting on the outcome of the ‘watch policy’ for testicular cancer. He was promoting quality in healthcare before it was generally recognised.

As the first Medical Oncologist in Christchurch, starting in 1972, he established the service, and he was innovative. Working with pharmacists and nurses, he introduced safe and effective chemotherapy treatments for Canterbury patients. Thus he was responsible for cures of previously incurable malignancies, especially testicular cancers and lymphomas. He trained the first Christchurch Oncology Chemotherapy nurse, who assessed patients and also gave therapies. Radiation oncologists had been providing some palliative chemotherapy, but he extended this, offering a longer, better quality of life for many more people. A major achievement was to introduce
national surveillance for early testicular cancers, together with organised monitoring of blood tests for tumour markers, allowing many young men to avoid chemotherapy treatment, unless relapse occurred. Barry Colls started a previously non-existent clinical service, that of medical oncology, at a time when development had occurred overseas, but there was no New Zealand experience. Communications at that time were much inferior to the current time, and he used international contacts to draw down the necessary knowledge and learned how to manage previously untreatable malignant conditions. He was a lone practitioner at that time, starting a specialty that now requires more than 10 specialists in Christchurch. He had vision about the need for overseas training and had a major influence over the training of most of the current New Zealand-trained medical oncologists nationally. He was a quiet, modest achiever who saw what could be done to improve the outcome for patients with cancer in New Zealand.

He was also a general physician, and it was a challenge to fulfil both roles effectively, let alone meet his university commitments. His teaching, clinical research activities and roles on so many committees involved with training physicians, and his many CDHB committees, meant that he worked far beyond his contracted hours and had a huge role in setting the standards for medicine and medical oncology over several decades. This was recognised with the award of the Christchurch School of Medicine Gold medal for excellence in teaching in 1993, Life Membership of the New Zealand Society for Oncology in 1998 and the Royal Australasian College of Physicians Medal for outstanding service to the college in 1999.

Colleagues in medical oncology regard Barry Colls as the father of medical oncology in New Zealand and recognise his very big role in setting up the necessary training and development of what was a new specialty. Doctors who trained in Christchurch under his tutelage still comment on the importance of his input in their development as physicians and in honing their clinical skills. His highly respected medical acumen and his opinion were frequently sought by his peers for help with difficult clinical problems. Barry retired in 1995, only to continue to work in general medicine for many more years, despite having at least two retirement dinners, such that his retirement became a shared joke.

Barry was predeceased by his wife Lynne and wife Rosemary, and is survived by his partner Jan and his four children, David, Susie, Rebecca and Andrew.

Comment from the editor
I had the pleasure of working with Barry on the NZMJ editorial board for many years. He wrote for the NZMJ under the title of Methuselah (which is synonymous with longevity). In his writing, Barry demonstrated his breadth of medical knowledge and wit. He brought humanity to medical research with his understanding, exploring the impact of illness on both patients and doctors, while interpreting newly reported research in light of what had been reported before. His longitudinal understanding of medical knowledge was a reflection of his long productive life.

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URL:
www.nzma.org.nz/journal-articles/dr-barry-malcolm-colls
A Case of Malignant Endocarditis

1921

By Major G. H. ROBERTSON, M.Sc., M.B., Ch.B., Officer in Charge of Medical Division, Trentham Military Hospital.

On account of the somewhat unusual features which it presents, this case is considered worthy of being recorded. The history of the case is as follows:

Sergeant A.B., aged 52 years, three years' services overseas, admitted 1st January, 1921. Had no illness pre-war. Enteritis (mild) in Egypt, April, 1916, but went to France with his battalion in that month and carried on with full duty during the battle of the Somme (September, 1916), and was quite well up to December, 1916. About this time, the weather being very cold and damp, he began having attacks of sweating at night. These attacks were always of the same nature, a chill followed by a heavy sweat, and always occurred in the early morning. He would feel better after the sweating, would fall asleep again, and wake feeling well enough to go on duty, so that he did not report sick. At this time he was having “chills” every ten to fourteen days for the space of two months, when the weather became warmer and the attacks ceased. He remained on full duty and free from “chills” until the following winter. During the Battle of Passchendaele (October, 1917) the condition returned with much greater severity, accompanied this time by severe pains in both legs (not localised). He was evacuated to England. He stated that he was diagnosed “rheumatism and heart trouble.” He was sent to Torquay and returned to New Zealand in January, 1918. He had no attacks from the date of leaving England until June, 1918 (midwinter), when he began having chills as before. These were present without intermission from that time, June, 1918, up to the date of admission to hospital, January, 1921 (2 ½ years). At first every ten to fourteen days they increased in frequency until during six months before admission they were as frequent as three every week. They were of the same nature throughout. During the day he would feel restless, complaining of headache, of feeling hot and thirsty. In the early morning he would wake up very cold, would shiver, and then become very hot, with heavy sweating. After the attack he would fall asleep and wake feeling relieved and able to go to his work, which was of a moderately heavy and exacting nature. He worked up to within a fortnight of his admission to hospital. During the last year his weight fell from 16 to 14 stone, but at the same time he noticed increasing distension of his abdomen. There had been no cough. His appetite was good; there was no vomiting or other gastric disturbance; there had been obstinate constipation. There had been no urinary disturbance. Not long before admission he noted a tenderness below the left rib margin, and found that this prevented him from lying on that side. He had been trouble with pain and tenderness in both calves and with occasional swelling of both ankles. Careful questioning failed to elicit any further symptoms.

Condition on Examination.—Patient showed average development with no sign of emaciation. The abdomen was greatly distended. There was relative wasting of all muscles of the left leg (patient was unaware of this). Both feet were clawed, the left more than the right. The faeces was mildly suggestive of a septic condition. There were no petechial haemorrhages of the skin. The fingers did not show any clubbing. The temperature was 99.8deg., pulse rate 88. Sensation, epicritic and protopathic, was normal over trunk and limbs. There was no spasticity. Reflexes; definite extensor response left big toe, variable extensor right big toe; no ankle clonus, no knee clonus. Knee jerks normal and equal on both sides; abdominal reflexes indefinite. Pupils reacted sluggishly; there was no nystagmus. Examination of the lungs
HEART: A CASE OF MALIGNANT ENDOCARDITIS.

Spleen: A Case of Malignant Endocarditis.
revealed no abnormality. Examination of the heart: no cardiac enlargement could be made out, rate and rhythm were normal, the first sound was obscured in all areas, a marked systolic murmur was heard in the second and third interspaces at the left border of the sternum; the second sound in this area was indefinite and no decision as to its precise nature was made. The brachial and radial arteries were felt to be somewhat thickened. Readings of blood pressure were not taken. The abdomen was distended, making examination difficult. There was tenderness and increased resistance in the left hypochondrium, but it was not possible to determine enlargement of the spleen. The liver was enlarged to one and a-half inches below right costal margin; the enlargement appeared to be regular. There was no free fluid in the abdominal cavity. Rectal examination revealed no abnormality. Examination of the urine showed a trace of albumin, no other abnormality. Subsequent daily specimens showed uniformly small quantities of albumin and a few pus cells; urine was acid. Blood counts showed both red and white cells reduced in number, red cells 4 ½ millions per cubic m.m., haemoglobin 85 per cent., white cells 4600 per cubic m.m., polymorphs 66 per cent., small lymphocytes 22 per cent., large lymphocytes 7 per cent. Diagnosis was deferred.

Chart of a Case of Malignant Endocarditis.
The subsequent history of the case was as follows:— January 1st—Admitted. January 3rd—in the early morning patient had an attack exactly of the type described by him; the temperature rose to 100.6deg. at 4 a.m.; temperature 98.6deg. at 9 a.m. January 6th—A similar attack; temperature 100.8deg. at 4 a.m., temperature 98.6deg. at 9 a.m. In each case the patient's general appearance was improved on the morning follow the attack. January 8th—A more severe attack; temperature 103deg. At 4 a.m., temperature 98.4deg. at 9 a.m. Repeated examinations of blood films showed absence of malaria parasites. The blood serum did not agglutinate bacilli of the typhoid and paratyphoid groups. Complement fixation test for syphilis was “indefinite owing to the amount of anti-complement present” (Mr. Hurley). January 9th—At 4 a.m., as before, a severe rigor; temperature 103.6deg., pulse 98; no fall of temperature after this rigor. Careful examination of the lungs showed no sign of pulmonary involvement; the resonance at the bases was not impaired, the line of resonances moved normally to deep inspiration and deep expiration. Blood examinations showed leucopænia still present. No malaria parasites detected in films taken during rigor. January 10th—Morning temperature 104.8deg. at 9 a.m., pulse 104, respiration 34. Heavy doses of quinine, up to 15gr. four-hourly, had given no relief to the condition, and malaria was finally excluded. Enemata and other appropriate measures had been only moderately successful in reducing abdominal distension, but enabled a large and somewhat tender spleen to be made out. A diagnosis of malignant endocarditis was made. (This was confirmed in consultation with Lieut.-Col. D. E. Fenwick.) The patient was now becoming more ill, but no new physical signs could be made out. Up to this date patient had complained of no symptoms whatever except as regards the distention of his abdomen and the tenderness below the left rib margin. January 11th—Temperature 99.8deg., pulse 92, respiration 24 at 9 a.m. Breathing was accompanied by fine expiratory crackles; on auscultation these were heard widespread over both lungs. During the forenoon there occurred an acute attack of respiratory embarrassment with cyanosis. This soon passed off; no pain was complained of during the attack. Examination two or three hours later revealed consolidation of right middle and lower lobes, with bronchial breathing, bronchophony, etc. Temperature 103deg., pulse 104, respiration 28. Patient showed no symptoms of pneumonia, was quite comfortable, in no pain, breathing was regular and deep, no cough, no sputum; there was very little cyanosis. Patient was examined by the Radiologist (Major D. F. Myers), who reported on the screen appearances as follows: “Right lower and middle lobes are less transradiant than normal, suggesting pneumonia. No definite cardiac enlargement can be detected. The diaphragmatic cupolæ appear normal in contour.” January 12th—Patient in status quo, comfortable, with the same signs of lung consolidation and with the same absence of symptoms. January 13th—Patient was very restless during the night, collapsed in the early morning, and died at 11.25 a.m. from respiratory failure.

The follow report on blood cultures taken early during he stay in hospital was received from Captain D. C. Low, too late to assist in either diagnosis or treatment:—“In first culture gram positive cocci and gram negative bacilli were isolated. In subcultures a growth of gram positive cocci only could be obtained. These resembled staphylococcus aureum.”

Owing the circumstances, only a very limited autopsy could be undertaken, but sufficient, however, to obtain the following findings:—Appearance of right lower and middle lobes of lungs that of lobar pneumonia in the stage of red hepatisation. Right upper lobe and left lung not abnormal to naked eye examination. Heart in position of systole, muscle of left ventricular wall much more developed than that of the right ventricle, aortic valves thickened and showing numerous vegetations, other valves normal to naked eye appearances. No apparent disease of the aorta. Liver greatly enlarged, no irregularity of surface, no sign of infarct; liver tissue is paler and more friable than usual. Spleen much enlarged, well-marked infarct at lower pole. Small intestines distended with gas. Left kidney does not show any infarct, but some pus present in the pelvis of the kidney. This was as far as the post mortem was carried, but it served to confirm the diagnosis of malignant
endocarditis, the aortic valve alone being infected. In the illustrations the irregular outline of the aortic cusps (which are distended with cotton wool) is well shown; also the relative thickening of the left ventricular wall. The infarct in the spleen is also shown.

This case presents may departures from the text-book description of malignant endocarditis. In this case the duration of the disease was at least four years. Osler (1918 edition) refers to the duration of chronic infective endocarditis as a matter of months—“six, eight, ten, even thirteen”—and Price (“Diseases of the Heart," 1918) similarly states, “according to some, even eighteen months of longer.”

This case conforms more to the septic or pyæmic type of the disease than to the type recently described as subacute bacterial endocarditis with its typical clubbing of the fingers and skin petechiae, both absent in this instance.

Most observers describe a leucocytosis in infective endocarditis (“10 to 20 thousand per cubic m.m.”—Price), but in this case there was a leucopenia present during the whole of the time that the patient was under observation. This increased the difficulty of excluding malaria. The leucopenia may be due to the fact that there is a fair presumption that the infecting organism was a gram negative bacillus; does this explain also the comparative chronicity? Or it may be that by the time the patient came under observation an initial leucocytosis had been converted, by the exhaustion of the defensive mechanisms of the patient, into a leucopenia. It is a remarkable fact that for the space of two and a-half years the patient, although he was having constantly recurring chills, was able to continue his usual work. He did not report until within four weeks of his death. Osler mentions that “the patient may keep at work for months with a daily rise of temperature, or perhaps an occasional sweat,” but this patient was having up to three sweats a week. When it occurred, the terminal lung condition was thought to be due to pulmonary embolism, but it now appears to have been a lobar pneumonia, the absence of obvious reaction on the part of the patient being due to a breaking down of those processes whereby the normal organism resists the invasion of disease. The evidence of old injury to the pyramidal tract (left side) is interesting and may date back to the attack in October, 1917, and have been caused by an embolus in the cortex or capsule of the right side of the cerebrum.

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