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Inadequate resourcing for clinical science in New Zealand

A Mark Richards

Biomedical research underpins first-world medical education and clinical services. It is a key factor in sustaining high standards of healthcare capacity and competency. Despite plentiful talent among local researchers, New Zealand has historically and severely underfunded this sector of its healthcare system and its economy. This reduces the ability to sustain international standards of medical education and healthcare in New Zealand. Recruitment and retention of the best clinical staff and biomedical academic staff is compromised, and New Zealand's ability to contribute and compete in biomedical discovery and applications—an important sector in modern first-world economies—is impaired. Planned restructuring of biomedical research funding in New Zealand promises upcoming disruption of this already inadequately supported part of our national endeavour/economy—without any sign that funding will be increased.

Investigating the association between experiencing discrimination in healthcare settings and avoidance of healthcare services among Pacific Rainbow+ in Aotearoa New Zealand

Patrick Thomsen, Kyle Tan, Phylesha Brown-Acton, Sam Manuela, Dion Enari, Sisikula Sisifa, Sarah McLean-Orsborn, Roannie Ng Shiu, Zerlina Wong

Our research illuminates the connection between experiencing discrimination and the likelihood of avoiding healthcare services among Aotearoa New Zealand's Pacific Rainbow+ community. Drawing data from the Manalagi Survey, which surveyed over 480 Pacific Rainbow+ individuals in the country, our statistical analyses found that experiencing a single incident of discrimination, as reported by respondents, increased their likelihood of avoiding future healthcare services by 60%. This is concerning as we know that both Pacific and Rainbow+ individuals are likely to have more challenges to their overall health and wellbeing than non-Māori, non-Pacific and straight, cisgender New Zealanders. Avoidance of healthcare services as a result of discrimination must be addressed in our healthcare system.

Scoping the vape retail environment and retailers' responses to vape control measures in selected Auckland suburbs with different levels of socio-economic deprivation

Robin van der Sanden, Chris Wilkins, Marta Rychert, Jude Ball, Janet Hoek, Penelope Truman, Geoff Kira, El-Shadan Tautolo

This paper examines the attributes and location of registered specialist vape retailers (SVRs), focussing on “store-within-a-store” (SWAS) outlets, which have emerged among convenience stores, petrol stations and some liquor stores as a response to these regulations. Our paper uses a Google Maps and Street View scoping methodology to assess SVR distance from sensitive locations (educational institutes and marae), as well as grouping vape stores by type (upmarket, budget, SWAS). We apply this scoping methodology across a wide range of Auckland suburbs with different socio-economic and demographic attributes to consider differences in vape retail environment. Our results show that SWAS retail is concentrated in suburbs with higher levels of socio-economic deprivation and in residential areas as opposed to commercial centres. These attributes may mean this type of retail plays a considerable role in undermining efforts to curb vape product exposure among youth, particularly in areas already facing greater health inequities.

“The welfare system is a necessity for us”: providers’ perspectives on the barriers to accessing welfare support for people living with work-limiting conditions and disability in Aotearoa New Zealand

Lynley Uerata, Amy Jones, Polly Atatoa Carr, Jade Tamatea, Nina Scott, Ross Lawrenson

Many Māori with long-term health conditions often come to hospital with serious social problems, such as not having enough food, heating or stable housing, or not getting the income support they are entitled to. The research team spoke to people working in different health settings who said that Māori often struggled to get clear information and support from the welfare system. Because the health and welfare systems are complicated, hard to access and not set up to promote fairness, many Māori patients were on the wrong type of welfare support. Others stopped trying to get help because the process was too difficult, and those who needed the most support often found it even harder. Healthcare providers don’t have enough funding, staff or resources to help patients get welfare support, so to fix this, health, welfare and other sectors need to work together in a more coordinated and fair way.

Physician burnout in ophthalmology: a New Zealand survey

Theodore A Sutedja, Verona E Botha, Elizabeth A Insull

This study surveyed New Zealand ophthalmologists to understand how common burnout is and what contributes to it. We found that one in five ophthalmologists are currently experiencing burnout, with rates highest among those working in public hospitals. Burnout was strongly linked to workplace pressures, such as heavy workloads, limited control over schedules and administrative demands, rather than personal factors like age or gender. Many ophthalmologists (63%) had experienced burnout at some point in their careers but often did not seek help due to lack of time, stigma or difficulty accessing support. These findings highlight the need for health system changes to reduce pressure on clinicians and better support their wellbeing.

A snapshot of families engaged with Whānau Ora services in Aotearoa New Zealand: a retrospective cross-sectional study

Logan Fitzpatrick, John Sluyter, Jesse Kokaua, Tamasin Taylor, Teinatangi Ringi, Roannie Ng Shiu, Trevor Guttenbeil, Yvonne Sinclair, Sam Pilisi, John Huakau, Debra Sorensen, Collin Tukuitonga

Pasifika Futures Ltd, as a Whānau Ora commissioning agency, was part of the New Zealand government-funded Whānau Ora programme that was active between 2014 and 2025 in supporting Pacific families across New Zealand in improving health, education, housing and employment outcomes. This study assessed wellbeing outcomes of 11,999 Pacific families engaged in Whānau Ora services across New Zealand over 8 years of this period (July 2015 to June 2023) to identify the socio-demographic groups with the highest needs. A measurement instrument called the Measurement Assessment Scoring Tool (MAST) was used to score family wellbeing holistically across multiple outcomes, with a higher score indicating lower wellbeing and higher level of need. For the results, needs were highest in non-English speaking families, larger family households, younger families and families in Northland and Auckland. In conclusion, this large, national study has identified socio-demographic factors associated with more needs in Pacific families, which can be used to create targeted interventions to drive improvements in wellbeing.

Balancing rights and governance: comparative analysis of open disclosure frameworks in Australia and New Zealand

Dylan A Mordaunt

This paper looks at how Australia and New Zealand handle “open disclosure”, which means being open

and honest with patients and their families when something goes wrong in healthcare. In Australia, open disclosure is built into hospital quality and safety standards, encouraging hospitals to learn from mistakes and improve the system, but this can be applied unevenly between places. In New Zealand, open disclosure is a patient right backed by law, which gives strong protections and clear rules but can turn the process into a legal or tick-box exercise rather than a genuine conversation. The paper argues that the best approach would combine both: strong legal rights for patients alongside a system that also focusses on learning, cultural safety (especially for Māori) and better support for staff and organisations to improve care after harm occurs.

Maintaining patient trust as artificial intelligence's role in healthcare grows

Rosie Dobson, Melanie Stowell, Robyn Whittaker

Patient trust is key to the delivery of healthcare and for the benefits of artificial intelligence (AI) in health to be realised. Patients want to be able to trust the health system and health services to respect, protect and use their data responsibly, and when integrating AI within health services, patients want to be able to trust that this is done with good governance to ensure equitable and safe care. Through transparency and good AI governance, trust can be built and maintained, but if broken or lost, it will be difficult to repair and will have wider implications. This paper provides recommendations for actions to be taken to build and maintain trust in health institutions within the context of the evolving AI landscape.

Is a clinician-researcher career viable in New Zealand?

Mark J Bolland, Andrew Grey

Recently, the Health Research Council of New Zealand (HRC) announced that they would prioritise research funding for 2026 Project Grant applications that enhanced the development of clinician-researchers. In this article, we argue that a clinician-researcher career is not currently viable in New Zealand. This is because of the combination of university job structures giving insufficient time for research, the lack of alternative options for long-term sustainable research salary funding, the low success rates for HRC research grant and scholarship funding applications, the low repeated success rates for HRC grants and programmes and the lack of increases in research funding for more than 15 years despite large increases in wage and research expense costs.

Cerebral venous sinus thrombosis secondary to otomastoiditis: an unusual presentation

Denise A Gomes, Guilherme S Cabral, Rafael D Almeida, Bruno F B B Abreu, Marcelo Q P Silva, Márcio L Duarte

This report describes a 44-year-old man who developed a serious complication from an ear and mastoid infection, in which a blood clot formed inside one of the large veins that drain blood from the brain. This condition, called cerebral venous sinus thrombosis, can cause headaches, confusion, trouble walking and problems with speech or hearing, as happened in this case. Magnetic resonance imaging scans and a special type of imaging that looks at the brain's veins were essential to making the diagnosis. The patient was treated with antibiotics to control the infection and blood thinners to help dissolve the clot, leading to improvement in his mental state and ability to walk. This case highlights the importance of recognising that ear infections can sometimes spread deeper and cause dangerous complications inside the skull.

Grim findings: when the Reaper haunts the radiograph

Stephen Rowlands

This paper shows an incidental finding of a Grim Reaper image within a radiograph of a patient. This has no clinical impact but highlights the fact that humans often see familiar objects within complex images.

First-in-New Zealand RAMIO: launching a robotic oesophago-gastric surgery programme in a general surgical unit

James Z Jin, Yazmin Johari, Michael Rodgers, Suheelan Kulasegaran

This report describes the first use of robotic-assisted keyhole surgery to remove oesophageal cancer in New Zealand's public health system. The procedure was successfully performed on an elderly patient after chemotherapy, with a good recovery, no major surgical complications, and effective cancer removal. Using robotic technology allowed surgeons to see and work more precisely in a difficult part of the body, which can be especially helpful in complex cases or patients with higher body weight. The programme was carefully introduced in stages, building on existing experience with minimally invasive surgery and supported by specialised training, teamwork and strict safety monitoring. This technology represents a strategic investment, advancing patient outcomes and surgical precision while establishing a credible foundation for safe, high-quality robotic surgery in New Zealand's public hospital system.

Inadequate resourcing for clinical science in New Zealand

A Mark Richards

Clinician-scientist researchers provide an essential link between laboratory-based fundamental discoveries and their translation to meaningful advances in the clinic. Without adequate support for both basic and applied biomedical research both will fail in the overarching aim of improving the nation's health.

In the article entitled: "Is a clinician-researcher career viable in NZ?" the authors argue "*that a clinician-researcher career involving publicly funded, investigator-led clinical research with meaningful end points to inform clinical care is currently not sustainable in New Zealand.*"¹

The writers are two highly credible and typical exemplars of New Zealand academic clinician-scientists having conducted clinical research alongside clinical roles for over 20 years. They have been salaried via their university appointments and external funding (fellowships, scholarships). They have been competitive in winning numerous grants. Their peer-reviewed published output ranks within the top echelons of clinician-scientists anywhere in the world. The authors outline why, in 2026, the career trajectory they have travelled in earlier decades seems no longer possible in New Zealand. The typical job structure for full-time clinician-scientists in New Zealand comprises a half-time clinical commitment, leaving the other half time, usually as a university appointee, split between teaching, service and research, typically allowing a scant 8 hours/week for research.

Eight hours per week is insufficient to obtain in-depth background (national and international) knowledge of a clinical research domain; define key unmet needs; design research; complete application processes for funding (with a less than 10% overall chance of success for funding)—then (if, against the odds, funding is acquired) obtain ethics and assorted other institutional approvals; set up infrastructure (hires, equipment, procedures) and conduct the research; analyse data and publish in well-respected peer-reviewed periodical(s) and, finally, facilitate implementation of the findings to improve clinical care and outcomes. There is no suggestion here that resourcing of research should not be competitive. However,

as the authors demonstrate, the attrition of time and money available in New Zealand to conduct research, through all the necessary phases, has now become so severe that it cannot sustain many excellent proposals that would be avidly approved and well supported in other Organisation for Economic Co-operation and Development (OECD) countries. Thus, New Zealand is inexorably moving towards irrelevance in the world of biomedical science, a key domain for maintaining and advancing modern societies, replete with societal and economic needs and opportunities.

The authors provide cogent analysis of the ongoing shrinking of resources provided by the only large funder of biomedical grants in New Zealand, the Health Research Council (HRC). The success rate of applications for HRC projects and programmes is less than 10%, and the real value of these grants has fallen profoundly over the last two decades. The funding available for a project grant has not changed in the more than 15 years since 2010, despite the increase in salaries of 75% and the consumer price index by 45%.

The overhead costs imposed upon HRC grants comprise 40% or more of the overall budget. For The University of Auckland and the University of Otago, overheads are budgeted at more than 100% of salaries included in the application. The justification for this level of overhead is far from transparent. Overhead funding rates are calculated according to different models between countries. However, overheads in New Zealand are high. The authors state: "*Australian universities typically use rates of 20–35%, United Kingdom funders will fund 80% of the full cost of the research expecting the university to fund the remaining 20%, and in the United States of America rates vary widely but typically are in the range of 30–70%.*"¹ Overheads, as currently calculated and imposed, clearly disadvantage New Zealand researchers. If a grant is won, a large proportion of it is removed from resourcing the research involved and redirected to overheads/salaries that universities are obliged to fund anyway.²

The parlous state of biomedical research funding in New Zealand is not new. Well-informed authors

have reported upon it repeatedly over the first 26 years of the current century. In 2000, Richards documented the rapid reduction of real grant numbers and value following introduction of “full cost recovery” policies for HRC grants.³ In 2008, senior officers of The University of Auckland and the University of Otago reported to these institutions documenting static funding levels for the HRC over the previous several years which, due to high inflation in research costs, had resulted in a one-third decrease in the quantum of research funded over that time: “*This contrasted markedly with the patterns of health research investment in Australia and the United Kingdom, where there had been a long-term commitment to annual funding increases which had resulted in progressive growth of medical research activity in those countries. As a result, New Zealand’s per capita funding levels were only a fraction of those in the countries with whom we compete for staff to run our hospitals and medical schools.*”⁴

Six years later an extended array of credible senior university officers from both our major research-based universities updated their review of research funding: “*From 2009 to the present funds for direct funding of research through the Health Research Council (HRC) have remained static at \$54m. As a result of inflation of research costs (principally salaries) this represents a decrease of approximately one-quarter in the quantum of research funded by the HRC over the last 4 years. Current funding rates in the comparator countries, population-adjusted and converted to NZ\$, are 3.4-fold higher in Australia, 4.5-fold higher in the United Kingdom and 9.7-fold higher in the United States.*”⁵ The current report indicates that in 2026 the situation has not improved.¹

The variation in funding of research, including biomedical research, within small first-world nations is starkly illustrated when New Zealand is compared to Singapore. Both are relatively affluent countries with a similar population size but one, (the “Switzerland” of Asia) has invested heavily and increasingly in its research and innovation sector as seen in Figure 1 summarising such investment by the government of Singapore since 1991. The key messages include:

1. Singapore has invested ongoing increases in overall funding amounting to a more than six-fold increase in dollar funding between 2001 and 2026.
2. A grand total of S\$37 billion dollars is budgeted for 2026–2030 (S\$~1.3xNZ\$), i.e.,

about S\$7.4 billion (at least NZ\$9.6 billion) per year.

3. There is clear allocation of funds towards expanding research and strengthening core capabilities, and some funds are specifically allocated to developing talent.⁶

Meanwhile in its 2026 budget statement, the New Zealand Government outlines fiscal restraint directing existing levels of funding to structural reforms **rather than increasing the overall research and development budget.**

The Singapore equivalent of New Zealand’s HRC is the National Medical Research Council (NMRC), which dispenses over S\$600 million in funds per annum, in contrast to the New Zealand HRC at about NZ\$120 million. The NMRC funding portfolio includes institutional capacity building grants (Centre Grants) of up to S\$20 million over 5 years, Large Collaborative Translational Grants of up to S\$25 million over 5 years and a large number of individual 3-year project grants at about S\$1.5–3 million each. These grants generally provide overheads (typically 25% of the overall grant budget) added onto, rather than subtracted from, the direct budget for research. The largest grant the HRC funds is a Programme Grant at NZ\$5 million over 5 years. Singapore also provides biomedical research funding from multiple sources beyond the NMRC, including funds managed by their ministry of education—plus a range of other institutions—which, in aggregate, more than double the public contestable biomedical research dollars beyond those managed by the NMRC. In contrast, in New Zealand, the HRC is the only sizable funder dedicated to this domain.

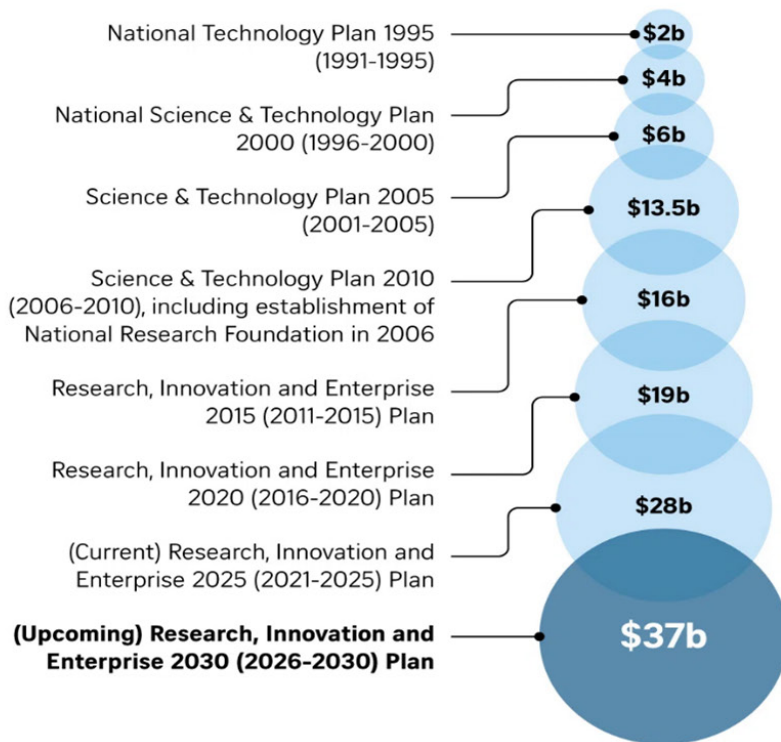
Why does all this matter? Why not simply import biomedical research New Zealand can use from elsewhere? The reasons are manifold and compelling.

As Reid et al. stated in 2014, “*Many doctors expect to remain research active as part of their clinical duties, and universities require research activity of their academic staff. As a result, opportunities to undertake research and its resourcing are key requirements for the staffing of our hospitals, general practices and medical schools.*”⁵ The relative impoverishment of research funding is therefore “*a major challenge to the recruitment and retention of clinical and academic staff in our hospitals and universities*” because New Zealand cannot currently be seen as a favourable place to pursue an academic research-based career in biomedicine.⁵ Adequate public contestable funding for biomedical

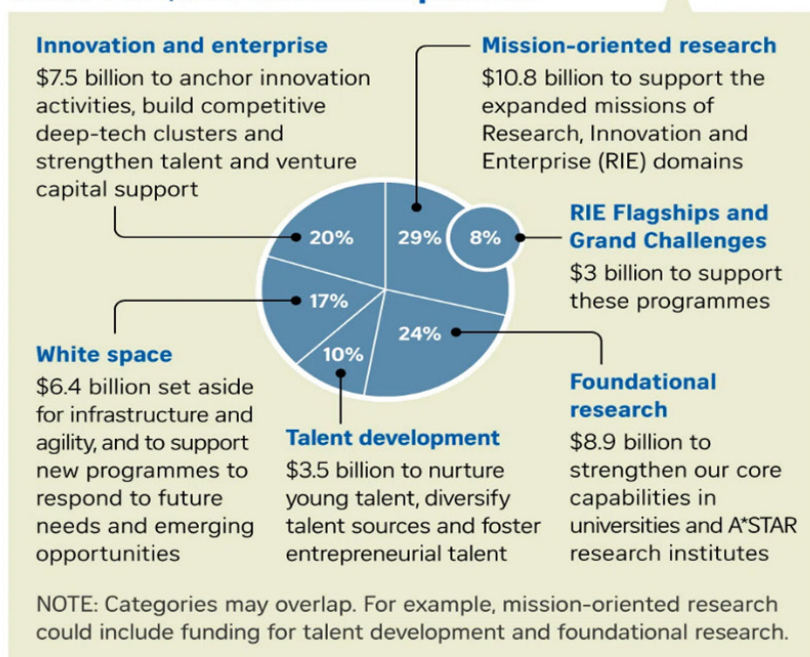
Figure 1: Singapore government-driven research, innovation and enterprise since 1991.

Govt-driven research, innovation and enterprise since 1991

Singapore commits to investing about 1% of GDP in 2026-2030 plan.



What the \$37b would be spent on



SOURCE: NATIONAL RESEARCH FOUNDATION
STRAITS TIMES GRAPHICS

research is necessary if the biomedical academic and clinical-workforce is to retain excellence and competence comparable to Australia, the United Kingdom, the nations of western Europe, Canada and the Scandinavian countries. New Zealand researchers—knowledgeable of New Zealand's unique epidemiologies and key unmet needs—linked to and competitive with work performed elsewhere can best promote continuous informed streamlining and upgrading of national healthcare staff, equipment and procedures. Inadequate resourcing leads to attrition of talent, recruitment by default of people who do not expect to be able to undertake cutting edge research and steady degradation of the academic biomedical research workforce.

New Zealand has long proved it can produce top-echelon research talent, and this should be seen as a national asset to be developed and retained rather than neglected and lost because our people can find better opportunities overseas. Rutherford, Wilkins, Liley, Barrat-Boyes, Liggins and a long series of others demonstrate New Zealand has produced researchers contributing to the greatest and most revolutionary discoveries of the twentieth century. Even now, in the author's own sphere of activity, New Zealanders exert influence worldwide—optimisation of biomarkers in managing acute coronary disease as pioneered in New Zealand has heavily influenced procedures in emergency departments globally. Likewise, the advice of New Zealand researchers is valued. Clinician-scientists of the Christchurch Heart Institute are consulted frequently by the major international pharmaceutical companies, international diagnostics corporates, start-up entities and investment houses on the biology and clinical applicability of cardiac natriuretic peptides and their analogues, the potential of urocortin analogues in treatment of heart failure and on many other aspects of the neurohumoral control of heart and vasculature—reflecting the institute's decades of internationally recognised contributions in these domains. The same is true for other New Zealand experts steeped in the research of a number of biomedical domains. New Zealand must sustain a pool of people who can contribute to, understand, apply and optimise either local or imported discoveries to our country's needs. A competent, adequately resourced research workforce will underpin start-ups needed to make New Zealand competitive in the biotech and biodiscovery worlds, generating new healthcare strategies, new diagnostic tests, new

medical devices and new pharmaceuticals.

This is all well appreciated and well illustrated by Singapore. In 1990 New Zealand and Singapore had GDPs of about US\$45 billion and US\$36 billion respectively. By the late 1990s Singapore had launched a programme of heavy investment in the life sciences, which has been expanded dramatically at 5-year intervals ever since (see Figure 1). More recently, New Zealand's GDP grew 5.2% (from US\$250 billion to US\$263 billion) from 2021 to 2025, while in Singapore GDP increased by 32% (from US\$435 billion to US\$574 billion—now more than double New Zealand's GDP) over the same interval. The biomedical sector is listed as one of the key drivers for Singapore's remarkable increment in national productivity.

The lack of attention to biomedical research capacity and translation to clinical and economic outputs in New Zealand reflects the small numbers of researchers and the generally self-effacing, low profile of this sector on the public stage, and the therefore lack of electoral leverage. The political community is focussed upon a 3-year electoral cycle and issues at front of mind for large proportions of New Zealanders—especially cost of living and the provision of healthcare (rather than biomedical research)—and presently politicians suffer no immediate downside by largely ignoring the health research sector.

The solution is to invest competitively in the sector. However, this long-term ongoing need is happening in a time of major turmoil for New Zealand research infrastructure. The Science System Advisory Group (SSAG) was established by the Ministry of Business, Innovation and Employment—Hikina Whakatutuki (MBIE) in March 2024 to advise the government on strengthening the science, innovation and technology system.⁷ Changes announced in October 2025 include disestablishment of the key entities currently providing contestable funding for biomedical research: the Marsden and Endeavour funds, components of the Strategic Science Investment Fund (SCIF) and the HRC.⁸ These changes are proposed without any interim increase in overall funding. The planned merging of funds in a new single New Zealand Research Fund (NZRF) is likely to be attended by delays and administrative missteps perhaps extending over some years until the new system is fully established. During this time the consequences of inadequate funding can only worsen. The best course would be to accompany the restructuring with a rapid boost in resourcing to match or exceed OECD averages as a

percent of national GDP. As the SSAG report states: *“Most European democracies and the Eastern ‘tiger economies’ have set GDP targets of about 3% research intensity, 1% from governmental sources and 2% from the private sector ... The 2024 Statistics New Zealand Research and Development Survey data suggests that the Crown spends 0.57% of GDP*

*on R&D and the private sector spends 0.97% of GDP, for an overall research intensity of 1.54% of GDP.”*⁷

The New Zealand biomedical research community needs to make its case more compelling to both the general public and the relevant public and private decision-makers and purse-string holders in both education and health.

COMPETING INTERESTS

Nil.

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Investigating the association between experiencing discrimination in healthcare settings and avoidance of healthcare services among Pacific Rainbow+ in Aotearoa New Zealand

Patrick Thomsen, Kyle Tan, Phylesha Brown-Acton, Sam Manuela, Dion Enari, Sisikula Sisifa, Sarah McLean-Orsborn, Roannie Ng Shiu, Zerlina Wong

ABSTRACT

AIM: This study aims to investigate the relationship between experiences of discrimination (ethnic/race-based, gender and sexuality-based discrimination) in a healthcare setting, and healthcare services avoidance in Pacific Rainbow+ in Aotearoa New Zealand.

METHODS: This study draws from a sample of Pacific Rainbow+ (Pacific cisgender sexuality minorities [n=239] and Pacific transgender and non-binary [n=126]) individuals taken from the Manalagi Survey. Multivariate logistic regression analyses were performed to test for a relationship between predictors based on respondent self-reported experiences, within a healthcare setting in Aotearoa New Zealand, of discrimination (race/ethnic discrimination or racism, sexuality and/or gender diversity—homophobia/transphobia and heterosexism) and outcome variables (avoiding healthcare and mental health services).

RESULTS: Discrimination based on ethnicity/race was more highly reported by both cisgender sexuality minorities and the transgender and non-binary groups in our sample, with this typology of discrimination also associated with increased odds of healthcare services avoidance. Discrimination based on race/ethnicity was further associated with increased likelihood of mental health service usage. On average, cisgender sexuality-diverse respondents reported 1.15 instances of listed forms of discrimination, and this nearly doubled for transgender and non-binary respondents. Notably, when the overall number of discriminatory exposures increased by a single point, respondents had an approximate 60% odds ratio (OR) of healthcare avoidance.

CONCLUSION: This study affirms findings of much research that describe discrimination (multiple forms) as a common experience for Rainbow+ individuals while seeking out healthcare services. Further, it reveals that these experiences have a predictive impact on the likelihood of Pacific Rainbow+ avoiding healthcare services. While this study's cross-sectional nature limits the ability to infer causality, these findings do underscore the importance of undertaking more intersectional research into the drivers and inhibitors of healthcare-seeking behaviours and healthcare service usage of Pacific Rainbow+ in Aotearoa New Zealand.

Pacific peoples are estimated to make up 8.9% of the Aotearoa New Zealand population.¹ While Pacific peoples are an integral part of New Zealand society, alongside Māori, they consistently experience poorer health and well-being outcomes than other ethnic groups such as Pākehā (New Zealand European) and Asian New Zealanders.² Much research identifies multiple factors underpinning persistent disparities in health and wellbeing among Pacific peoples and Māori in Aotearoa New Zealand, with both structural and interpersonal racism predicting adverse outcomes, which negatively impact healthcare service use.^{3,4}

Discrimination (in multiple forms) negatively impacts health outcomes and healthcare avoidance

among different minority groups.⁵⁻⁷ Rainbow+, an inclusive term used in Aotearoa New Zealand to encompass gender- and sexuality-diverse individuals who identify as, or a combination of, (L)esbian, (G)ay, (B)isexual, (T)ransgender, (Q)ueer, (I)ntersex, (A)sexual, and in the Pacific context (M)āhū, (V)akasalewalewa, (P)alopa, (F)a'afafine/fa'atama, (A)kavaine, (F)akafifine, (F)akaleiti/leiti (LGBTQIA+ MVPFAFF+) consistently experience multiple forms of discrimination in schools, workplaces, places of worship, at home and when seeking healthcare services.⁸⁻¹² Experiencing overt and subtle forms of discrimination (specifically homophobia/transphobia and heterosexism) has negative impacts on the health and healthcare-seeking behaviours of Rainbow+ individuals.¹³⁻¹⁵

In Aotearoa New Zealand, one in 10 Rainbow+ young people (14–26 years old) reported they had been treated unfairly by a healthcare professional because of their Rainbow+ identity, with gender-diverse Rainbow+ young people reporting a rate 3.5 times higher than cisgender sexuality-diverse respondents.⁸ For gender-diverse Rainbow+ individuals, data from Counting Ourselves report over a third of respondents (36%) avoided seeking out healthcare services due to worry about disrespect or mistreatment as a gender-diverse (transgender or non-binary) person.¹² Furthermore, Pacific Rainbow+ youth who completed the Youth 19 survey were more likely to forego healthcare than their Pākehā counterparts,¹⁰ and nearly half of gender-diverse youth who completed the Identify survey reported facing difficulties in accessing healthcare services.⁸ Sixty percent of Pacific Rainbow+ individuals that completed the Manalagi Survey indicated they had experienced discrimination in a healthcare setting in Aotearoa New Zealand, with discrimination associated with race or ethnicity (racism) more highly reported than discrimination associated with their Rainbow+ identity.¹⁶

International literature demonstrates how gender-diverse individuals avoid healthcare due to perceived discrimination, seek medication without doctor's supervision, find it difficult to access relevant medications or do not disclose their identity to their doctors.^{17–19} In the United States, some Rainbow+ individuals avoid healthcare due to anticipated discrimination related to their gender identity.²⁰ This pattern of avoidance is also highlighted in studies that investigate healthcare interactions experienced by gender-diverse individuals, where such negative interactions compel them to avoid seeking healthcare altogether.²¹ This avoidance leads to delays in necessary care and can have adverse outcomes for patients and families.²² The mental health of Rainbow+ people, in places like North Macedonia as an example, is hindered by societal stigmatisation and discrimination, which exacerbates barriers to accessing mental health services.²³

Considering local and global research findings highlighting the negative impact discrimination has on Rainbow+ health outcomes and healthcare-seeking behaviours, and given that local research shows that both Pacific and Rainbow+ individuals in Aotearoa New Zealand may experience discrimination in healthcare settings, we hypothesise an association between reported experiences of discrimination in healthcare settings and health-

care avoidance. In that, higher levels of reported discrimination experienced in healthcare settings by Pacific Rainbow+ individuals in Aotearoa New Zealand are likely to be associated with healthcare service avoidance.

Methods

The Manalagi Survey instrument

Data used to test our hypothesis are derived from the Manalagi Survey.¹⁶ The Manalagi Survey design, research procedure and associated documents were reviewed and given ethical approval by the Southern Health and Disability Ethics Committee under approval number 2021 EXP 10986. The Manalagi Survey—structured around pillars of Pacific wellbeing (family as foundation, physical health, mental health, spiritual health, other identity factors, with culture as the roof engaging with context, time and space) articulated in the Fonofale Model of Pacific Wellbeing²⁴—was co-designed with Pacific Rainbow+ individuals across Aotearoa New Zealand through 11 community consultation meetings held in eight cities.^{16,25,26} The survey was administered online and was available for Pacific Rainbow+ individuals and allies to complete from February 2022 to August 2022. Those who indicated that they were allies were branched to a separate survey for friends, family and allies. Criteria for inclusion in the Manalagi Pacific Rainbow+ sample required respondents to be able to give informed consent, be at least 15 years of age, be a resident in Aotearoa New Zealand at the time, and identify as both a Pacific person and as sexuality- or gender-diverse.

Participants

The survey collected 757 preliminary responses. The final sample for this study comprised 396 respondents after excluding those who did not complete beyond the demographic section ($n=91$); did not indicate their sexual or gender identity ($n=7$); identified as allies ($n=234$); were 14 years old or younger ($n=3$); were not currently residing in Aotearoa New Zealand ($n=10$); and did not have Pacific whakapapa (genealogy) ($n=16$). For the purposes of this study, Māori were not included. While Māori are part of the Pacific family, they hold tangata whenua and mana whenua status as the Indigenous people of Aotearoa New Zealand; thus, research pertaining to Māori Rainbow+ communities is regarded as a distinct domain that should be led by Māori. As non-Māori, it is not appropriate nor ethical for this research and

research team to claim, use or publish Māori data in the Aotearoa New Zealand context.

Table 1 presents the demographic details of the Pacific Rainbow+ respondents categorised by sexuality-diverse respondents labelled as 1) cisgender sexual minorities ($n=239$), and gender-diverse respondents labelled as 2) transgender ($n=60$) and non-binary ($n=66$). All respondents were counted only once within these categories. Most participants fall within the young adult and adult age ranges, come from large cities like

Auckland and Wellington and earn below NZ\$59,999.

Measures

Demographics

Rainbow+. Participants were asked, “Do you identify as part of the Pacific Rainbow+ community?” Response options provided were “yes” or “no”. We then asked those who selected “no” if they were “questioning”, “an ally” or “neither”. Participants who were questioning their identity

Table 1: Demographic characteristics of the Manalagi sample.

Demographic variables	n (%)	
	Cisgender sexual minorities (n=239)	Transgender and non-binary (n=126)
Age		
15–20 years	34 (14.2)	17 (13.7)
21–29 years	90 (37.7)	57 (46.0)
30–39 years	65 (27.2)	34 (27.4)
40–49 years	34 (14.2)	9 (7.3)
50–59 years	13 (5.4)	4 (3.2)
60+ years	3 (1.3)	3 (2.4)
Region		
Auckland	158 (66.1)	71 (57.3)
Wellington	36 (15.1)	23 (18.5)
Canterbury	18 (7.5)	8 (6.5)
Waikato	13 (5.4)	6 (4.8)
Other	14 (5.9)	16 (12.9)
Pacific whakapapa		
Samoa	115 (50.9)	47 (43.1)
Cook Island	17 (7.5)	12 (11.0)
Tongan	12 (5.3)	11 (10.1)
Other	28 (12.4)	11 (10.1)
Multi-ethnic	54 (23.9)	28 (25.7)
Personal income (NZD)		
<\$40,000	85 (36.3)	56 (47.5)
\$40,000–\$59,999	37 (15.8)	22 (18.6)
\$60,000–\$89,999	62 (26.5)	28 (23.7)
≥\$90,000	50 (21.4)	12 (10.2)

were grouped as part of the Rainbow+ sample, while those who identified as “an ally” or “neither” were excluded.

Gender. Participants were asked two sets of questions about their gender. First, a multi-select, single-item question: “Which of these statements apply to your gender identity?” Response options included “I am cisgender”, “I am transgender”, “I am non-binary” and “None of these apply”. Participants were categorised into three categories: cisgender, transgender or non-binary. A total of 77 participants selected “None of these apply”. Speculatively, it is possible that this high number is due to respondents not understanding the cisgender/transgender terminology or not wanting to conform to a prescribed Western gender classification, as much has been written on the incongruence between Indigenous Pacific Rainbow+ gender expressions (cultural identities) and the LGBTQIA+ classification (sexuality and gender diverse).^{25,26,28}

In cases where respondents selected “None of these apply” or it was unclear if a respondent should be categorised into one of our pre-determined categories, we referred to the response for the open-ended question “How do you describe your gender?” For example, respondents who selected “None of these apply” but wrote responses such as “Woman mostly, but gender fluid” and “Fa’afafine” were classified as non-binary. Respondents who were cisgender but categorised as Rainbow+ due to being sexuality diverse (LGB) were grouped as cisgender sexual minorities.

Pacific whakapapa (genealogy). Participants were asked, “Which Pacific Island group(s) do you identify with/whakapapa to? Select as many as

apply.” The options provided were: Cook Islands, Fiji, Kanaka Maoli (Hawaii), Kiribati, Niue, Papua New Guinea, Rotuma, Samoa, Solomon Islands, Tahiti, Tokelau, Tonga, Tuvalu, Vanuatu and not listed. Examples of non-listed Pacific Islands include Pitcairn, Marquesas and Norfolk. These responses were collated into a nominal variable to be used as a covariate in the regression models. A “multi-ethnic” category was created to encompass those who selected more than one Pacific ethnicity.

Region. We asked participants, “Where in Aotearoa New Zealand do you live?”

Income. We asked participants, “What is your approximate personal annual income?”

Predictors

Healthcare discrimination: Participants were asked, “Have you ever experienced any of these types of discriminatory behaviours at your general practitioner’s (GP’s) office, a medical clinic or hospital in Aotearoa New Zealand before? Check all that apply.” A definition was provided for “microaggressions” to indicate “the everyday, subtle, intentional—and oftentimes unintentional—interactions or behaviours that communicate some sort of bias toward historically marginalised groups.” Refer to Table 2 for the classified response options for different forms of discrimination: ethnic/racial, gender and other.

We generated an “Overall discrimination” variable by summing all reported experiences of discrimination in a healthcare setting. The index ranges from zero to 15. A response of one indicates that participants reported experiencing one of the discriminatory behaviours assessed. In Table 2, we report the average number of

Table 2: Healthcare utilisation and experiences of the Manalagi sample.

	Cisgender sexual minorities; <i>n</i> (%)	Trans and non-binary; <i>n</i> (%)
Have you ever avoided seeing your GP, or going to a medical clinic or hospital because of fear for your safety, or repercussions in any way? (Discrimination, violence or visa status etc.)	42 (17.6)	32 (26.0)
In the last 12 months, how many times have you sought help from mental health support services (i.e., counsellors, helplines, etc.?)	67 (30.9)	44 (37.0)
Ethnic/race-based discrimination		

Table 2 (continued): Healthcare utilisation and experiences of the Manalagi sample.

Felt you were treated differently from patients who were Pākehā	53 (22.2)	38 (30.6)
Experienced microaggressions based on your ethnicity	53 (22.2)	27 (21.8)
Experienced microaggressions based on your race	37 (15.5)	18 (14.5)
Gender-based discrimination		
Experienced microaggressions based on your gender	12 (5.0)	17 (13.7)
Subjected to transphobic comments	1 (0.4)	14 (11.3)
Misgendered by staff	7 (2.9)	34 (27.4)
Had your dead name used despite asking for your gender-affirming name to be used	0	16 (12.9)
Refused treatment based on your gender	1 (0.4)	4 (3.2)
Other discrimination		
Experienced microaggressions based on your sex	6 (2.5)	8 (6.5)
Experienced microaggressions based on your characteristics	25 (10.5)	17 (13.7)
Subjected to homophobic comments	7 (2.9)	13 (10.5)
Refused treatment based on your sex	1 (0.4)	6 (4.8)
Refused treatment based on your sexual orientation	2 (0.8)	1 (0.8)
Felt you were treated differently from patients who were cisgender and straight-presenting	3 (1.3)	24 (19.4)
Had your symptoms minimised	66 (27.6)	33 (26.6)
Overall discrimination (0 to 15) (mean; standard deviation)	1.15 (1.63)	2.18 (2.88)

discriminatory experiences for each gender group.

Outcomes

Healthcare avoidance. We asked participants, “Have you ever avoided seeing your GP, or going to a medical clinic or hospital because of fear for your safety or repercussions in any way (e.g., discrimination, violence or visa status, etc.)?” This

question was adapted from the Counting Ourselves¹² and Identify⁸ surveys, with final wording confirmed by Pacific Rainbow+ communities in survey testing.¹⁶

Seeking mental health support. We asked participants, “In the last 12 months how many times have you sought help from mental health support services (i.e., counsellors, helplines, etc.)?”

We adapted this question from Honour Project Aotearoa²⁷ and the Counting Ourselves Survey,¹² with final wording approved through community consultation and testing.¹⁶ The responses were binarised as “yes” or “no”.

Data analysis

All statistical analyses were conducted in IBM SPSS Statistics v30. First, we conducted descriptive analyses of the predictor and outcome variables for the two respective gender groups. We strategically limited our analysis to two gender groups in this study due to the low number of affirmative responses observed in preliminary analyses for predictor variables specific to transgender and non-binary sub-groups. This decision was made to avoid overestimating odds ratios, which could introduce bias resulting from small sample sizes.²⁹ Subsequently, multiple sets of multivariate logistic regression analyses were performed to ascertain the extent of association between each predictor on various types of discrimination, and the two outcome variables: healthcare avoidance and mental health support. These analyses were conducted using generalised linear models and adjusted for the effects of demographic variables (age, Pacific whakapapa, region and income). Regression analyses were undertaken only for variables with at least 20 participants reporting a discriminatory experience to guarantee sufficient statistical power for identifying a true difference. Statistical significance was determined at an alpha level of $p < .05$.

Results

Table 2 outlines the patterns of health and mental health care utilisation and experiences. Nearly one in five cisgender sexual minorities, and more than a quarter of transgender and non-binary respondents, have avoided accessing healthcare due to fears for their safety or potential repercussions. Multivariate findings in Table 3 indicate that Rainbow+ participants (both cisgender sexual minorities; transgender and non-binary) who had experienced ethnic/race-based discrimination including being treated differently from their Pākehā counterparts ($p < .001$) and experiencing ethnic-based microaggressions ($p < .01$) had increased odds of avoiding health services.

Transgender and non-binary respondents with prior exposure to misgendering in healthcare settings were significantly more likely to avoid

seeking healthcare services ($p < .05$). Cisgender sexual minority respondents who had experienced microaggressions based on their presenting characteristics ($p < .01$), or had their symptoms minimised by healthcare staff ($p < .01$), also reported elevated odds of healthcare services avoidance. Transgender and non-binary respondents who felt they were treated differently from their cisgender counterparts ($p < .001$) or had their symptoms minimised ($p < .001$) were significantly more likely to avoid healthcare services.

Cisgender sexual minorities respondents reported experiencing 1.15 instances of the listed forms of discrimination, while transgender and non-binary respondents reported nearly double with 2.18. When the overall number of discriminatory exposures increased by one point, it was estimated that both cisgender sexuality minorities as well as transgender and non-binary respondents had an approximate 60% increased likelihood of avoiding healthcare.

Nearly one-third of cisgender sexual minorities respondents, and more than one-third of transgender and non-binary respondents, sought mental health support in the past year. For cisgender sexual minorities, those who had experienced race-based microaggressions ($p < .05$) were significantly more likely to report having sought mental health support (see Table 4). Transgender and non-binary respondents who reported ethnic ($p < .01$) or race-based ($p < .001$) microaggression had significantly higher odds of seeking mental health care services. Further, transgender and non-binary participants who faced symptoms being minimised reported increased odds of mental healthcare service utilisation ($p < .001$). A one-point increment in discriminatory exposure predicted a 60% heightened likelihood for transgender and non-binary respondents to seek mental health care services.

Discussion

Our multivariate regression analysis demonstrates that discrimination (racism and homophobia/transphobia and heterosexism) reported by both Pacific cisgender sexual minorities and transgender or non-binary Rainbow+ individuals in Aotearoa New Zealand within a healthcare setting is associated with increased healthcare avoidance. These results align with international literature reporting Rainbow+ groups experiencing high levels of discrimination in healthcare settings (Australia),¹⁸ as well as similar associations among

Table 3: Multivariate regression of healthcare avoidance of the Manalagi sample adjusting for age, region, ethnicity and income.

	Cisgender sexual minorities (OR)	Transgender and non-binary (OR)
Ethnic/race-based discrimination		
Felt you were treated differently from patients who were Pākehā	6.21 [2.72–14.17]***	10.63 [3.15–35.86]***
Experienced microaggressions based on your ethnicity	3.18 [1.45–7.00]***	7.63 [2.19–26.60]**
Experienced microaggressions based on your race	3.02 [1.28–7.13]*	-
Gender-based discrimination		
Experienced microaggressions based on your gender	-	-
Subjected to transphobic comments	-	-
Misgendered by staff	-	3.00 [1.05–8.58]*
Had your dead name used despite asking for your gender-affirming name to be used	-	-
Refused treatment based on your gender	-	-
Other discrimination		
Experienced microaggressions based on your sex	-	-
Experienced microaggressions based on your characteristics	4.31 [1.63–11.42]**	-
Subjected to homophobic comments	1.41 [0.14–14.32]	-
Refused treatment based on your sex	-	-
Refused treatment based on your sexual orientation	-	-
Felt you were treated differently from patients who were cisgender and straight-presenting	-	18.88 [5.04–70.70]***
Had your symptoms minimised	3.10 [1.41–6.82]**	12.54 [3.64–43.11]***
Overall discrimination	1.56 [1.26–1.92]***	1.59 [1.27–2.00]***

OR = odds ratios.

Note that we only conducted regression analyses for discriminatory variables with more than 20 affirmative responses. We used a dash to indicate variables that were omitted from assessment. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4: Multivariate regression of seeking mental health care among the Manalagi participants adjusting for age, region, ethnicity and income.

	Cisgender sexual minorities (OR)	Transgender and Non-binary (OR)
Ethnic/racial-based discrimination		
Felt you were treated differently from patients who were Pākehā	1.26 [0.61-2.60]	8.64 [2.78-26.87]***
Experienced microaggressions based on your ethnicity	1.16 [0.55-2.43]	7.67 [2.18-26.95]**
Experienced microaggressions based on your race	2.57 [1.14-5.79]*	-
Gender-based discrimination		
Experienced microaggressions based on your gender	-	-
Subjected to transphobic comments	-	-
Misgendered by staff	-	1.34 [0.49-3.65]
Had your dead name used despite asking for your gender-affirming name to be used	-	-
Refused treatment based on your gender	-	-
Other discrimination		
Experienced microaggressions based on your sex	-	-
Experienced microaggressions based on your characteristics	2.14 (0.85-5.43)	-
Subjected to homophobic comments	-	-
Refused treatment based on your sex	-	-
Refused treatment based on your sexual orientation	-	-
Felt you were treated differently from patients who were cisgender and straight-presenting	-	-
Had your symptoms minimised	2.00 [0.99-4.06]	7.31 [2.63-20.35]
Overall discrimination	1.14 [0.95-1.38]	1.60 [1.36-2.05]**

OR = odds ratios.

Note that we only conducted regression analyses for discriminatory variables with more than 20 affirmative responses. We used a dash to indicate variables that were omitted from assessment. * $p < .05$; ** $p < .01$; *** $p < .001$.

Rainbow+ individuals reporting incidences of discrimination in healthcare settings and increased healthcare avoidance in Thailand (gender-affirming healthcare avoidance)¹⁷ and the United States.¹⁹ However, some measures (i.e., minimisation of symptoms) may be associated with both racism and homophobia/transphobia and have not been meaningfully disentangled in our analysis. The most significant predictors of healthcare avoidance among Pacific Rainbow+ related to being treated differently from Pākehā and experiencing microaggressions based on ethnicity and race.

For transgender and non-binary respondents, other predictors of healthcare avoidance were more significant than for cisgender sexual minorities; namely, misgendering by staff and a belief that they were treated differently than cisgender or straight-presenting patients. While having symptoms minimised could be associated with healthcare avoidance, transgender and non-binary respondents reported significantly higher odds ratios (statistically significant) of seeking mental health care based on minimisation of symptoms than cisgender sexual minorities respondents (not statistically significant).

Respondents were also more likely to access mental health services if they had experienced ethnic or race-based discrimination. This is an important finding, as it highlights the way discrimination impacts Pacific Rainbow+ individuals on two axes of difference: race/ethnicity and sexuality and/or gender diversity. Furthermore, our findings indicate that experiences of discrimination have a cumulative effect on healthcare avoidance for Pacific Rainbow+. An increment of a reported discriminatory experience—based on gender or ethnicity/race—could increase the odds of healthcare avoidance by nearly 60%.

Limitations

In the present study, we were required to collapse the diverse gender identities within Pacific Rainbow+ communities into Western categorical frameworks due to analytical constraints, including a small sample size. As a result, we were unable to meaningfully examine gender-group differences within our sample, despite existing research indicating such differences in healthcare utilisation.¹² Further, our regression findings are limited by the

cross-sectional nature of the data, which restricts our ability to infer causality. While our results suggest that experiences of discrimination may contribute to healthcare avoidance and increased use of mental health services, alternative explanations remain plausible. For example, it is equally possible that individuals within Rainbow+ communities who avoid healthcare and rely more heavily on mental health services are more likely to report discrimination in healthcare settings. Nevertheless, this reverse hypothesis continues to underscore the critical importance of addressing ethnic and sexuality as well as gender diversity-based discriminatory practices experienced by Pacific Rainbow+ communities within healthcare settings.

Conclusion

Our findings affirm research that details high levels of discrimination experienced in the lives of Rainbow+ individuals both in Aotearoa New Zealand and abroad. For Pacific Rainbow+ respondents in this study, experiences of discrimination (racism, homophobia/transphobia) had a negative predictive effect on healthcare service use. Further analysis shows that discrimination related specifically to race and/or ethnicity had a stronger predictive effect than sexuality- and gender-based discrimination. For transgender and non-binary respondents, being treated differently from cisgender patients was also a strong predictor of healthcare service avoidance. Our analysis also shows that experiences of racial and ethnic based discrimination (racism) also increased the likelihood of mental health service usage among respondents. While findings of the study are limited by the cross-sectional nature of the data and the statistically strategic decision to collapse Pacific gender and sexuality diversity into narrower Western gender and sexuality categories, the intersectional complexity of the Pacific Rainbow+ experience with the Aotearoa New Zealand healthcare system needs further investigation and research. This will help provide further nuanced data and evidence to better support this multiply marginalised cohort's comfortability with, and usage of, services provided by the Aotearoa New Zealand healthcare system.

COMPETING INTERESTS

Nil.

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As the dataset contains sensitive information shared by Pacific community members, the dataset is not publicly available. However, requests from researchers will be considered on a case-by-case basis; please contact the corresponding author if you wish to use the Manalagi dataset.

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Scoping the vape retail environment and retailers' responses to vape control measures in selected Auckland suburbs with different levels of socio-economic deprivation

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ABSTRACT

AIMS: Emerging research suggests exposure to vape stores and their proximity to schools play a role in vaping initiation among adolescents. In New Zealand, regulatory changes enacted that restrict sales of flavoured vape products to specialist vape retailers (SVRs) have led to growth in “store-within-a-store” (SWAS) SVRs in or beside convenience stores to circumvent restrictions. This paper assesses the number and type of SVR retailers, including SWAS, and their proximity to educational institutes (primary, secondary and tertiary) and marae across Auckland suburbs with different socio-economic deprivation levels.

METHODS: Google Maps data and tools were used to assess SVR “type” and distance from schools, marae and other SVRs in selected Auckland suburbs. One hundred and sixty SVRs were examined across 14 suburbs.

RESULTS: The median number of SVRs per suburb was 9.5. Forty-four percent of SVRs were SWAS. SWAS density increased with socio-economic deprivation, with high-deprivation suburbs containing a median of 8.5 SWAS compared with 2.0 in low-deprivation suburbs. Half of the SVRs (56%) were located within 300m of at least one educational institute.

CONCLUSION: SWAS density in Auckland increased with neighbourhood socio-economic deprivation. SWAS retailers likely contribute to greater exposure to vape retail and products among adolescents in these areas.

In November 2020, New Zealand implemented the *Smokefree Environments and Regulated Products (Vaping) Amendment Act 2020*,¹ which ended vaping product promotions and sales to under-18s. The *Act* restricted the vape product flavours that convenience stores, petrol stations and supermarkets could sell to mint, menthol and tobacco. Only approved specialised vape retailers (SVRs)² could sell other vape product flavours. Two factors underpinned these regulatory changes: firstly, rapid growth in the sales and marketing of unregulated vape products from 2018 onwards^{3,4} and, secondly, growing community concerns about youth vaping.^{5,6} The *Act* sought to extend existing regulations on the sale of “notifiable products”, such as tobacco, to vaping products, hereby using retail restrictions and SVR licenses to curb their visibility and appeal to young people while keeping them accessible to people who smoke.

The SVR application process aims to limit “general retail” of vape products from convenience

stores, supermarkets and petrol stations by ensuring vape retailers operate from an “appropriate premises”.⁷ SVR requirements at the time of writing require stores to operate from a “fixed, permanent” structure, and generate at least 70% of store revenue from the sale of vape products (with some exceptions).⁷ On 21 September 2023, additional SVR regulations were implemented; these no longer allowed new SVR licences to be obtained by retailers located within 300m of a registered school (primary or secondary) or marae.⁸ These regulations do not apply to licences granted to retailers before this date.

Some convenience store retailers responded to the new restrictions on vape retail by constructing separate premises within or adjacent to their store to obtain an SVR licence that allowed the sale of the full range of vape flavours.^{9,10} We term these outlets “store-within-a-store” (SWAS) vape retailers.⁹ Today, SWAS outlets may be found inside, or adjacent to, convenience stores, petrol stations and sometimes also liquor stores. Based on

Ministry of Health data on SVRs as of September 2021, Boston et al. estimated that 14% of SVR applicants were convenience stores.¹⁰ More recently, Ball et al. carried out an in-person audit of all SVRs in the Wellington Region and reported that 47% (N=74) were SWAS.⁹ These findings suggest there may have been significant growth in the number of SWAS SVRs in New Zealand in recent years.

The continued accessibility of appealing vape products from convenience stores and petrol stations via SWAS retailers is notable from a public health standpoint as it may undermine the principal stated objective of the SVR approval scheme: to minimise vaping exposure and harm to children and youth.⁷ A recent qualitative study of underage youth found that social supply and sharing via peers was the primary form of access to vapes.¹¹ However, interviewees also reported sourcing from small, local retail outlets like convenience stores that were known to have lax age verification procedures,¹¹ a practice also documented in the media.¹² Internationally, exposure to vaping products in “small shops”, or local convenience stores, may be linked to increased likelihood of experimenting with vaping or intention to try vaping.¹³

Environmental exposure to vape retailers and youth vaping behaviours

Emerging research suggests environmental exposure to vape product use and advertising, including vape retail density and proximity to schools, may play a role in vaping uptake among adolescents.¹⁴ These associations are consistent with findings from the tobacco¹⁵ and alcohol¹⁶ fields, where environmental exposure to advertising and retail density influence levels of use among young people. Studies have also shown that socio-economic factors may influence vape retailers' location, with a greater density of vape retailers in areas with higher populations of minoritised ethnic groups^{17,18} and higher socio-economic deprivation.¹⁹ In New Zealand, Ball et al. identified clustering of vape stores in high socio-economic deprivation suburbs and fewer stores in low socio-economic deprivation suburbs around the Wellington Region.⁹ Similarly, recent studies conducted in 2023 using spatial mapping to assess vape store density and proximity to schools across New Zealand found a high concentration of vape stores in high socio-economic deprivation areas.^{20,21} Waterman et al.²⁰ found

that in Auckland vape store density was greatest in high socio-economic deprivation areas with larger Māori and Pacific populations. The study authors note that vape retailers' expansion in New Zealand has led to rapid increases in the number of stores in high-deprivation areas, while the number of stores in low-deprivation areas has remained relatively stable.²⁰ Additionally, Payinda et al.²¹ found that, as of June 2023 when the requirements for SVRs to be more than 300m from schools and marae came into effect, 13% of New Zealand primary and secondary schools already had at least one SVR within 300m. They also found that schools in more socio-economically deprived areas were considerably more likely to have SVRs nearby. However, it is not yet known how different “types” of vape retail contribute to environmental exposures to vape products, and whether some types of SVR may play a greater role in increasing environmental exposure to vaping products among teens.

To date, no data have been collected on the number of SWAS SVR established in Auckland. This gap is notable given Auckland is New Zealand's largest and most demographically diverse urban centre. The diversity of Auckland suburbs may provide valuable insights into the concentration and location of SWAS SVRs within different communities and urban centres. This study thus aimed to explore the number and types of SVR across Auckland suburbs with different socio-economic and demographic characteristics. Additionally, we aimed to determine the number of SVRs located within 300m of educational institutes (tertiary, secondary and primary) and marae to investigate levels of current exposure. Lastly, we focussed on the distance between SVRs within the same suburb, applying the same 300m distance measure to examine SVR concentrations across suburbs.

Methods

This study used Google Maps and Google Street View data to identify and assess the number, type and location of SVR in selected Auckland suburbs. Google Maps data, and, in particular, Google Street View, have previously been used to assess compliance with public health measures internationally²² and in New Zealand.^{22,23} In this paper, we extend the use of Google Street View to examine SVR attributes and those of the surrounding area across selected Auckland suburbs.

Suburb selection

The 14 study suburbs were selected using a purposive sampling approach based on the research team's knowledge of key Auckland suburban retail hubs and community characteristics. Suburbs were selected to encompass diversity in socio-economic deprivation, ethnicity and urban density. Table 1 presents the suburbs selected for data collection and their respective socio-economic and demographic attributes based on available 2023 Census population estimates and 2023 New Zealand Index of Deprivation (NZDep) scores. We used census statistical area 2 (SA2) polygons to estimate suburb populations, ethnicity counts and median age by combining the SA2 polygons located within the suburb boundaries visualised on Google Maps. All suburbs are comprised of multiple SA2 polygons (median 8, interquartile range 2–16). It should be noted that Auckland suburbs vary markedly in the number of residents, with Papatoetoe being Auckland's most populous suburb, while Devonport has among the fewest inhabitants.²⁴

Google Maps data collection procedures and SVR classification

A standardised Google Maps and Street View data collection protocol was developed to collect data on SVRs in the selected suburbs. The initial phase of the protocol involved a manual search procedure to identify SVRs visible on Google Maps for a given suburb, as well as educational institutes and marae. Visible locations for each suburb were recorded as screenshots, along with a list of SVR names and addresses.

Once this initial identification phase was completed, data collection for each SVR commenced. Firstly, using Google Maps directions, distances were mapped between each SVR and surrounding schools, marae (if present) and other SVRs to determine whether they were located within 300m of the store. This procedure was completed using the "walking distance" option. Data were recorded by taking screenshots of Google Maps walking route suggestions, ensuring that a distance measurement was visible. Screenshots were added to a folder and overall outcomes (e.g., was the SVR within 300m of any educational institutes? Y/N) were recorded in an Excel spreadsheet.

In addition to Google Maps distance data, photos linked to the SVR's Google Maps profile were examined. We then classified SVRs into three broad categories (i.e., i) upmarket, ii) budget; iii) SWAS) based on store attributes, such as exterior

store front signage, interior furnishings, display layout and product marketing. Table 2 outlines the characteristics of each category. Relevant photos showing each store's interior, exterior and product displays were downloaded. Google Street View was used to check each SVR's location. Google Maps data collection took place from August 2023 to March 2024.

Verification of Google Maps data coverage and accuracy

Google Street View may not be updated for several months at a time and is not available inside shopping malls. To address these limitations, we used several independent data sources for verification.

Google SVR locations were checked against the list of registered SVRs for each suburb maintained by the Health Advisory and Regulatory Platform (HARP) (HARP specialist vape retailers register: <https://vaping.harp.health.nz/search/1DC97E34-E3F1-40E3-ADFE-30092B36F21C>). The Auckland SVR register was downloaded from the HARP website on 14 March 2024 (N=451). This step proved important in locating SWAS SVRs, with many suburbs containing several that were identified only through the HARP registry. In cases where an unknown SVR was identified, Google Maps and Street View were used to match a likely location to the SVR (e.g., a convenience store, or sometimes a liquor store) and the data collection process was then completed for the SVR based on this location. The HARP register also provided the opportunity to update suburb data already collected from Google Maps (e.g., identifying SVRs that had closed since data collection occurred). We verified Google Maps data for SVR proximity to both schools and marae by cross-checking our results with the Ministry of Health's new pre-application proximity assessment tool for prospective specialised vape retailers (Ministry of Health pre-application assessment tool for prospective SVR retailers: <https://experience.arcgis.com/experience/3c09af73f40748e4b84faa3691284f3b>).

We collated data by suburb and recorded SVR attributes in an Excel spreadsheet to facilitate between-suburb comparison. In addition to comparing suburbs, descriptive analyses grouped suburb data by median 2023 NZDep score (see Table 1). We then compared differences in SVR type and location between high and low socio-economic deprivation groups, with the Auckland CBD kept separate as a suburb outlier. This grouping procedure was used to calculate average numbers

Table 1: Selected suburbs and their respective deprivation levels, ethnic make-up and characteristics.

Suburb	Median socio-economic deprivation level (2023 NZDep) ^a	Estimated resident population (2023 NZ Census) ^b	Ethnic make-up of suburb population (2023 NZ Census) ^b	Median age of suburb population (2023 NZ Census) ^b	Suburb characteristics (e.g., residential, CBD)
St Heliers	1	11,439	74% European, 4% Māori, 2% Pacific, 15% Asian, 5% Other	45.6	Residential
Birkenhead	1.5	10,344	68% European, 6% Māori, 5% Pacific, 19% Asian, 4% Other	39.2	Residential
Devonport	1.5	5,079	83% European, 6% Māori, 2% Pacific, 4% Asian, 4% Other	49.4	Residential
Remuera	2	25,458	58% European, 4% Māori, 2% Pacific, 32% Asian, 3% Other	41.1	Residential
Takapuna	3	8,487	63% European, 5% Māori, 2% Pacific, 25% Asian, 5% Other	42.7	Residential/CBD area
Mount Eden	4.5	22,887	56% European, 7% Māori, 5% Pacific, 28% Asian, 5% Other	36.1	Residential
Onehunga	7	17,133	41% European, 12% Māori, 23% Pacific, 19% Asian, 4% Other	34.7	Residential/ industrial
Mount Roskill	7	29,100	25% European, 6% Māori, 15% Pacific, 49% Asian, 5% Other	35.5	Residential
Auckland Central (CBD)	8	31,215	36% European, 7% Māori, 5% Pacific, 45% Asian, 7% Other	32	CBD area
Henderson	8.5	37,675	33% European, 14% Māori, 18% Pacific, 31% Asian, 4% Other	36.5	Residential/CBD area

Table 1 (continued): Selected suburbs and their respective deprivation levels, ethnic make-up and characteristics.

Papakura	9	31,932	27% European, 25% Māori, 20% Pacific, 25% Asian, 2% Other	30.2	Residential/CBD area
Papatoetoe	9	47,910	14% European, 11% Māori, 31% Pacific, 42% Asian, 2% Other	31.8	Residential
Glen Innes	9	9,540	35% European, 16% Māori, 31% Pacific, 14% Asian, 4% Other	31.9	Residential/ industrial
Ōtara	10	21,711	9% European, 18% Māori, 66% Pacific, 6% Asian, 1% Other	27.1	Residential

^aSource: NZDep for 2023 (NZDep2023): <https://www.ehinz.ac.nz/indicators/population-vulnerability/socioeconomic-deprivation-profile/#nzdep-for-2023-nzdep2023>

^bSource: 2023 Census totals by topic for individuals by SA2 part 1 (clipped to coastline): <https://2023census-statsnz.hub.arcgis.com/datasets/StatsNZ::2023-census-totals-by-topic-for-individuals-by-sa2/about?layer=0>

Table 2: Classification of different types of SVR and their respective attributes.

Category name	SVR attributes and characteristics	Examples of each category
Upmarket	<p>“Boutique” store layout (e.g., wood furnishings, curated product displays, vape recycling initiatives, indoor plants).</p> <p>May incorporate a more “open” store layout and product display (e.g., products not kept behind glass), with a small counter for payments.</p> <p>Most do not sell bongs, hookah or other smoking paraphernalia.</p> <p>May have more heavily stylised branded store displays or, alternatively, may be a branded store.</p>	<p>Examples of upmarket stores:</p> <ul style="list-style-type: none"> • VAPO • Cosmic • Vape Merchant <p>Heavily branded upmarket stores:</p> <ul style="list-style-type: none"> • IQOS • Podlyfe • 313 by Airscream
Budget	<p>A standardised retail store layout.</p> <p>Typically involves basic store layout with products displayed in glass cases, often lit with LEDs, and behind glass counters (e.g., most products cannot be picked up without first asking the store attendant).</p> <p>Often more minimally branded (e.g., a poster on the wall, or a standard alt. brand product display case).</p> <p>Most sell other smoking-related products (e.g., shisha, bongs, rolling papers, etc.).</p>	<p>Examples of budget SVRs:</p> <ul style="list-style-type: none"> • Shosha • MyBlitz • Vape Haven • The Vape Shed

Table 2 (continued): Classification of different types of SVR and their respective attributes.

“Store-within-a-store” (SWAS)	Located inside or attached to convenience stores, petrol stations or liquor stores. Store is constructed to provide nominal impression of being a separate premises from the main shop. Small store size. Minimally branded.	
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of SVR types and stores within 300m of educational institutes, marae and other vape retailers. This paper presents the results of this cross-suburb Google Maps scoping procedure and subsequent descriptive analysis.

Results

Differences in number and type of SVRs across suburbs

Table 3 presents an overview of the demographics and SVR data per 1,000 population for each suburb scoped. A total of 160 SVRs were identified, of which 44% were SWAS outlets (n=70), 42% budget (n=67), 10% (n=16) upmarket and 4% (n=7) were of unknown store type.

The overall median number of SVRs per suburb was 9.5, comprising 4.5 SWAS, 3.5 budget and 0.5 upmarket SVRs, and 0 SVRs of unknown store type. The Auckland City CBD had by far the highest total number of SVRs (n=43), followed by Henderson (22), Papakura (17), Papatoetoe (13), Ōtara (13) and Mount Roskill (11). In contrast, St Heliers had no SVRs.

The density of SVRs per 1,000 suburb residents was greatest in the Auckland CBD area (1.38) followed by high socio-economic deprivation residential/industrial suburb Glen Innes (0.74), residential/CBD area Takapuna (0.71) and high-deprivation residential suburb Ōtara (0.60). SVR density was lowest in low socio-economic deprivation residential suburbs St Heliers (0.00) and Remuera (0.12), and in the high socio-economic deprivation residential suburb Papatoetoe (0.27).

Figure 1 summarises the median number of SVRs (total and subtype) by suburb socio-economic deprivation level (1=lowest socio-economic deprivation; 10=highest socio-economic deprivation). The median number of budget SVRs was highest in the mid-high socio-economic deprivation group (6). The number of SWAS SVRs increased with the

socio-economic deprivation status of the suburb. For example, the low socio-economic deprivation group (decile ≤ 2) had a median of only 2.0 SWAS SVRs compared to the high socio-economic deprivation suburbs (decile ≥ 9) with a median of 8.5.

Proximity to sensitive sites and other SVRs

Fifty-six percent of SVRs in the sample were located within 300m of at least one educational institute (tertiary, secondary or primary), 10% were located within 300m of a marae (noting that only a minority of suburbs had any marae) and 66% were located within 300m of at least one other SVR.

In the Auckland CBD, 81% of SVRs (n=35) were located within 300m of an educational institute (86% within 300m of a tertiary institute; 14% secondary; and 0% primary), while 68% (n=15) of SVRs in Henderson were located within 300m of educational institutes that were mostly primary or secondary schools (20% tertiary; 60% secondary; and 40% primary).

Suburbs in the medium-high socio-economic deprivation group (median NZDep Index score of more than 5.5 and less than 9) contained a median of 7.0 SVRs located within 300m of an educational institute (Figure 2). Suburbs in the highest socio-economic deprivation (≥ 9) group contained a median of 4.0 SVRs within 300m of an educational institute. The medium-high, high and low-medium socio-economic deprivation suburbs also had the greatest median number of SVRs located within 300m of another SVR (medium-high deprivation group=7.0; high deprivation group=6.0; low-medium deprivation group=6). In contrast, a suburb in the lowest socio-economic deprivation group (≤ 2) contained a median of only 2.0 SVRs located within 300m of an educational institute, and only 2.0 SVRs located within 300m of another SVR.

Figure 1: Median number of specialist vape retailers (SVRs) (all types) and SVRs of different “types” by sampled suburb socio-economic deprivation level. Auckland CBD not included.

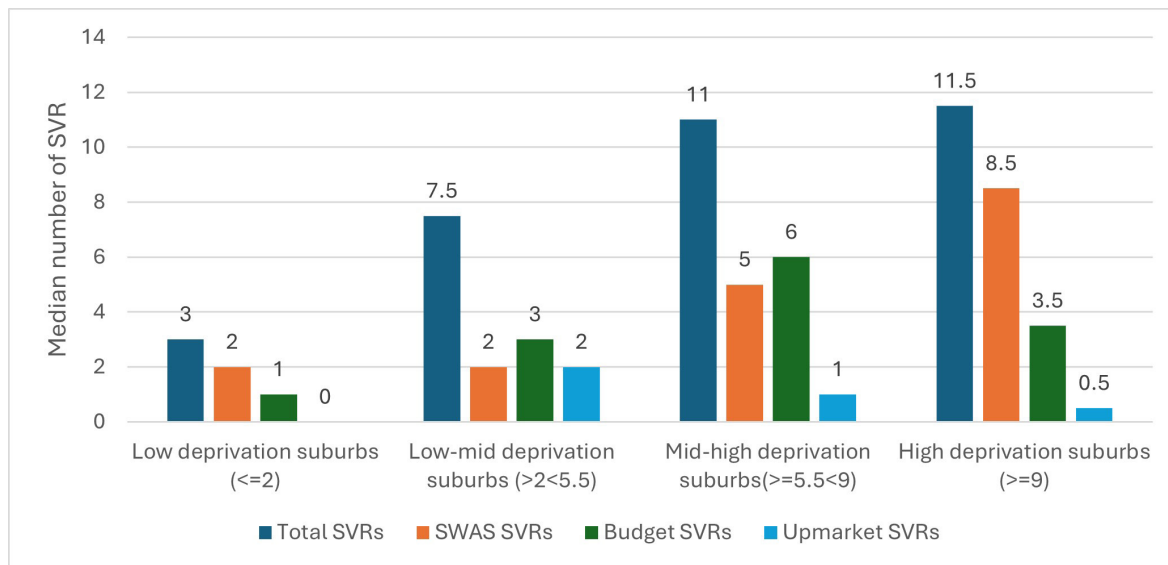


Figure 2: The median number of specialist vape retailers (SVRs) within 300m of each location by socio-economic deprivation level.

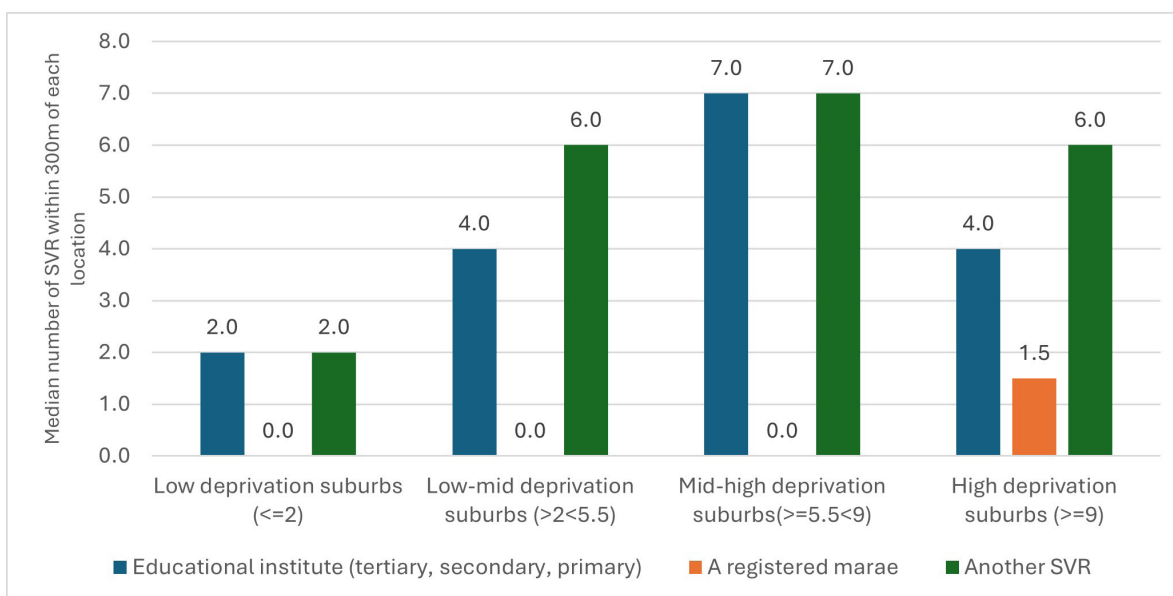


Table 3: Demographics and specialist vape retailer (SVR) composition of scoped Auckland suburbs. Auckland CBD is shaded as a suburb outlier.

	Median 2023 NZDep (SA2) ^a	Estimated suburb resident population (2023 NZ Census, SA2) ^b	% Māori population (2023 NZ Census, SA2) ^b	% Pacific population (2023 NZ Census, SA2) ^b	Total number of SVRs	Upmarket SVRs	Budget SVRs	SWAS SVRs	Unknown store type	Average number of SVRs per 1,000 suburb residents
St Heliers	1	11,439	4%	2%	0	-	-	-		0.00
Birkenhead	1.5	10,344	6%	5%	3	0	1	2		0.29
Devonport	1.5	5,079	6%	2%	3	0	1	2		0.59
Remuera	2	25,458	4%	2%	3	0	1	2		0.12
Takapuna	3	8,487	5%	2%	6	2	2	1	1	0.71
Mount Eden	4.5	22,887	7%	5%	9	2	4	3		0.39
Onehunga	7	17,133	12%	23%	10	1	4	5		0.58
Mount Roskill	7	29,100	6%	15%	11	0	6	5		0.38
Auckland CBD	8	31,215	7%	5%	43	6	22	11	4	1.38
Henderson	8.5	37,675	14%	18%	22	2	10	9	1	0.58
Papatoetoe	9	47,910	11%	31%	13	0	3	9	1	0.27
Papakura	9	31,932	25%	20%	17	2	6	9		0.53
Glen Innes	9	9,540	16%	31%	7	0	3	4		0.74
Ōtara	10	21,711	18%	66%	13	1	4	8		0.60
Totals	7	315,286	13%	22%	160	16	67	70	7	0.51

^aSource: NZDep for 2023 (NZDep2023): <https://www.ehinz.ac.nz/indicators/population-vulnerability/socioeconomic-deprivation-profile/#nzdep-for-2023-nzdep2023>^bSource: 2023 Census totals by topic for individuals by SA2: <https://2023census-statsnz.hub.arcgis.com/maps/StatsNZ::2023-census-totals-by-topic-for-individuals-by-sa2/about>

Discussion

This paper explored the socio-economic and demographic patterning of vape retailers across selected Auckland suburbs, with a focus on scoping the distribution of SWAS retailers, which emerged as an unintended retail industry response to New Zealand vaping regulation changes in 2020. Our findings contribute to the growing evidence of vape retail location and density as an emerging form of health inequity in New Zealand^{20,21} by providing insight into different types of retail outlets and their placement in suburbs with different socio-economic characteristics.

Consistent with other recent New Zealand studies,^{9,20,21} we found higher median numbers of SVRs in high socio-economic deprivation areas, which often had a high proportion of Māori and Pacific residents. Among our sampled suburbs, greater density of SVRs in high socio-economic deprivation areas was linked to a greater number of SWAS SVR outlets compared to suburbs with lower socio-economic deprivation levels. Almost half of the SVRs examined in our Auckland study (44%; N=160) were SWAS SVRs. This is very similar to Ball et al.,⁹ who found 47% of Wellington SVRs (N=74) were SWAS outlets. While our findings show budget and upmarket SVRs tend to be concentrated in suburbs with distinct commercial areas (e.g., Auckland CBD, Takapuna, Henderson, Papakura), SWAS SVRs were predominantly found in residential areas. Furthermore, their association with convenience stores is likely to mean that children and teens are routinely exposed to vaping products, which often feature appealing product packaging. Among our sampled suburbs, the potential for youth exposure to vape products posed by SWAS SVRs fell largely on those populations already facing the greatest health inequities.

Notably, rates of daily and regular youth vaping remain considerably higher among Māori and Pacific youth compared with youth of other ethnicities.^{25,26} Greater density of SVR outlets in areas with large Māori and Pacific populations^{20,21} may be an important factor in maintaining higher youth vaping rates among these groups. However, our findings show how attributes of the vape retail environment, particularly greater numbers of SWAS retailers, may also increase youth exposure to vaping products. Therefore, a focus on reducing SWAS retail outlets may be effective at reducing youth vaping uptake among Māori and Pacific young people.

Our findings suggest addressing the unintended

SWAS retail outlets should be a priority area for policymakers. Current Health New Zealand – Te Whatu Ora (Ministry of Health) guidelines for prospective specialised vape retailers require applicants to submit photos and floorplans of prospective store locations to determine whether they are an appropriate vaping premises (AVP).⁷ This information could be used to assess whether the proposed AVP falls within the footprint of another store (i.e., is a SWAS). Consequently, a possible response is to require current SVR applicants to submit additional photographic evidence of store surroundings to prove the premises are not operating in a space within or adjacent to existing convenience stores, petrol stations or liquor stores. This process could be applied retrospectively to existing SVR outlets to remove SWAS retailers.

The concentration of SVRs in high-deprivation suburbs in Auckland may warrant further regulatory responses that better balance the needs of predominately adults to access vaping products as a means to stop smoking with limiting vape products to young people who have never smoked. The recently announced *Auckland Local Alcohol Policy (ALAP)* has signalled tougher restrictions on the opening of new alcohol off-licences across 23 “priority areas” in Auckland, focussing on high-deprivation suburbs.²⁷ The new provisions include a 2-year freeze on the granting of new liquor licenses in these areas.²⁸ It may be useful to consider a similar cap and “sinking lid policy” to reduce the number of SVR licences in high socio-economic deprivation Auckland suburbs over time. This could be accomplished without impacting general retail of tobacco-, mint- and menthol-flavoured vape products in convenience stores, petrol stations and supermarkets to ensure vaping products remain accessible to smokers. We note that the number of general retailers operating in Auckland and the wider country at large who sell vape products is currently unknown. As such, the role general retailers may play in the continued accessibility of vaping products to young people remains unclear.

Importantly, in June 2025 additional regulatory requirements for SVRs and online vape retailers came into effect. Regulatory changes disallow the sale of disposable vapes and greatly curtail the visibility and marketing of vaping products by both online and physical vape retailers. These changes also increase penalties for retailers selling vaping products to minors, and do not allow new SVRs to open within 100m of early childcare

centres.²⁹ Our findings suggest that removing the unintended SWAS vape retail model is another approach to reduce youth exposure to vaping products.

Limitations

This study has limitations that should be taken account when interpreting the findings. Firstly, our findings are based on a select number of key Auckland suburbs, which may not be wholly representative of the wider Auckland Region. Secondly, our findings reflect the SVR environment in each suburb between August 2023 and March 2024, thus do not capture more recent regulatory changes and their related impacts over time. Additionally, though we used the most recent population data sources at the time of writing, the populations of many Auckland suburbs have increased since the 2023 Census period,²⁴ which may mean SVR store densities relative to suburb populations have declined. Thirdly, the availability of Google Maps data and the recency of Google Street View images varied across SVR locations and suburbs in this study. The SVR count by suburb and the proximity of SVR locations to schools and marae were all checked against available third-party data sources and our dataset updated as required. Finally, the rapid expansion of SVRs in New Zealand in the last few years means that some locations had opened too recently to be verified via Google Maps or Street View, given these tools are updated only periodically. For this

reason, some of the SVRs are listed as “unknown store type” in Table 3.

Conclusion

Scoping of the number, type and density of SVRs across Auckland suburbs with diverse socio-demographic characteristics suggests the number and density of SVRs increase as deprivation level increases. Furthermore, this association was particularly strong in the case for SWAS SVRs located inside or adjacent to convenience stores, petrol stations and sometimes liquor stores, which were much more likely to be located in high socio-economic deprivation suburbs with large populations of Māori and Pacific people. SWAS SVRs are more likely to be located in residential rather CBD areas, and the high number associated with convenience stores increases the likelihood that youth in these areas will have higher exposure to vape products with appealing packaging and product names. A possibly response to the SWAS, which was developed by the retail sector as a response to new retail vape restrictions, is to remove them by requiring photographic evidence from current SVR licence holders of their proximity to convenience stores. This would be an important step in striking the balance between the need to reduce youth exposure to vaping products while ensuring vape products remain accessible as an alternative to smoking tobacco.

COMPETING INTERESTS

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“The welfare system is a necessity for us”: providers’ perspectives on the barriers to accessing welfare support for people living with work-limiting conditions and disability in Aotearoa New Zealand

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ABSTRACT

AIMS: Income is a key determinant of health and health equity. This paper outlines the current welfare supports for people with long-term conditions and reviews the issues associated with accessing those supports, particularly during health system engagement.

METHODS: Weaving a Kaupapa Māori methodology, the He Pikinga Waiora framework and a qualitative approach, our team spoke to 130 healthcare providers across the Waikato Region in face-to-face and virtual engagements about system-level issues associated with accessing welfare support. Notes taken during these engagements were analysed using inductive thematic analysis, systems thinking and a Kaupapa Māori lens.

RESULTS: Because of the way health and welfare systems operate and limited access to advocacy, computerised resources and information about welfare and other supports, key informants observed that patients experienced many difficulties accessing the right type and level of welfare support, with likely consequent impact on health outcomes. These realities were exacerbated because providers were not enabled to help patients navigate the welfare system.

CONCLUSION: The health and welfare systems are not designed to enable access to welfare support. Providers could have a more meaningful role ensuring equitable access to welfare and other supports but are underfunded, understaffed and unsupported. A more integrated approach and cross-sectoral action are needed.

Health and welfare are interconnected, and income is a critical determinant of health outcomes and the equitable distribution of health outcomes.¹ Health conditions have significant and diverse effects on labour market participation.^{2,3} The functional and cognitive limitations imposed by a health condition and the pain experienced combine to reduce the number of hours and type of work people with work-limiting conditions and disabilities can do.³ They tend to move in and out of the labour market, have a reduced capacity to earn and are more likely to be unemployed.²⁻⁷

Low access to economic resources, including income, exacerbates poor health outcomes in many ways.¹⁻¹¹ As economic resources are absorbed through higher health costs,^{3,10,11} low access to economic resources constrains self-care and access to health-enabling resources, such as health insurance and stable housing,^{10,11} and increases

stress and anxiety.^{11,12} While these factors elevate the need to access the health system, low economic resources make it difficult to get to and access the health system, including medication and forms of healthcare.¹⁰ The role of appropriate income support becomes increasingly important to achieve health and health equity gain.

Income support systems function as a social safety net designed to support people experiencing economic hardship caused by unemployment, disability, illness or old age.^{1,6,13} Income support systems typically assist with costs associated with housing, children and childcare, and health conditions or disabilities, and are purported to provide a basic standard of living.^{1,6} While the right to access social security is outlined in Article 22 of the Universal Declaration of Human Rights and Article 9 of the International Covenant on Economic, Social and Cultural Rights,¹⁴ national and international research shows income support

rates are often significantly less than the total eligible population because of complex and time-consuming government processes.^{1,6}

In Aotearoa New Zealand, Article 2 (tino rangatiratanga) of Te Tiriti o Waitangi (Te Tiriti) sets out the government's obligation to ensure Māori have the same rights and privileges, including health and wellbeing, as other New Zealanders.^{1,6,15} As citizens and partners to the Crown under Te Tiriti, Māori should be able to access welfare and other support.^{1,6,10,15} Māori experiences of colonisation and harmful colonial systems mean the need for support for Māori is disproportionately higher.^{6,10,15} However, research shows Māori tend to have lower access to these supports because of the complex, changing and time-consuming nature of government policies and processes, and systemic racism.^{1,3,6,10,15} Even if Māori and others needing welfare support received what they are entitled to, the level of welfare support is “woefully inadequate”.¹⁵ These realities represent a systems failure.

Current welfare supports

In Aotearoa New Zealand two government agencies—Ministry of Social Development (MSD) and Accident Compensation Corporation (ACC)—provide financial and other support to people with work-limiting health conditions sustained through disability, illness or injury.¹ ACC does not cover long-term conditions that are not work- or injury-related, however, and is not included in this substudy. While the type and level of support provided depends on how an impairment occurred and incapacity manifests,^{1,7} the level of weekly payment depends on the age, relationship status and number of dependent children.¹⁶ Administered through Work and Income New Zealand (WINZ), MSD provides two main benefits for people with work-limiting health conditions or disability, including Jobseeker Support—Health Condition or Disability (JS-HCD) for short-term incapacity and the Supported Living Payment (SLP) for permanent and severe incapacity.¹⁶ These main benefits can be accessed by citizens, permanent residents or residence-class visa holders who have lived in Aotearoa New Zealand for more than 2 years.¹⁶ MSD uses an individualised application process and provides flat-rate, means-tested support.^{1,17} All recipients are subject to case management and medical reassessment.^{1,16}

SLP

The SLP is a weekly payment for people with

work-limiting health conditions, injury or disability or a full-time, home-based carer.¹⁶ Eligible individuals are 16 years or older, and totally blind or have a health condition, injury or disability that severely restricts their ability to work more than 15 hours weekly. It is expected that their incapacity will last longer than 2 years, or life expectancy is less than 2 years.¹⁶ Where the spouse being cared for would otherwise need hospital- or residential-level care, a carer can apply who is 16 years or older and without dependent children, or 20 years or older with dependent children.¹⁶

JS-HCD

The JS-HCD benefit is a subset of the Jobseeker Support benefit and only available to a person living with a work-limiting health condition or disability.¹⁶ Eligible individuals are 18 years or older without dependent children, or 20 years or older with dependent children, and unable or limited in their capacity to work full-time, or are in employment but can only work between 15 and 29 hours weekly. From 1 July 2025, recipients will be provided 26 weeks (previously 52 weeks) of support before they need to re-apply.¹⁸ Both SLP and JS-HCD applicants must complete a Work Capacity Medical Certificate penned by a registered doctor, dentist, midwife or nurse. Both SLP and JS-HCD recipients are automatically provided the Winter Energy Payment and can apply for the Accommodation Supplement and Disability Allowance for ongoing housing and health costs.¹⁶

This substudy is part of a larger project to co-design a hauora (wellbeing) needs assessment that integrates the socio-economic determinants and clinical support for Indigenous Māori living with chronic disease. When participants in the larger project described access to welfare support as a critical and continuing issue for Māori patients for many reasons,¹⁰ our team decided to explore what was going on, particularly the higher-level drivers and government responsibilities, and drive change. Alongside other published and forthcoming papers,¹⁰ this substudy explores, from providers' perspectives, barriers to accessing income and other support for eligible patients and monitors the Crown against its Te Tiriti obligations to Māori.

Methods

This substudy is part of a response to a whānau- and community-defined problem that is grounded in a Kaupapa Māori methodology,^{19,20} guided by

the He Pikinga Waiora framework,^{21,22} and used a qualitative approach. Key informants were recruited for in-person and virtual engagements between 2021 and 2023 via community and clinical networks, hospital teams and digital or physical pānui (poster), with snowball sampling leading to further referrals. Key informants' perspectives were gained using semi-structured, qualitative engagements, which enabled an in-depth, flexible exploration of experiential understanding across health contexts, focussing on Māori patients' experiences.²⁰ Because research practices can be a barrier to participation, we took an informal approach to the engagements, which did not include written consent and audio-recording.

Individual and group engagements were undertaken with 130 Māori and non-Māori providers working across many health contexts and roles (Table 1). Beginning with tikanga (practices), such as karakia (prayer) and whakawhanaungatanga (making connections),^{19,20} engagements explored providers' observations of the health determinants and systemic issues impacting patients' lives and service provision. Examples of questions asked were: What health determinants are operating in patients' everyday lives? What systemic issues enable and constrain your service? With informants' verbal consent, the information was written in notes by LU during the engagement, then discussed with the research team.

Systems thinking and inductive thematic analysis of the notes were undertaken by LU, then developed into themes with the research team and a social worker.^{20,23} Inductive thematic analysis enabled

themes to emerge from the empirical material rather than be categorised into predetermined boxes.^{20,23} Themes were then contextualised within the layers of the health and government systems, and issues of power, privilege and racism were highlighted using systems thinking.^{21,22,24} Victim-blaming and cultural deficit theories were rejected in the writing up of the results, and a mana-enhancing, rights-based account provided about how a group of Māori people are negatively impacted by colonial systems. The team—comprising Māori and non-Māori researchers and healthcare providers—shared results in many contexts, such as conferences, policy discussions and decision-maker engagement, while using whānau and provider feedback to drive systems-level change and implementation. Social workers are often mentioned specifically in the results because they play a key role in supporting patients needing welfare support.

A key tension in this substudy was the use of Māori and non-Māori providers' perspectives who see and support Māori in many contexts. We have used these perspectives because they encounter systems from within and provide valuable insights about how system-level issues shape whānau experiences. These perspectives may be different from whānau lived experience, however, and they could be read alongside Uerata et al., which explored whānau lived experience of health determinants, including the welfare system.¹⁰ Ethical approval was granted by the Health and Disability Ethics Committee (Ref: 21/NTB/148) and Waikato DHB Māori Research Review Committee.

Table 1: Types of organisations and roles held by participants.

Type of organisation	Number of key informants	Type of role	Number of key informants
Hospital	77	Allied health	56 (including 9 social workers)
Community	17	Clinical	44
Māori primary care/ primary care	16/4	Management and leadership	14
University	8	Mental health	8
Māori and/or Pacific support services	5	Research	6
Government	3	Culture	2
Total	130		130

Results

Three themes particular to the hospital context were developed: the application process, pushed around and missing out, and WINZ policies and processes. Key informants reported that patients presented to the hospital with significant social needs, especially housing and income support. Patients described many difficulties when engaging WINZ, especially Māori patients, and asked for social workers to support them. Social workers reported that they helped patients to access welfare support every day because of high unmet need and because many patients were receiving the wrong type and level of support. Providers noted that many patients were unemployed and worried about paying for basic living and health costs on a low income. Poor access to food and heating were common, and those affected were often unwell.

The application process

Key informants reported that many eligible patients experienced limited access to information about how to access services and support. Social workers observed that patients spent significant time waiting for WINZ to answer the phone and became frustrated when redirected to complete an online application form, because the WINZ website stated they could apply by phone. Key informants noticed that the individualised application process was especially difficult for the newly diagnosed who were coming to terms with long-term disease and the specificities of a complex welfare system they might not have previously accessed. Additional challenges in the application process were noted for those who found it difficult to navigate online platforms and processes, those without internet access and appropriate technology and those with learning support needs. These experiences show how information barriers intersect with individual barriers to constrain access to welfare support. Informants identified many groups of people with the greatest need who seemed to experience the greatest difficulty accessing support intended for those with the least.

Social workers observed that government representatives questioned the existence of patients' conditions and the medication taken, including those with advanced renal disease. Answering questions about their condition after providing the necessary documentation was "disempowering" and demeaning for patients. While the welfare system required a lot of information from appli-

cants, a lack of communication from the welfare system left many patients waiting and wondering whether they would receive support.

Pushed around and missing out

Key informants mentioned that many patients assumed ACC would help them and were surprised when referred on to WINZ without any support. When patients also found it difficult to get help from WINZ, key informants observed that many patients gave up trying to access support. When advocating for patients, social workers noticed that many existing welfare recipients were not on the right type and level of welfare support and accessing additional support was difficult, such as the Disability Allowance, housing or support for food. Gaining social housing was described by one social worker as "impossible". Key informants across many health contexts explained that WINZ's reimbursement mechanism requires pre-payment and reimbursement takes significant time to be processed. Consequently, many patients were choosing to forego accessing healthcare rather than use this financial support.

WINZ is presented by key informants as unwilling to see and support people's situations appropriately and holistically, and as pushing people to the next government agency without support or direction.¹⁰ This approach is more significant for people with complex needs because they cannot access other government services, such as the Winter Energy Payment and housing, without first accessing MSD support. Because Māori experience a higher burden of chronic disease and are more likely to experience circumstances that require benefit use, they are more likely to be adversely affected by being without welfare support and experience further delays to accessing the health system.^{1,10,11}

WINZ processes and policies

Because of the way the welfare system operates, patients approached social workers to help them navigate WINZ and other government agencies. When trying to advocate for patients, social workers found it difficult to get through to WINZ and it was impractical to wait by patients' beds for long periods of time. When the phone was answered, WINZ representatives were not forthcoming with information and were sometimes unwilling to communicate with them. While there was a Kāinga Ora Homes and Communities (government housing agency) representative to answer queries about housing, there was lacking an MSD representative to address

queries about welfare support. For these reasons, alongside a shortage of social work staff, some social workers were directed by departmental leadership not to support patients to access welfare support. How widely this is practised is unknown. For the reasons described above, social workers said they were forced to be “creative” and “persistent” in their advocacy for patients. They routinely helped to correctly complete application forms and provided questions for patients and whānau to ask WINZ, and sometimes bypassed unhelpful local agency offices to communicate directly with MSD leadership.

Key informants identified many ways the health and welfare systems are not set up to enable access to support, describing that system-level issues across the health and welfare systems interacted to constrain access. The difficulties faced by hospital-based social workers mean the scope for intervention for the benefit of patients can be ineffective and restrictive, and their role to support access for patients is severely undermined. Consequently, the difficulties faced by patients and their whānau will continue.

Discussion

This substudy highlights issues associated with accessing welfare support for Māori patients with long-term conditions from providers’ perspectives. Providers’ experiences present the welfare system as demeaning, difficult, time-consuming, unresponsive and unwilling to see and support real people appropriately, meaningfully and holistically.^{10,15} Crucial supports that enable access to welfare support are not being provided, including advocacy within the hospital context. Consequently, many eligible Māori patients are not accessing and being denied their full right to welfare support.^{1,6,10,15} The various barriers and blocks described above show the health and welfare systems are not designed to enable access, consider equity, nor appropriately counteract the effects of colonisation and systemic racism.^{10,15} These are breaches of the right for Māori to access income and other support.^{1,6,15}

Access to economic security is essential to health and wellbeing, especially for people with long-term conditions.^{1,6,10,15} Access to such support is crucial for Māori and Pacific patients as they tend to be diagnosed younger than non-Māori, non-Pacific people, and their experience of long-term conditions is exacerbated by inequitable

access to healthcare and poorer care.^{10,25} The National Party-led coalition government’s (2023–) commitment to reduce welfare receipt, increase the obligations of recipients and apply sanctions more strictly will make life more difficult for people with long-term conditions and result in further economic hardship.^{26,27}

The current approach to welfare provision positions providers as gatekeepers to income and other support, and they therefore have a role in ensuring equitable access. However, this is currently underfunded, understaffed and providers need support from MSD and WINZ to ensure they understand the available welfare supports. The current approach also puts significant onus on advocates and individuals in difficult situations to navigate a “*landscape of diverse, uncoordinated and disordered service provision*” to access the support patients are eligible for.²⁸ If constrained, stretched, underfunded non-government and community organisations (whose contracts have been cut) continue to be expected to overcome these government failures,²⁹ the government will not fix the failures it creates and recreates. We urge government agencies to take responsibility for the failures and make change.

Given the importance of income to wellbeing, we agree with the findings of the 2018 Welfare Expert Advisory Group that an integrated approach to accessing welfare support and cross-sectoral action are needed.¹ The recent report *Determining our Future* by the Public Health Advisory Committee notes that income support policies are one of the most effective interventions at improving health outcomes and health equity.³⁰ Therefore, it is essential that reform across the health and welfare sectors is actioned to reduce siloes and foster preventative care. An integrated approach that enables easy access to the right type and level of welfare support for those in contact with health services is recommended. The integrated approach should be co-designed (including with whānau, government and non-government services), with appropriate data sharing and troubleshooting. Opportunities are needed for those with health concerns to be supported by a dedicated MSD team to respond to queries and progress applications for welfare supports. Health workers need to understand their roles and opportunities to enable the available welfare supports. This approach can be fostered by workforce development within the existing sector services and the provision of further social worker and navigator

supports in health contexts to initiate applications for patients. Secondments of MSD staff into the health sector, embedding health sector knowledge into the benefit review system, and cross-sectoral governance support can also reduce gatekeeping and enable integrated practice. Ensuring access to income and other supports through an integrated approach is also relevant to the Crown meeting its obligations under Te Tiriti.

The results of this substudy should be considered in light of some limitations. Only the perspectives of providers in the Waikato Region are presented and may be different from whānau lived experiences and other regions. Audio-recording the engagements would have been beneficial, adding quotes to the results.

Conclusion

The welfare system continues to be complex and multiple barriers impede access, including the gatekeeper role of doctors, nurses and social workers. The workforce constraints described by providers, coupled with the changing and complex welfare system, likely exacerbate the inadequate and inequitable delivery of income support to those with the greatest need; thus, perpetuating critical health inequity. Providers could have a more meaningful role in ensuring equitable access to welfare and other supports, but funding and support are needed. An integrated approach and cross-sectoral action are essential.

COMPETING INTERESTS

The Health Research Council of New Zealand provided the funding for the parent project and the present paper. There are no known conflicts of interest. We accept full responsibility for the conduct of the study, for our access to the data and for our decision to publish.

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Physician burnout in ophthalmology: a New Zealand survey

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ABSTRACT

BACKGROUND: Burnout is a chronic syndrome that compromises physician wellbeing and patient care. This study aimed to quantify burnout among New Zealand ophthalmologists and identify key demographic and practice-related factors associated with increased risk, as well as to assess lifetime burnout experiences, time off taken and barriers to seeking help.

METHODS: A cross-sectional study of 171 New Zealand ophthalmologists used a modified Mini Z 2.0 Burnout Survey to assess workplace satisfaction, stress and burnout, while additional questions gathered demographic and practice characteristics, as well as retrospective data on burnout frequency, time off taken, help sought and perceived barriers.

RESULTS: Out of 161 delivered surveys, 84 responses were received (52% response rate). Overall burnout was 20%, with a significantly higher rate in the public sector ($p < 0.05$). Burnt-out respondents reported notably lower job satisfaction, team effectiveness and workload control. No significant associations were found with other demographic or practice factors. Sixty-three percent had experienced burnout at least once, and 40% reported multiple episodes, yet only 15.5% took time off. Among those who sought help (51%), family members were the most common source of support, while 43% did not seek help, primarily due to time constraints.

CONCLUSION: This study shows that burnout affects one in five New Zealand ophthalmologists. Findings underscore the importance of reducing stigma and cultivating supportive environments that encourage help-seeking without fear of repercussions. Reducing administrative tasks and expanding mental health resources, especially in the public sector, may mitigate burnout and strengthen workforce recruitment and retention.

Burnout is a psychological syndrome arising from prolonged occupational stress, characterised by emotional exhaustion, depersonalisation and a reduced sense of personal accomplishment.¹ Burnout negatively impacts clinician wellbeing, productivity and patient safety.² Rates are disproportionately higher among healthcare professionals, particularly surgeons and medical specialists.^{3,4} Yet, studies focussing specifically on ophthalmologists remain limited.

International data suggest that ophthalmologists are not exempt from this challenge. Burnout prevalence has been reported at 38% in the United States, 25% in India and over 35% in Canada, with younger and female ophthalmologists particularly affected.⁵⁻⁸ Although ophthalmology is often perceived as a desirable specialty with good work-life balance, these findings emphasise that ophthalmologists remain vulnerable to the pressures of modern medical practice.

In New Zealand, 175 ophthalmologists serve a population of 5.1 million, equating to approximately 34 per million people.^{9,10} This is well below the ratio in other high-income countries, where figures range between 40 and 114 per million.¹¹ Workforce pressures are compounded by uneven

distribution, with services concentrated in metropolitan centres and regional ophthalmologists facing greater on-call demands, limited subspecialty support and professional isolation.^{12,13} Coupled with an ageing population and increasing demand for eye care, these factors may place New Zealand ophthalmologists at heightened risk of burnout.

To date, no comprehensive study has yet quantified the prevalence of burnout among New Zealand ophthalmologists. Understanding the extent of the problem, and the demographic or practice-related factors that contribute to it, is critical. Such insights are necessary not only to safeguard the wellbeing of ophthalmologists but also to ensure the sustainability of the workforce and the delivery of equitable eye care across the country.

Methods

A cross-sectional survey was conducted among all Medical Council of New Zealand-registered ophthalmologists ($n=171$) identified as eligible at the start of the study.

Data were collected using a modified version of the Mini Z 2.0 Burnout Survey, a validated

instrument developed by the American Medical Association to assess workplace satisfaction, stress and burnout. The Mini Z 2.0 has been previously validated against the Maslach Burnout Inventory, ensuring reliability as a burnout measure.^{14,15}

The original Mini Z 2.0 survey comprises 10 items on a five-point Likert scale, assessing domains such as job satisfaction, stress, burnout symptoms, workload control, teamwork, alignment of values with leadership, administrative burden and workplace atmosphere. For this study, documentation, electronic medical record (EMR) use and EMR proficiency were combined into a single category labelled “administrative time” to reflect the variable adoption of EMR systems across New Zealand.

Burnout was assessed using the validated burnout item from the Mini Z 2.0 survey, which asks participants to self-assess symptoms of burnout. Respondents were classified as experiencing burnout if they selected one of the following: “I am beginning to burn out and have one or more symptoms of burnout”, “The symptoms of burnout that I’m experiencing won’t go away. I think about work frustrations a lot” or “I feel completely burned out. I am at the point where I may need to seek help”.

In addition, demographic and practice-related characteristics were recorded. These included age, gender, years of practice and subspecialty, as well as workload, work location, work sector, certification status, presence of registrars and frequency of on-call duties.

Participants were also asked whether they had ever experienced burnout during their careers, whether they had taken time off for this reason, the sources of help they sought and barriers encountered when seeking support.

Data were collected using an anonymous SurveyMonkey survey. (Symphony Technology Group, 2017, trademark SURVEYMONKEY®). Email addresses were collected only for survey distribution, and responses were de-identified. A reminder email was sent 2 weeks prior to the survey’s closure, and the survey remained open for 6 weeks, from 11 November 2024 to 25 December 2024.

Burnout prevalence was reported as frequencies and percentages, stratified by demographic and practice characteristics. Associations between burnout and these factors were examined using multivariate logistic regression. Mean scores for Mini Z 2.0 survey items were compared between participants with and without burnout using the

Mann–Whitney U test. Statistical significance was defined as $p < 0.05$.

The study has been evaluated by the New Zealand Health and Disability Ethics Committee and deemed not to require ethics approval. The study received approval from Te Whatu Ora – Te Matau a Māui Hawke’s Bay Research Review Committee.

Results

Of 171 surveys distributed, 10 were undeliverable, leaving 161 successfully delivered. Eighty-four responses were received, yielding a 52% response rate.

Seventeen respondents (20%) reported current symptoms of burnout. Burnout prevalence was highest among ophthalmologists working exclusively in the public sector (29.4%), which was significantly higher than among those working exclusively in the private sector (15.4%, $p < 0.05$).

Although differences across demographic groups did not reach statistical significance, several trends were observed. Male respondents reported slightly higher burnout (21.2%) than females (16.7%, $p = 0.29$). Burnout was more common among general ophthalmologists (28.6%) compared with subspecialists (17.5%, $p = 0.77$). By age, prevalence was greatest among those aged 40–49 years (36%, $p = 0.14$), and lowest among those aged 50–59 years (9.1%, $p = 0.99$). No differences were found between regional and urban practices (21.4% vs 19.6%, $p = 0.09$), or between Royal Australian and New Zealand College of Ophthalmologists–certified and international medical graduates (20.6% vs 19.1%, $p = 0.48$). Burnout also appeared more frequent in those working 32–40 hours per week ($p = 0.85$), in practices without registrars ($p = 0.70$) and among those with frequent on-call duties ($p = 0.06$), although these trends were not statistically significant (Table 1).

Analysis of Mini Z 2.0 responses showed that respondents without burnout reported higher job satisfaction, teamwork and workload control ($p < 0.05$). They also demonstrated lower stress and workplace disorder, as indicated by higher survey scores, along with slightly more time for administrative tasks and better alignment of professional values with their team, although these differences were not statistically significant (Table 2).

Across their careers, 53 respondents (63%) reported having experienced burnout at least once. Of these, 34 (40%) reported two or more

Table 1: Demographic and practice characteristics of New Zealand ophthalmologists and associated burnout prevalence.

Demographics		n (%)	Burnout, n (%)	p-value
Total		84 (100)	17 (20)	
Sex	Female (ref) ^a	18 (21.4)	3 (16.7)	0.29
	Male	66 (78.6)	14 (21.2)	
Age	30–39 (ref) ^a	8 (9.5)	2 (25)	0.14
	40–49	25 (29.8)	9 (36)	
	50–59	33 (39.3)	3 (9.1)	
	60 or older	18 (21.4)	3 (16.7)	
Years worked	<5 (ref) ^a	7 (8.3)	2 (28.6)	0.45
	5–9	14 (16.7)	4 (28.6)	
	10–15 years	16 (19.1)	5 (31.2)	
	>15	47 (55.9)	6 (12.8)	
Workload	0.5–0.79 FTE ^b (20–32 hours per week) (ref) ^a	11 (13.1)	2 (18.2)	0.85
	0.8–0.99 FTE (32–40 hours per week)	45 (53.6)	10 (22.2)	
	More than 1.0 FTE (40+ hours per week)	28 (33.3)	5 (17.9)	
Specialty	General ophthalmologist (ref) ^a	21 (25)	6 (28.6)	0.77
	Subspecialist	63 (75)	11 (17.5)	
Workplace	Rural (ref) ^a	28 (33.3)	6 (21.4)	0.09
	Urban	56 (66.7)	11 (19.6)	
Work sector	Private only (ref) ^a	13 (15.5)	2 (15.4)	0.04
	Public only	17 (20.2)	5 (29.4)	
	Public and private	54 (64.3)	10 (18.5)	
Certification	IMG ^b (ref) ^a	21 (25)	4 (20.6)	0.48
	RANZCO ^b	63 (75)	13 (19.1)	
Registrar presence	No (ref) ^a	14 (16.7)	4 (28.6)	0.70
	NTR ^b	9 (10.7)	3 (33.3)	
	TR ^b	9 (10.7)	1 (11.1)	
	TR and NTR	52 (61.9)	9 (17.3)	

Table 1 (continued): Demographic and practice characteristics of New Zealand ophthalmologists and associated burnout prevalence.

Demographics		n (%)	Burnout, n (%)	p-value
On-call duties	No on-call duties (ref) ^a	26 (31)	5 (19.2)	
	≤1 in 5	29 (34.5)	10 (66.7)	0.06
	1 in 6–10	18 (21.4)	2 (11.1)	0.71
	1 in >10	11 (13.1)	0	1.0

^aReference group for multivariate analysis.

^bFTE = full-time equivalent. Regional centres refer to locations outside the major urban cities of Auckland, Hamilton, Wellington, Christchurch and Dunedin. IMG = international medical graduate (trained outside of New Zealand or Australia); RANZCO = Royal Australian and New Zealand College of Ophthalmologists; NTR = non-training registrars (registrars not enrolled in the RANZCO training programme); TR = training registrars (registrars enrolled in the RANZCO training programme).

Table 2: Mean Mini Z 2.0 scores for workplace factors, stratified by burnout status.

	Not burnt out mean score	Self-reported burnout mean score	p-value
Job satisfaction	4.1	3.3	<0.05
Alignment of values	3.6	3.3	0.20
Team effectiveness	3.8	3.1	<0.05
Workload control	3.7	3.1	<0.05
Job stress	3.3	2.9	0.07
Administration time	2.9	2.8	0.66
Work atmosphere	3.2	2.9	0.07

episodes and eight (9.5%) reported five or more episodes. Only 13 respondents (15.5%) had ever taken time off work due to burnout. While a greater proportion of female ophthalmologists reported ever experiencing burnout compared with males (66.7% vs 62%), these differences were small and not statistically significant.

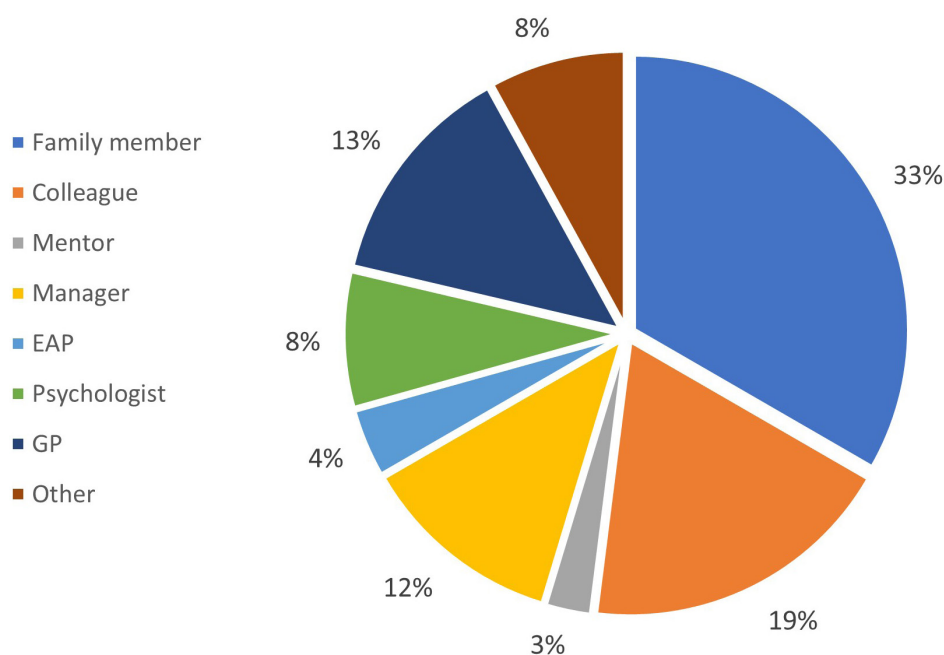
Among those who sought support, family members were the most common source of help (33%), followed by colleagues (19%), general practitioners (13%) and psychologists (8%). Less commonly reported sources included managers, employee assistance programmes, mentors and other supports such as counsellors, workshops or religious leaders (Figure 1).

Barriers to help-seeking were also reported. The most frequent was lack of time (55%), followed by limited support from colleagues or supervisors (24%) and difficulty accessing

services (11%). Other barriers included self-blame and lack of family support.

Discussion

Burnout is a critical issue with effects that extend beyond the individual. In this national survey of 84 ophthalmologists, representing approximately half of New Zealand's practicing ophthalmology workforce, 20% reported symptoms of burnout. While the response rate was relatively strong (52%), these findings may not be fully representative of all ophthalmologists nationwide. Nevertheless, burnout in this sample was associated with lower job satisfaction, reduced team efficiency and limited workload control, which, if left unaddressed, can undermine collaboration and the trust essential to clinical practice.^{2–4,7} Burnout rates among ophthalmologists

Figure 1: Sources of help-seeking among ophthalmologists with burnout.

(20%) were considerably lower than the average across other New Zealand specialties, including radiology (59%), psychiatry (56%), emergency medicine (58%), internal medicine (50%), obstetrics and gynaecology (48%) and surgery (44%).¹⁶ These differences likely reflect variations in workload intensity, administrative burden and patient acuity across disciplines, though ophthalmology remains affected by the same systemic pressures influencing clinician wellbeing nationwide.

The higher burnout rate among public sector ophthalmologists may reflect underlying differences in workload and autonomy.^{17–20} Similar patterns have been reported internationally, with hospital-based ophthalmologists in the United States and Canada, and New Zealand radiologists and oncologists, showing higher burnout than their private counterparts.^{5,8,17–20} A recent Medscape 2023 survey identified excessive bureaucratic tasks, particularly documentation and charting, as the leading contributor to burnout among ophthalmologists.²¹ Office-based clinicians spend an additional 1.84 hours per day—equivalent to 9.2 hours per week—on administrative tasks beyond scheduled hours, further compounding stress and burnout.²²

Other key contributors to burnout in hospital-based settings include insufficient remuneration, limited autonomy and the burden of government regulations.^{5,8,17–20} In contrast, private practice offers greater flexibility,

control over the work environment and more efficient administrative systems. With stronger support staff, ophthalmologists in private practice can delegate non-clinical tasks, reducing administrative burden and potentially lowering burnout rates in this group.

Although not statistically significant, our survey suggested that burnout was more common among ophthalmologists aged 40–49 years. This mid-career stage often coincides with peak professional demands, including leadership and mentorship responsibilities alongside a rising clinical workload.^{7,23,24} At the same time, many in this age group face substantial personal pressures, such as raising children or supporting ageing parents, which may compound emotional exhaustion and contribute to burnout.²⁴

Contrary to our initial hypothesis that practice location might influence burnout rates, with regional ophthalmologists expected to be more vulnerable, our survey found no significant difference between regional and urban practices, with both reporting burnout rates of about 20%. Regional clinicians often face professional isolation, frequent on-call duties and limited access to subspecialty support, all of which can elevate burnout risk.^{12,13,25} Conversely, urban ophthalmologists encounter distinct challenges, including heavier job demands, reduced job control and greater work-related exhaustion.²⁵ Burnout is a multifactorial syndrome shaped by numerous factors;^{1–4} although the

nature of these stressors differs across rural and urban settings, both environments appear to result in comparable levels of burnout. Further research is needed to delineate which specific features of urban and regional ophthalmology practice contribute most to this outcome.

Our study revealed a non-significant trend suggesting that male ophthalmologists may be more affected by burnout at the time of the survey (21.2% vs 16.7%), a finding that contrasts with much of the existing literature reporting higher rates among female physicians.^{6,7} One possible explanation is that men may be less likely to seek support for mental health concerns due to societal expectations around masculinity and resilience, potentially worsening the severity of burnout when it occurs.²⁶ However, when considering career-long experiences, a higher proportion of female respondents reported having experienced burnout at least once (66.7% vs 62%), aligning more closely with prior studies. This suggests that while male ophthalmologists may be more vulnerable to acute or survey-time burnout, female ophthalmologists continue to face heightened lifetime risk, likely reflecting the additional pressures of caregiving responsibilities, work-life integration challenges and experiences of workplace harassment and discrimination.^{5,6} Together, these findings highlight the importance of further research into gender-specific drivers of burnout within ophthalmology.

Nearly two-thirds of respondents (63%) reported experiencing burnout at least once in their careers, and 40% had faced multiple episodes. Yet only 15.5% took time off to recover, and just half sought help. Such reluctance reflects multiple barriers, including concerns about professional repercussions, redistribution of workload and the culture of resilience deeply embedded in the specialty. Consistent with existing literature, physicians are often hesitant to seek support due to fears of judgement, confidentiality concerns and potential damage to reputation or career progression.^{27,28} The culture of stoicism and self-reliance in medicine reinforces this silence, perpetuating unaddressed burnout and magnifying its long-term effects on clinician wellbeing and the quality of patient care.

Implications

New Zealand has one of the lowest ophthalmologist-to-population ratios among high-income countries, with 34 per million

people.¹¹ While burnout prevalence in this study is lower than in Canada and the United States and closer to India,^{5,6,8} workforce pressures will intensify with an ageing population and rising demand for care. The ophthalmologist-to-population ratio is projected to fall by nearly 10% by 2050,¹⁰ highlighting the urgent need for strategies to mitigate burnout and maintain workforce sustainability.

In this context, our findings point to the importance of re-evaluating workplace structures, particularly in public hospitals. Lessons can be drawn from private practice, where lower burnout rates are linked to greater autonomy, reduced bureaucratic demands and more efficient delegation of administrative tasks. Adopting similar strategies in the public sector—such as streamlining documentation, limiting non-essential audits and meetings and providing greater control over schedules—may help reduce stressors and improve job satisfaction.^{17–20,22}

Beyond structural reforms, there is also a pressing need to normalise discussions around mental health and reduce stigma, ensuring ophthalmologists can seek support without fear of professional repercussions. Organisational priorities should include increasing staffing in public sector roles, refining administrative workflows and expanding access to mental health resources. Just as importantly, fostering a culture that supports recovery from burnout—through structured mental health leave, robust employee assistance programmes and adequate backup staffing—can help break the cycle of unaddressed distress and its long-term consequences.²⁹

Strengths and limitations, and suggestions for future research

As with all voluntary self-report surveys, this study is subject to non-response bias, as individuals experiencing burnout may have been less likely to participate, potentially leading to underestimation of prevalence.³⁰ Reliance on self-reported data also introduces the possibility of recall and social desirability bias.

Female ophthalmologists, who make up just over a quarter of the New Zealand workforce,^{10,11} were under-represented in the sample (20%), which may have influenced findings related to gender-associated burnout and limited their generalisability. The modest sample size may also have reduced statistical power to detect associations with demographic and practice factors. None-

theless, the response rate of 52% strengthens the representativeness of results and supports their relevance to comparable ophthalmology populations internationally.

Future research should incorporate qualitative methods to explore ophthalmologists' perspectives on burnout, particularly focussing on protective and resilience factors. These insights could guide the design of targeted interventions to enhance workplace wellbeing. In addition, longitudinal studies are needed to assess the sustained impact of workplace changes on burnout and job satisfaction.

Conclusion

Burnout affects one in five New Zealand

ophthalmologists, with many experiencing repeated episodes across their careers. Despite its impact, few seek help or take time off, reflecting systemic and workplace barriers. Public sector ophthalmologists appear particularly vulnerable due to heavy workloads, administrative demands and limited autonomy. Contributing factors include low job satisfaction, reduced team efficiency and restricted control over work. Addressing these challenges requires systemic reforms—streamlining bureaucracy, strengthening workplace support and fostering a culture that prioritises mental health. Such efforts are essential for sustaining the workforce and supporting recruitment and retention, both in New Zealand and internationally.

COMPETING INTERESTS

VB is on the RANZCO executive committee, the ANZOPS executive committee and the RANZCO New Zealand workforce committee.

El is RANZCO New Zealand Branch chair and a CMC trustee.

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Appendix

Mini Z 2.0 Survey

1. Overall, I am satisfied with my current job:

5.Strongly agree 4.Agree 3.Neither agree/disagree 2.Disagree 1.Strongly disagree

2. Using your own definition of “burnout”, please circle one of the answers below:

5. I enjoy my work. I have no symptoms of burnout.
4. I am under stress, and don't always have as much energy as I did, but I don't feel burned out.
3. I am definitely burning out and have one or more symptoms of burnout, e.g. emotional exhaustion.
2. The symptoms of burnout that I'm experiencing won't go away. I think about work frustrations a lot.
1. I feel completely burned out. I am at the point where I may need to seek help.

3. My professional values are well aligned with those of my department leaders:

5.Strongly agree 4.Agree 3.Neither agree/disagree 2.Disagree 1.Strongly disagree

4. The degree to which my care team works efficiently together is:

5 – Optimal 4 – Good 3 – Satisfactory 2 – Marginal 1– Poor

5. I feel a great deal of stress because of my job

5.Strongly disagree 4. Disagree 3.Neither agree/disagree 2.Agree 1. Agree strongly

6. The amount of time I spend on the electronic medical record (EMR) at home is:

5 – Minimal/none 4 – Modest 3 – Satisfactory 2 – Moderately high 1 – Excessive

7. Sufficiency of time for documentation is:

5 – Optimal 4 – Good 3 – Satisfactory 2 – Marginal 1– Poor

8. Which number best describes the atmosphere in your primary work area?

5. Calm 4 3.Busy, but reasonable 2 1. Hectic, chaotic

9. My control over my workload is:

5 – Optimal 4 – Good 3 – Satisfactory 2 – Marginal 1– Poor

10. The EMR adds to the frustration of my day.

5.Strongly disagree 4.Disagree 3.Neither agree/disagree 2.Agree 1.Strongly agree

Mini Z 2.0 Survey.

The Mini Z survey, created by Dr Mark Linzer and his team at Hennepin Healthcare in Minneapolis, Minnesota, is a versatile tool designed for use in research, programme evaluation and educational purposes without any restrictions. However, its use in commercial or revenue-generating contexts requires prior approval from Dr Linzer or the Hennepin Healthcare Institute for Professional Worklife. For more information, visit www.professionalworklife.com.

A snapshot of families engaged with Whānau Ora services in Aotearoa New Zealand: a retrospective cross-sectional study

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ABSTRACT

AIM: Pasifika Futures Ltd, as a Whānau Ora commissioning agency, was part of phase two of the government-funded Whānau Ora initiative that was active between 2014 and 2025 in supporting Pacific families across Aotearoa New Zealand in improving health, education, housing and employment outcomes. This study investigated wellbeing outcomes of Pacific families engaged in Whānau Ora services over 8 years of this period to identify socio-demographic groups with the highest needs.

METHOD: This was an observational, national cross-sectional study of 11,999 Pacific families engaged with Whānau Ora services between July 2015 and June 2023. The Measurement Assessment Scoring Tool (MAST), a measure of multi-domain outcomes, was used to assess family wellbeing. Regression models yielded comparative mean differences and odds ratios.

RESULTS: Multivariable-adjusted regressions showed that needs, assessed using MAST scores, were significantly higher in families with Sāmoan or Tuvaluan ethnicity, non-English speaking, larger family households or younger family age. Compared with Auckland, needs were higher (all $p < 0.0001$) for those living in Northland and lowest for families living in the South Island (by 4.0), families living in Wellington (by 6.1) and families living in the Midland area (by 6.8).

CONCLUSION: Socio-demographic factors are associated with lower holistic wellbeing in Pacific families. These results can inform targeted interventions directed at reducing wellbeing disparities.

Pacific peoples make up 8.9% of the total Aotearoa New Zealand population.¹ There are at least 17 distinct Pacific ethnicities, all with unique languages and cultures.^{2,3} Two-thirds of the population live in Auckland and make up around 17% of the total Auckland population.

Compared with Aotearoa New Zealand's total population, Pacific peoples are more likely to live in large households, with over half living in households with five or more people.⁴ Although larger household size is associated with a reduced risk of loneliness and higher Pacific language competency⁴ (i.e., fostering cultural identity and better mental wellbeing⁵), it is also associated with overcrowding and lower levels of various socio-economic and health outcomes.^{6,7} The 2023 Census found that 40% of Pacific peoples live in overcrowded housing. One of the contributing factors is an insufficient rental market, with 65% of Pacific families renting, and yet it is estimated that only 4% of rentals have five or more bedrooms.⁴ Overcrowding has been linked to

negative impacts on health. For example, Pacific families who lived in dwellings with at least one major issue such as cold, mould, damp or need for repairs gave substantially lower self-ratings for physical health, mental wellbeing and life-satisfaction compared to those with no housing issues.⁴ Additionally, Pacific people living in overcrowded housing are more likely to have higher rates of hospitalisations due to preventable illnesses.⁸

Pacific communities face greater socio-economic challenges, which contribute to poorer health. In comparison to the total population, Pacific peoples are more likely to have higher debt, higher unemployment rates, lower income and greater material hardship.⁹ Further, Pacific children are more likely to live in a household experiencing material hardship, food insecurity or housing issues.⁹ These disparities partly stem from factors such as lower educational attainment, lower English proficiency and experiences of discrimination and inequality.⁹

In 2014, Pasifika Futures Ltd (PFL), Aotearoa New Zealand's Whānau Ora commissioning agency for Pacific communities was established by the Pasifika Medical Association to provide comprehensive services that would meet the health and social needs of Pacific communities in a family-centred and co-designed approach.¹⁰ Supported by programme navigators, families created plans and set goals to achieve their aspirations in four areas of wellbeing: economic independence (financial freedom), education (lifelong learning), health and community connection. Depending on each family's goals and needs, navigators connected them to the relevant resources and services. Nationally, the programme has maintained a broad influence currently reaching about 90% of Pacific families in Aotearoa New Zealand. Over a 10-year span, PFL has worked alongside and funded over 100 Whānau Ora commissioned partners and supported over 83,000 Pacific families, translating to 395,300 individuals.¹¹

Conversely, other behaviour change interventions developed for Pacific communities are traditionally more likely to be based on health behaviour models premised on the central theory that behaviour is individual and rational.¹² These frameworks are not designed to consider wellbeing values that go beyond physical health as the only measure of wellbeing, compared to holistic Pacific models of health such as the Fonofale model.¹³ Whānau Ora was set up to address the wellbeing of families from a broader, holistic perspective and develop programmes that are community led and not constrained by conventional service paradigms.

Previous analyses of Pacific Whānau Ora data outcomes used the Measurement Assessment Scoring Tool (MAST) to create "needs" scores for families enrolled in the programme.¹¹ The most recent PFL report found that needs scores reduced from entry into the programme to exit. In 2020/2021 over 40% of families who entered the service had moderate to high levels of need compared to 15–20% of families subsequently exiting the services in the following years.¹¹ While these findings support the effectiveness of the programme, more detailed analyses regarding particular subsets of the Pacific population and their level of needs are required to understand who may require targeted support. The aim of this current study was to examine the association between socio-demographic factors and needs (as measured by the MAST score) in families enrolled

in Whānau Ora over an 8-year period.

Method

This observational, national cross-sectional study describes the families engaged with Whānau Ora services over 8 years at their first MAST score assessment. Whānau Ora services focus on Pacific families in Aotearoa New Zealand. The study period spans from July 2015 to June 2023, using data from families enrolled in Whānau Ora Core Navigation services commissioned by Pasifika Futures Ltd. As this study is based on a programme where evaluation is routinely performed to monitor its progress, ethical approval was not required.

Measurements

The programme navigators had performed the measurements (gave "needs" score ratings of families) using a standardised MAST (provided in the Appendix) protocol to assess baseline wellbeing and needs at the time of service engagement. Data on these measures were retrieved from the family databases. Wellbeing and needs scores measured wellbeing across four outcome domains: economic (financial freedom), education (lifelong learning), health (living longer, living better) and connection (leadership, culture and community). Altogether there are 47 items that are clustered into 20 areas of need, and these are each scored between one (lowest need level) and five (highest need level). These scores are further grouped together into four priority areas of need: living financially free; lifelong learning; living longer, living better; and leadership, culture and community. The priority area scores yield a maximum score of 25 in each. Thus, the overall summed MAST scores can range from five (minimum level of need) to 100 (maximum level of need). These data from overall MAST scores, developed specifically for the Whānau Ora Core Navigation programme, were analysed. A higher MAST score indicates lower wellbeing and higher level of need. Finally, families who registered a score of 80 or more are considered "high" needs. This was also identified as an outcome in our analysis. Demographic data included mean family age, male percentage (% of family members that were male), main family ethnicity (identified by the family), languages spoken, region and family size. Region is based on the following programme-defined groups: Auckland, Northland, Wellington, South Island and Midlands (all other

regions located in the middle of the North Island).

Statistical analysis

Statistical analysis was performed at the family level, as the MAST scoring items relate to the family as a whole (Appendix). MAST score distribution was checked for normality. Linear regression was used to examine predictors of initial MAST score (continuous), measured at the first assessment. Logistic regression was used to examine predictors of high-needs initial MAST score, measured at the first assessment. Regression analyses were performed for univariable (unadjusted) and multivariable (adjusted for all other predictors) models. The independent variables in each multivariable model comprised age, male percentage, ethnic group, languages spoken, region and family size. Unstated answers to covariates were retained so that regression output was adjusted for non-responses. All analyses were performed using R (version 4.3.2). A two-sided P-value of less than 0.05 was considered statistically significant.

Results

There were 15,135 families representing 51,362 individuals—of whom 51,068 belonged to families who identified with a Pacific ethnicity as their main ethnic group—with an initial MAST assessment registered with Pasifika Futures between July 2015 and June 2023. Of these 15,135 families, 3,136 were excluded as they had missing MAST details. The remaining 11,999 families were included in this study. Table 1 shows the characteristics of the families included in the study. Over half (53%) of families had a mean age of less than 40 years. One-quarter had fewer than one in 10 members who were males. Nearly 40% were Sāmoan, and a further 31% were Tongan. Over a quarter (27%) of families spoke English only or were bilingual, while a further 25% of families spoke only their Pacific language. Around 30% of families had at least six members.

Mean differences in initial MAST scores

Table 2 shows mean differences in initial MAST scores between groups of Whānau Ora families. The univariable analysis showed significant differences across all the comparison groups ($p < 0.0001$). Compared with MAST scores for families living in Auckland, scores were lower (by up to 9.1 points) in three regions outside of Auckland: Midlands (−7.2, 95% CI: −8.0–−6.4), South Island

(−7.9, 95% CI: −8.7–−7.1) and Wellington (−9.1, 95% CI: −9.9–−8.3).

Multivariable analysis, adjusted for other covariates, shows that average MAST scores remained significantly lower than in Auckland (by up to −6.8, 95% CI: −7.6–−6.0) in these three regions ($p < 0.0001$). MAST scores were 4.0 points (95% CI: 1.6–6.3) higher in Northland than in Auckland. Living outside of Auckland, except for Northland, was associated with having a lower average initial MAST score and a higher level of wellbeing.

The univariable results showed increasing family size was associated with a higher average MAST score. Compared to the MAST score of families in the lowest tertile (one to three members), MAST scores were higher by 5.0 points (95% CI: 4.4–5.6) among those in tertile two (four to five members) and even higher (by 6.0 [95% CI: 5.4–6.6]) in those in tertile three (six to 26 members). Accounting for influences from other factors in the multivariable analysis, these differences were reduced but were still significant ($p < 0.0001$). That is, compared to those in the lowest tertile of family size, those in the highest tertile had a MAST score 2.4 points (95% CI: 1.7–3.8) higher. Thus, larger families tend to have higher average initial MAST scores and a higher level of need (lower wellbeing).

Groups with high need

Table 3 shows odds ratios (OR) for predictors of having a “high need” MAST score (a MAST score of 80 or more out of 100). Perhaps not unsurprisingly, these results emulate those in Table 2, in that all the covariate groups are significantly associated with odds of receiving high-needs assessment scores ($p < 0.0001$). Adjusting for other covariates, sub-groups with lower multivariable odds for registering a high-need score compared with living in Auckland were: living in the Midlands (OR: 0.65, 95% CI: 0.48–0.86), South Island (OR: 0.29, 95% CI: 0.22–0.37) or Wellington regions (OR: 0.37, 95% CI: 0.27–0.48); or older families, average age over 40 (OR: 0.66, 95% CI: 0.56–0.79). Conversely, sub-groups with greater odds were those who spoke a Pacific language only (OR: 1.47, 95% CI: 1.19–1.82 or higher); younger families (with an average age under 25); larger families (particularly those with six or more members, OR: 1.50, 95% CI: 1.28–1.75); or living in either Auckland or Northland. Compared with Sāmoan families most other ethnic groups had lower odds (OR: 0.71, 95% CI: 0.54–0.93 or less).

Table 1: Description of families seen by Whānau Ora services, 2015–2023.

Characteristic	Group	n	%
Total number of families	-	11,999	100
Age (years)	<25	3,037	25.3
	25–39.9	3,265	27.2
	≥40	2,767	23.1
	Not stated	2,930	24.4
Male %	<10	2,984	24.9
	10–39.9	2,288	19.1
	40–59.9	2,497	20.8
	≥60	2,652	22.1
	Not stated	1,578	13.2
Ethnic group	Sāmoan	4,685	39.0
	Tongan	3,725	31.0
	Cook Islands	1,691	14.1
	Niuean	232	1.9
	Fijian Itaukei	477	4.0
	Tuvaluan	435	3.6
	Tokelauan	216	1.8
	Kiribati	248	2.1
	Other Pacific	206	1.7
Other	84	0.6	
Languages spoken	English only	2,085	17.4
	Bilingual	1,120	9.3
	Pacific only	3,007	25.1
	Not stated	5,787	48.2
Region	Auckland	8,058	67.2
	Midlands	1,166	9.7
	Northland	147	1.2
	South Island	1,286	10.7
	Wellington	1,342	11.2
Family size	1–3 members	5,035	42.0
	4–5 members	3,442	28.7
	≥6 members	3,522	29.4

Table 2: Predictors of summed initial Measurement Assessment Scoring Tool (MAST) score.

Variable	Group	Mean (SD)	Mean difference (95% confidence interval)	
			Univariable	Multivariable *
Age (years)	<25	66.3 (14.2)	Reference	Reference
	25–39.9	64.3 (14.1)	-2.01 (-2.68--1.34)	-0.96 (-1.62--0.31)
	≥40	60.0 (13.0)	-6.26 (-6.96--5.56)	-3.17 (-3.91--2.42)
	Not stated	58.6 (12.9)	-7.67 (-8.36--6.98)	-4.30 (-5.32--3.27)
			P<0.0001	P<0.0001
Male %	<10	58.4 (11.7)	Reference	Reference
	10–39.9	65.2 (14.7)	6.78 (6.04–7.52)	3.30 (2.52–4.08)
	40–59.9	65.1 (14.5)	6.70 (5.97–7.43)	3.07 (2.26–3.87)
	≥60	63.3 (14.3)	4.88 (4.16–5.59)	2.35 (1.62–3.09)
	Not stated	60.0 (13.1)	1.61 (0.78–2.45)	3.40 (2.20–4.60)
		P<0.0001	P<0.0001	
Ethnic group	Sāmoan	64.3 (15.4)	Reference	Reference
	Tongan	61.5 (13.1)	-2.73 (-3.32--2.14)	-2.70 (-3.41--1.99)
	Cook Islands	61.3 (11.9)	-3.00 (-3.77--2.24)	-1.77 (-2.61--0.92)
	Niuean	61.7 (13.7)	-2.55 (-4.37--0.73)	-1.78 (-3.53--0.02)
	Fijian Itaukei	57.5 (13.1)	-6.73 (-8.03--5.43)	-4.49 (-5.76--3.22)
	Tuvaluan	64.8 (12.6)	0.48 (-0.88–1.83)	-0.36 (-1.65–0.93)
	Tokelauan	57.1 (10.7)	-7.18 (-9.07--5.30)	-0.71 (-2.54–1.13)
	Kiribati	59.4 (11.8)	-4.88 (-6.64--3.11)	-2.80 (-4.54, -1.06)
	Other Pacific	60.4 (11.3)	-3.86 (-5.79--1.93)	-2.78 (-4.62--0.95)
	Other	64.4 (13.4)	0.17 (-2.81–3.15)	1.89 (-0.94–4.73)
		P<0.0001	P<0.0001	
Languages spoken	English only	60.4 (13.0)	Reference	Reference
	Bilingual	61.4 (14.1)	1.07 (0.06–2.08)	2.26 (1.27–3.25)
	Pacific only	61.5 (12.9)	1.16 (0.38–1.93)	2.14 (1.35–2.94)
	Not stated	63.8 (14.6)	3.46 (2.76–4.15)	2.52 (1.77–3.27)
		P<0.0001	P<0.0001	
Region	Auckland	65.0 (14.0)	Reference	Reference
	Midlands	57.7 (12.6)	-7.21 (-8.03--6.38)	-5.07 (-6.10--4.04)
	Northland	66.6 (11.9)	1.62 (-0.57–3.80)	3.95 (1.60–6.30)
	South Island	57.1 (11.9)	-7.88 (-8.67--7.09)	-6.79 (-7.61--5.96)
	Wellington	55.8 (11.6)	-9.11 (-9.88--8.33)	-6.09 (-6.94--5.25)

Table 2 (continued): Predictors of summed initial Measurement Assessment Scoring Tool (MAST) score.

			P<0.0001	P<0.0001
Family size	1–3 members	59.2 (12.7)	Reference	Reference
	4–5 members	64.2 (14.4)	5.02 (4.43–5.61)	1.71 (1.06–2.36)
	≥6 members	65.2 (14.3)	5.99 (5.40–6.58)	2.41 (1.74–3.08)
			P<0.0001	P<0.0001

*The multivariable model included all predictors listed: age, male %, ethnic group, languages spoken, region and family size.

Table 3: Odds ratios for predictors of high-needs initial Measurement Assessment Scoring Tool (MAST) score.

Variable	Group	High needs (n, %)		Odds ratio (95% confidence interval)	
		No	Yes	Univariable	Multivariable *
Age (years)	<25	2,373 (78.1)	664 (21.9)	Reference	Reference
	25–39.9	2,699 (82.7)	566 (17.3)	0.75 (0.66–0.85)	0.89 (0.78–1.02)
	≥40	2,504 (90.5)	263 (9.5)	0.38 (0.32–0.44)	0.66 (0.56–0.79)
	Not stated	2,685 (91.6)	245 (8.4)	0.33 (0.28–0.38)	0.38 (0.27–0.54)
				P<0.0001	P<0.0001
Male %	<10	2,794 (93.6)	190 (6.4)	Reference	Reference
	10–39.9	1,837 (80.3)	451 (19.7)	3.61 (3.02–4.33)	2.14 (1.76–2.61)
	40–59.9	2,014 (80.7)	483 (19.3)	3.53 (2.96–4.22)	1.95 (1.59–2.39)
	≥60	2,209 (83.3)	443 (16.7)	2.95 (2.47–3.53)	1.93 (1.59–2.35)
	Not stated	1,407 (89.2)	171 (10.8)	1.79 (1.44–2.22)	2.84 (1.96–4.18)
				P<0.0001	P<0.0001
Ethnic group	Sāmoan	3,700 (79.0)	985 (21.0)	Reference	Reference
	Tongan	3,317 (89.0)	408 (11.0)	0.46 (0.41–0.52)	0.48 (0.41–0.57)
	Cook Islands	1,556 (92.0)	135 (8.0)	0.33 (0.27–0.39)	0.40 (0.32–0.50)
	Niuean	197 (84.9)	35 (15.1)	0.67 (0.46–0.95)	0.82 (0.55–1.20)
	Fijian Itaukei	439 (92.0)	38 (8.0)	0.33 (0.23–0.45)	0.45 (0.31–0.63)
	Tuvaluan	359 (82.5)	76 (17.5)	0.80 (0.61–1.02)	0.71 (0.54–0.93)
	Tokelauan	206 (95.4)	10 (4.6)	0.18 (0.09–0.33)	0.54 (0.26–1.00)
	Kiribati	229 (92.3)	19 (7.7)	0.31 (0.19–0.49)	0.40 (0.23–0.64)
	Other Pacific	190 (92.2)	16 (7.8)	0.32 (0.18–0.51)	0.39 (0.22–0.64)
	Other	68 (81.0)	16 (19.0)	0.88 (0.49–1.49)	1.34 (0.73–2.32)
				P<0.0001	P<0.0001

Table 3 (continued): Odds ratios for predictors of high-needs initial Measurement Assessment Scoring Tool (MAST) score.

Languages spoken	English only	1,892 (90.7)	193 (9.3)	Reference	Reference
	Bilingual	975 (87.1)	145 (12.9)	1.46 (1.16–1.83)	1.89 (1.48–2.42)
	Pacific only	2,710 (90.1)	297 (9.9)	1.07 (0.89–1.30)	1.47 (1.19–1.82)
	Not stated	4,684 (80.9)	1,103 (19.1)	2.31 (1.97–2.72)	1.77 (1.49–2.13)
				P<0.0001	P<0.0001
Region	Auckland	6574 (81.6)	1484 (18.4)	Reference	Reference
	Midlands	1067 (91.5)	99 (8.5)	0.41 (0.33–0.51)	0.65 (0.48–0.86)
	Northland	119 (81.0)	28 (19.0)	1.04 (0.68–1.55)	2.15 (1.24–3.68)
	South Island	1218 (94.7)	68 (5.3)	0.25 (0.19–0.32)	0.29 (0.22–0.37)
	Wellington	1283 (95.6)	59 (4.4)	0.20 (0.15–0.26)	0.37 (0.27–0.48)
				P<0.0001	P<0.0001
Family household size	1–3 members	4618 (91.7)	417 (8.3)	Reference	Reference
	4–5 members	2815 (81.8)	627 (18.2)	2.47 (2.16–2.82)	1.43 (1.23–1.67)
	≥6 members	2828 (80.3)	694 (19.7)	2.72 (2.39–3.10)	1.50 (1.28–1.75)
				P<0.0001	P<0.0001

*The multivariable model included all predictors listed: age, male %, ethnic group, languages spoken, region and family size.

Discussion

This large-scale, national cross-sectional study examined socio-demographic group differences in Pacific family support needs, enabling the identification of key indicators that point to higher support requirements. Higher needs were observed in those with Sāmoan or Tuvaluan ethnicity, those who were non-English-speaking, those with larger family households, those living in Auckland or Northland and those with younger families. Regional findings showed that families living in Auckland and Northland have the highest rates of severe housing deprivation. These results relate to previous studies that consistently show that Pacific populations in Aotearoa New Zealand experience disproportionately high rates of housing deprivation, with contributing factors including socio-economic disparities, larger family household sizes and cultural norms.⁶ Pacific families experiencing severe housing deprivation were shown to be young, with nearly 50% aged

under 25 years.⁶ Another study showed that those of Sāmoan and Tongan ethnicity were more likely to live in crowded households and had higher rates of child hospitalisations for respiratory-related illnesses compared to those of Cook Islands Māori and Niuean ethnicity.⁷

In many cases, we did not have data on age, male percentage and languages spoken (Tables 1–3). However, we adjusted for their non-responses by including these in our analysis as “not stated” groups. Missing data for male percentage and languages spoken was associated with higher needs (higher adjusted MAST score; Tables 2 and 3). A possible reason for this is that this missing information is reflective of families who had a low level of exposure to the programme: those who had minimal contact with the navigators or those who dropped out. Given this scenario, together with the assumption that less exposure to the programme is associated with more need, we would expect “not stated” groups to have higher MAST scores. In support of this assumption, prior analysis of the Pacific Whānau Ora data showed

that needs scores reduce from entry into the programme.¹¹ Another possible explanation is that, given demographic variation in non-response rates in Aotearoa New Zealand research,¹⁴ the “not stated” groups may tend to be of demographics that are associated with higher needs. For example, speaking a Pacific language only or being bilingual were associated with having a higher MAST score (Tables 2 and 3), and if non-respondents were more likely to belong to these language groups, this would account for their higher MAST scores.

The current study was able to utilise data collected by health navigators who worked closely with families. This increased the validity of the data by being more likely to capture accurate and salient family needs at the time of measurement. Another strength of the study included the power to detect statistical differences between groups due to the large sample number, which enhances the study’s generalisability. The final population number represented around 11.5% of the current total Pacific population in Aotearoa New Zealand.

There are several limitations that are important when considering these findings. Although the MAST tool has been validated for content by experts and Pacific community members,¹¹ it has not undergone robust statistical validation, which may introduce bias (e.g., construct-validity bias).¹⁵

Additionally, subjective measures in the MAST score could introduce self-report bias. Another limitation is that, as this was an observational study, it was not able to establish causality. For instance, there was an association between larger family household size and higher needs scores, but we cannot confirm causation, and as these are scores assigned to families seen by Whānau Ora services, reverse causation is also a consideration. For the observed associations between region and MAST scores, we cannot determine if MAST scores influence where a family resides, or vice versa. Finally, there may be residual confounding from unmeasured variables unaccounted for in the models.

In conclusion, our study has identified socio-demographic factors associated with lower well-being in Pacific families, which can be used to create targeted interventions to drive improvements. It gives key evidence for supporting families whose primary language is a Pacific language, and developing housing assistance initiatives and financial literacy workshops. In addition, finding ways to give targeted support, particularly for younger families, could lead to overall better distribution of healthcare resources and improved access to vital social services to improve wellbeing for our Pacific families who have unmet needs.

COMPETING INTERESTS

Nil.

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Appendix: Measurement Assessment Scoring Tool (MAST)

A: ECONOMIC - LIVING FINANCIALLY FREE FAMILY NAME REF NO DATE..... NAVIGATOR NAME.....		MAST	1	2	3	4	5	Score
		A1: Family debt	A1.1	No or low debt (repayments are less than 10% of income)	Low to medium debt (repayments are 10–25% of income)	Medium debt (repayments are 25–40% of income)	Medium to high level of debt (repayments are 40–55% of income)	High level of debt (repayments are 55% +of income)
	A1.2	Borrowing is from mainstream banks	Borrowing mostly from mainstream banks	Some borrowing from mainstream and finance companies	Borrowing mainly from finance companies	Borrowing from high interest finance companies		
	A1.3	Debt structure is consolidated (one competitive loan or mortgage)	Debt structure is consolidated (two competitive loans or mortgages)	Debt structure is mixed (mainly consolidated with some small loans)	Fragmented debt structure but they are looking to consolidate some loans	Fragmented debt structure		
		Total A1	Add A1.1, A1.2 and A1.3 and divide by 3 to get Total A1					
A2: Financial literacy	A2.1	Financially literate, able to understand and apply financial terms and concepts	Able to understand financial terms and concepts	Not financially literate but is learning about financial literacy	Not financially literate but has a goal to become financially literate	Not financially literate		
	A2.2	Follows a financial plan or budget, all of the time	Follows a financial plan or budget, most of the time	Follows a financial plan or budget, sometimes	Completed a financial plan or budget	Does not have a financial plan or budget		
	A2.3	Pays all bills on time	Pays most bills on time	Pays some bills on time	Reducing defaults by planning bill payments	Regularly defaults on bill payments		
	A2.4	Uses electronic banking services for nearly all transactions	Uses electronic banking services for many transactions	Uses electronic banking services for some transactions	Has a bank account and exploring electronic banking options	No or limited use of banking services		
	A2.5	Good credit rating	Improved credit rating	Following plan to improve credit rating	Has plan to improve credit rating	Poor credit rating		
		Total A2	Add A2.1 to A2.5 and divide by 5 to get Total A2					
A3: Family income	A3.1	NZ\$75,001 plus	NZ\$60,001–75,000	NZ\$40,001–60,000	NZ\$25,001–40,000	NZ\$25,000 or less		
	A3.2	After meeting living costs, the family have 10% or more of total income left	After meeting living costs, the family have between 5–10% of total income left	After meeting living costs, the family have between 3–5% of total income left	After meeting living costs, the family have between 0–3% of total income left	Unable to meet living costs (food, home, clothing)		
	A3.3	All family members are employed or business owners and have career goals	Most family members are employed or business owners and have career goals	Most family members are unemployed; however, the family has a plan to increase income	Most family members are unemployed	All family members are unemployed		
		Total A3	Add A3.1 to A3.3 and divide by 3 to get Total					
A4: Home ownership and wealth	A4.1	Family owns their own home/business/significant asset or has a mortgage towards ownership	Family has embarked on a savings plan to own their own home/business/significant asset	Family has a goal to own their own home/business/significant asset and knows how to achieve this goal	Family has a goal to own their own home/business/significant asset	Does not own their own home/business/significant asset or have a mortgage towards ownership		
	A4.2	Family are saving more than 10% of total income	Family are saving between 5–10% of total family income	Family has started following a savings plan and are saving between 0–5% of total family income	Family has developed a savings plan	No savings		
		Total A4	Add A4.1 and A4.2 and divide by 2 to get Total					
A5: Family assessment	A5	My family is financially independent and comfortable	My family is financially independent	My family is becoming financially independent	My family struggles financially, some of the time	My family struggles financially, most or all of the time		
Total A		Total A	Add A1, A2, A3, A4 and A5 to get Total A					

Appendix (continued): Measurement Assessment Scoring Tool (MAST)

		1	2	3	4	5	Score	
B: LIFE LONG LEARNING FAMILY NAME REF NO..... NAVIGATOR NAME..... DATE.....	B1: Early childhood education	B1.1	There are no children aged between 3-5 in the family	All children aged between 3-5 are enrolled in ECE and know about the range of ECE options available	Only some of the children aged between 3-5 are enrolled in ECE and know about the range of ECE options available	None of the children aged between 3-5 are enrolled in ECE but parents/caregivers have a plan to enroll them and know about the range of ECE options available	None of the children aged between 3-5 are enrolled in ECE and parents/caregivers have not prioritized ECE	
		B1.2	There are no children between 3-5 in the family	All children between 3-5 are reading, drawing or counting with a family member often (4 or more times per week)	All children between 3-5 are reading, drawing or counting with a family member sometimes (1-3 times per week)	Children between 3-5 are not regularly reading, drawing or counting with a family member but parents/caregivers have an early learning plan for under 5s	Children between 3-5 are not regularly reading, drawing and counting with a family member	
	Total B1		<i>Add B1.1 and B1.2 and divide by 2 to get Total B1</i>					
	B2: Primary and secondary school	B2.1	There are no primary or secondary school aged children in the family	All children are meeting or exceeding age related standards at school.	Most children are meeting age related standards at school	Most children are not meeting age related standards at school. Those who are not are engaged in support to help them meet or exceed the standards.	Most children are not meeting age related standards at school, or the family do not know if the children are meeting age appropriate standards.	
		B2.2	There are no primary or secondary school aged children in the family	The family consistently does all the following: contacts teachers, has homework times, talks about learning, looks for ways to help their child learn, is involved in parent leadership	The family consistently does some of the following: contacts teachers, has homework times, talks about learning, looks for ways to help their child learn, is involved in parent leadership	The family is not consistently involved with the children's schooling or learning at home. However, the family has a plan to become more involved and supportive of their children's schooling	The family is not consistently involved with the children's schooling or learning at home	
	Total B2		<i>Add B2.1 and B2.2 and divide by 2 to get Total B2</i>					
	B3: School leavers and tertiary/trades qualifications & workplace skills	B3.1	There are no school leavers (youth aged between 15-24) in the family	All school leavers aged between 15-24 are engaged in some form of education, employment or training	School leavers who are not in employment, education or training are progressing on their career plan towards education, employment or training	At least one school leaver aged between 15-24 is not in employment, education or training but the family has a career plan in for all youth	At least one school leaver aged between 15-24 is not in employment, education or training	
		B3.2	Most family members have completed a tertiary/trades qualification or workplace skill and have secured employment in this area	Most family members have completed a tertiary/trades qualification or workplace skill or they are on the pathway to achieving this	At least one family member has completed a tertiary/trades qualification or workplace skill	No one in the family has/or is currently completing a tertiary or trades qualification or workplace skill but the family has a tertiary/trades/training plan for all family members	No one in the family has/or is currently completing a tertiary or trades qualification or workplace skill	
	Total B3		<i>Add B3.1 and B3.2 and divide by 2 to get total B3</i>					
	B4: Family literacy	B4.1	All family members have adequate levels of English literacy	Most family members have adequate levels of English literacy	Most family members have low levels of English literacy but the family has a goal to improve their English literacy	Most family members have low levels of English literacy	All family members have low levels of English literacy	
B4.2		All family members have adequate levels of technical literacy	Most family members have adequate levels of technical literacy	Most family members have low levels of technical literacy but the family has an technical literacy plan for these family members	Most family members have low levels of technical literacy	All family members have low levels of technical literacy		
Total B4		<i>Add B4.1 and B4.2 and divide by 2 to get Total B4</i>						
B5: Self-assessment	B5	My family is educationally successful	Most of my family is educationally successful	Most of my family is not educationally successful but we have a goal to improve this	Most of my family is not educationally successful	My family is not educationally successful		
Total B		<i>Add B1, B2, B3, B4 totals and B5 to get Total B</i>						

Appendix (continued): Measurement Assessment Scoring Tool (MAST)

C: HEALTH - LIVING LONGER LIVING BETTER FAMILY NAME REF NO..... NAVIGATOR NAME..... DATE.....	MAST		1	2	3	4	5	Score	
	C1: Healthy families	C1.1	Families have achieved a goal in their health plan	Families are following their health plan	Families have a health plan agreed to by their GP	Families do not have a health plan but they have a goal to create one	Families do not have a health plan		
		C1.2	The family is physically active and makes healthy eating choices, all of the time	The family is physically active and makes healthy eating choices, most of the time	The family is physically active and makes healthy eating choices, sometimes	The family is not physically active and does not make healthy eating choices but they have a goal to improve this	The family is not physically active and does not make healthy eating choices		
		C1.3	All family members are up to date with all their immunisations	Most family members are up to date with all their immunisations	Most family members are not up to date with all their immunisations but they plan to get immunised	Most family members are not up to date with all their immunisations	No family members are up to date with all their immunisations		
		C1.4	All family members are up to date with all their cancer screening tests	Most family members are up to date with all their cancer screening tests	Most family members are not up to date with their cancer screening tests but they plan to get tested	The family know about the importance of cancer screening, however screening is out of date for the majority of the family	Cancer screening status of family members is unknown or out of date		
		C1.5	The family home has all of the following (ventilation, warmth, dryness and not overcrowded)	The family home has three of the following (ventilation, warmth, dryness and not overcrowded)	The family home has two of the following (ventilation, warmth, dryness and not overcrowded)	The family home has one of the following (ventilation, warmth, dryness and not overcrowded)	The family home has none of the following (ventilation, warmth, dryness and not overcrowded)		
		C1.6	All family members are enrolled with a primary care provider	Most family members are enrolled with a primary care provider	Some family members are enrolled with a primary care provider	No family members are enrolled with a primary care provider but they plan to enroll	No family members are enrolled with a primary care provider		
		Total C1						Add C1.1 to C1.6 and divide by 6 to get Total C1	
	C2: Smoke free	C2.1	No family members currently smoke (and all past smokers have stopped smoking for more than 3 months)	No family members currently smoke (but some past smokers have stopped for less than 3 months)	Family members who are smokers are engaged in smoking cessation service/s and have set a quit date	Family members who are smokers have a goal to stop smoking and are aware of smoking cessation support	At least one family member is a smoker		
		C2.2	The family house and cars are smoke free, always	The family house and cars are smoke free, most of the time	The family house and cars are smoke free, some of the time	The family has a goal to make the house and cars smoke free	The family house and cars are not smoke free		
		Total C2						Add C2.1 to C2.2 and divide by 2 to get Total C2	
	C3: Long-term conditions	C3.1	There are no family members with a long-term condition	All family members who have a long-term condition are managing their condition with their health professional	Most family members who have a long-term condition are managing their condition with their health professional	Most family members who have a long-term condition have discussed their condition with their health professional	Most family members who have a long-term condition have not discussed their condition with their health professional		
		C3.2	There are no family members with a long-term condition	Family members are committed to supporting those with a long-term condition to manage their health	Family members sometimes support those with a long-term condition to manage their health	Family members do not support those with a long-term condition to manage their health but they have a goal to improve this	Family members do not support those with a long-term condition to manage their health		
		Total C3						Add C3.1 to C3.2 and divide by 2 to get Total C3	
	C4: Disability	C4.1	There are no family members with a disability	Family members who have a disability are doing all of the following: achieving their aspirations, participating fully in society and accessing services where required	Family members who have a disability are doing one or two of the following: achieving their aspirations, participating fully in society and accessing services where required	At least one family member who has a disability is doing none of the following: achieving their aspirations, participating fully in society and accessing services where required, but they have a plan to achieve their aspirations	At least one family member who has a disability is doing none of the following: achieving their aspirations, participating fully in society and accessing services where required		
		C4.2	There are no family members with a disability	Family members are committed to supporting the member with a disability to achieve their aspirations, to participate fully in society and access support	Family members sometimes support the member with a disability to achieve their aspirations, to participate fully in society and access support	Family members do not support the member with a disability to achieve their aspirations, to participate fully in society and access support but they have a goal to improve this	Family members do not support the member with a disability to achieve their aspirations, to participate fully in society and access support		
		Total C4						Add C4.1 to C4.2 and divide by 2 to get Total C4	
	C5: Family assessment	C5	My whole family is healthy	Most of my family is healthy	Most of my family is unhealthy but we have a goal to improve this	Most of my family is unhealthy	My whole family is unhealthy		
		Total C						Add C1, C2, C3, C4 totals, and C5 to get Total C	

Appendix (continued): Measurement Assessment Scoring Tool (MAST)

MAST		1	2	3	4	5	Score
D1: Culture	D1.1	All family members feel connected to their Pacific culture	Most family members feel connected to their Pacific culture	Most family members do not feel connected to their Pacific culture but they have a goal to get more connected	Most family members do not feel connected to their Pacific culture	No family members feel connected to their Pacific culture	
	D1.2	All family members are able to have a conversation in a Pacific language	Most family members are able to have a conversation in a Pacific language	Most family members are unable to have a conversation in a Pacific language but they have started to learn	Most family members are unable to have a conversation in a Pacific language	All family members are unable to have a conversation in a Pacific language	
	D1.3	Pacific cultural protocols are observed at home, most of the time	Pacific cultural protocols are observed at home, sometimes	Pacific cultural protocols are seldom observed at home but the family has a goal to change this	Pacific cultural protocols are seldom observed at home	Pacific cultural protocols are never observed at home	
<i>Total D1</i>		<i>Add D1.1, D1.2 and D1.3 and divide by 3 to get D1</i>					
D2: Family strength	D2.1	Family members respect each other, always	Family members respect each other, most of the time	Family members respect each other, sometimes	Family members seldom respect each other	Family members do not respect each other	
	D2.2	Family members work together to resolve issues/problems, always	Family members work together to resolve issues/problems, most of the time	Family members work together to resolve issues/problems, sometimes	Family members seldom work together to resolve issues/problems	Family members do not work together to resolve issues/problems	
	D2.3	Conflict between family members is worked through in a non-violent manner, always	Conflict between family members is worked through in a non-violent manner, most of the time	Conflict between family members sometimes results in violent behavior	Conflict between family members often results in violent behavior	Conflict between family members nearly always results in violent behavior	
	D2.4	Home is a safe and supportive environment for the family, always	Home is a safe and supportive environment for the family, most of the time	Home is sometimes unsafe and is not a supportive environment for the family	Home is often unsafe and is not a supportive environment for the family	Home is nearly always unsafe and is not a supportive environment for the family	
<i>Total D2</i>		<i>Add D2.1, D2.2, D2.3 and D2.4 and divide by 4 to get Total D2</i>					
D3: Community networks	D3.1	The family has many strong community connections	The family has many community connections	The family has some community connections	The family is not connected to its community, but would like to be more connected	The family is not connected to its community	
	D3.2	Family members have leadership roles in the community or often participate in community events	Family members have leadership roles in the community or sometimes participate in community events	Family members have leadership roles in the community and seldom participate in community event	Family members do not have leadership roles in the community or participate in community events but they would like to change this	Family members do not have leadership roles in the community or participate in community events	
<i>Total D3</i>		<i>Add D3.1 and D3.2 and divide by 2 to get Total D3</i>					
D4: Caring for older people	D4.1	There are no older people in the family	The older people in the family do all of the following: live in a safe environment, have some independence, manage their health and connect to friends/family/community	The older people in the family do three of the following: live in a safe environment, have some independence, manage their health and connect to friends/family/community	The older people in the family do only one or two of the following: live in a safe environment, have some independence, manage their health and connect to friends/family/community	The older people in the family do none of the following: live in a safe environment, have some independence, manage their health and connect to friends/family/community	
<i>Total D4</i>		<i>Add Total D4</i>					
D5: Family assessment	D5	My family is strong and safe and contributes positively to the community	My family is strong and safe	My family is becoming strong and safe	My family is not strong or safe, most of the time	My family is never strong or safe	
TOTAL D		<i>Add D1, D2, D3, D4 totals, and D5 to get Total D</i>					

D: LEADERSHIP CULTURE AND COMMUNITY

FAMILY NAME REF NO.....
NAVIGATOR NAME..... DATE.....

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Balancing rights and governance: comparative analysis of open disclosure frameworks in Australia and New Zealand

Dylan A Mordaunt

ABSTRACT

AIM: We aimed to conduct a comparative analysis of the open disclosure frameworks in Australia and New Zealand to identify the strengths, weaknesses and trade-offs of their respective approaches and to propose a hybrid model that integrates the best practices from both systems.

METHOD: This qualitative comparative policy analysis systematically reviewed key policy documents from Australia and New Zealand. Data extraction focussed on the principles, processes, governance, legal aspects and implementation strategies of each framework. A multi-theoretical approach was adopted, applying four core theoretical frameworks—institutional theory, regulatory governance, ethics of care and implementation science—to analyse the extracted data. The analysis involved thematic coding, a cross-country comparison through each theoretical lens and a synthesis of the findings to identify the trade-offs between the two models and to inform the development of a refined hybrid model.

RESULT: The analysis revealed that Australia's framework, which is embedded in national safety standards, emphasises system-wide governance and accreditation, offering flexibility but at the risk of implementation variability. In contrast, New Zealand's model, which is legally mandated under consumer rights legislation, prioritises individual accountability and patient rights, ensuring strong enforcement but potentially fostering a compliance-driven culture. The key differences between the two frameworks emerged in their legal specificity, enforcement mechanisms and the practicalities of their implementation. The analysis highlighted the critical role of ethical considerations, workforce capacity and organisational readiness for the effective implementation of open disclosure.

CONCLUSION: Both the Australian and New Zealand open disclosure frameworks offer valuable insights into the challenge of balancing systemic governance and consumer rights. A hybrid approach that integrates Australia's focus on systemic learning with New Zealand's robust legal mandate for patient rights and explicit ethical considerations could provide a more effective and equitable framework for open disclosure, and could enhance healthcare quality and transparency. Future research should focus on the empirical evaluation of the practical implementation and outcomes of such hybrid models.

Open disclosure—transparent and honest communication with patients and their families following an adverse healthcare event—is a cornerstone of modern patient safety systems.¹ It is fundamental to fostering transparency, accountability and trust, and is essential for cultivating a restorative, just and learning culture where lessons are learned from harm.² There is a global consensus on the ethical imperative and practical benefits of open disclosure, which include improved patient satisfaction, reduced litigation and enhanced organisational learning from errors.³ However, despite this global recognition, the implementation of open disclosure varies significantly across different national contexts, reflecting diverse legal, regulatory and cultural landscapes. This variation presents

a research gap in understanding how different national approaches to open disclosure balance the competing priorities of system-level governance and individual patient rights, and what lessons can be learned from these different models.

Australia and New Zealand, two countries with comparable healthcare systems and a shared commitment to patient safety, provide a compelling case for a comparative analysis of open disclosure frameworks. Both nations have formally adopted open disclosure, yet their approaches are fundamentally different. Australia, through its National Safety and Quality Health Service (NSQHS) Standards,⁴ has integrated open disclosure into a broader framework of accreditation and continuous quality improvement, emphasising a system-wide governance model. In contrast, New

Zealand has adopted a legally mandated, rights-based approach, with open disclosure overseen by the Health & Disability Commissioner (HDC) under the *Code of Health and Disability Services Consumers' Rights*,⁵ which prioritises individual consumer entitlements and accountability.

These divergent approaches present inherent trade-offs. Australia's system-focussed model may promote continuous improvement and a learning culture, but it also risks creating variability in implementation and potentially de-prioritising individual patient experiences. On the other hand, New Zealand's rights-based model ensures legal accountability and consistency, but could foster a compliance-driven culture that focusses on legal obligations rather than genuine, patient-centred communication. A deeper, multifaceted comparative analysis is therefore needed to understand these nuances, with a focus on the practical implications, underlying policy instruments, legal ramifications and the impact on health service delivery. This examination is needed for identifying transferable lessons and informing the development of more effective and equitable open disclosure policies internationally.

This study addresses this research gap by conducting a comprehensive comparative policy analysis of the open disclosure frameworks in Australia and New Zealand. Our objectives are to: systematically review and synthesise key policy documents; apply a focussed multi-theoretical framework to analyse these policies; identify distinct regulatory priorities, institutional structures, policy instruments and implementation strategies; critically assess the trade-offs between system governance and consumer rights; and propose a refined hybrid model that integrates the strengths of both approaches. By achieving these objectives, this research aims to provide valuable insights for enhancing healthcare quality, patient safety and transparency on a global scale.

Methods

Study design

This study employed a qualitative comparative policy analysis design to systematically examine and contrast the open disclosure frameworks of Australia and New Zealand. The analytical approach was structured around a focussed multi-theoretical framework to provide a robust interpretation of the policy landscape, integrating key insights relevant to clinical governance and health policy. The protocol was registered with the

Open Science Foundation (<https://osf.io/7pa65/>).

Data sources

Primary data sources included key policy documents from both countries. For Australia, these comprised the Australian Open Disclosure Framework (2014),⁶ the *Review: Implementation of the Australian Open Disclosure Framework – Final consultation report* (February 2020)⁷ and relevant sections of the NSQHS Standards.⁴ For New Zealand, documents included *Guidance on open disclosure policies* (2019)⁸ by the HDC and relevant sections of the *Code of Health and Disability Services Consumers' Rights*.⁵ Supplementary documents, such as legislative acts pertaining to open disclosure, apology laws and data privacy, were also included where identified as relevant during the review process.

Theoretical frameworks

The analysis was guided by a two-stage theoretical approach. Initially, a comprehensive review was undertaken using nine distinct theoretical frameworks to ensure a robust and wide-ranging analysis of the policy documents (see the Appendix for a full description of all nine frameworks). Following this, the four most salient frameworks were selected for an in-depth analysis, as they provided the most direct insights into the core trade-offs and practicalities of the open disclosure policies. These four frameworks were:

- Institutional theory framework: This framework was used to examine how formal and informal rules, including statutory law, common law, regulatory instruments and professional codes, shape policy design and implementation.^{9,10} It helped identify the specific types of legal structures and their interactions or potential conflicts, providing a foundational understanding of the institutional environment in which open disclosure operates.
- Regulatory governance framework: This framework focussed on the mechanisms of policy enforcement, the roles of various regulatory bodies (e.g., Australian Commission on Safety and Quality in Health Care [ACSQHC], HDC) and the specific sanctions or consequences for non-compliance.^{11,12} It helped understand how accountability is ensured and how clinical leadership drives and supports policy implementation.

- **Ethics of care framework:** This framework examined the ethical underpinnings of consumer–provider relationships, emphasising empathy, responsiveness and the relational aspects of care.^{13–15} It allowed for analysis of specific patient rights and remedies, and how patient and staff feedback, along with psychological support, is integrated into the disclosure process.
- **Implementation science framework:** This framework assessed the translation of policies into practice, identifying barriers and facilitators to effective implementation and fidelity.^{16,17} It provided insights into workforce capacity, training needs and organisational readiness for open disclosure, including the effectiveness of training programmes and factors hindering organisational change.

Analytical approach

The author conducted all data extraction and analysis. To ensure rigour and mitigate bias, extraction and analysis was repeated after a 2-week wash-out period. Any differences were resolved after a second 2-week wash-out period, comparison of the extractions and finalised interpretation. The analytical process involved the following steps:

1. **Document review and data extraction:** Each identified policy document was thoroughly read by the author. Key information related to open disclosure principles, processes, governance, legal aspects and implementation strategies was extracted. This included specific attention to the types of legal frameworks, enforcement mechanisms and sanctions, patient rights and remedies, medico-legal barriers and protections, data privacy, cost–benefit considerations, efficiency, resource allocation, funding mechanisms and the economic consequences of non-disclosure.
2. **Thematic analysis:** The extracted data underwent thematic analysis, conducted by the author, to identify recurring themes and patterns within and across the Australian and New Zealand frameworks. This focussed on the practicalities of implementation, the role of clinical leadership and interprofessional collaboration.
3. **Comparative analysis through theoretical lenses:** The identified themes and policy

elements were compared through the lens of the four selected frameworks. This involved describing how each framework manifests in both Australian and New Zealand policies. Similarities and differences in their application and outcomes were identified, including the impact on clinical outcomes and interprofessional collaboration. The strengths, weaknesses and inherent trade-offs of each approach were analysed, considering the political, economic, social and technological (PEST) factors influencing policy choices.

4. **Synthesis and hybrid model proposal:** The insights gained from the comparative analysis were synthesised to develop a refined hybrid model for open disclosure. This model aims to integrate the most effective elements from both Australian and New Zealand frameworks, addressing identified gaps and maximising benefits for patient safety, consumer rights, systemic learning, cultural competence and sustainable service delivery. This synthesis also considers actionable insights for clinical practice and effective patient/family engagement in service co-design.

Ethical considerations

As this study involved the analysis of publicly available policy documents and did not involve human subjects or data, direct ethical approval was not required. The study adhered to principles of academic integrity, transparency and responsible research conduct. All sources were cited.

Results

This section presents the key findings from the comparative analysis of open disclosure frameworks in Australia and New Zealand, structured around the insights derived from the application of the four selected theoretical frameworks. The analysis reveals significant differences in the institutional, regulatory, ethical and implementation dimensions of the two frameworks, which are summarised in Figure 1 and detailed below.

The Australian open disclosure framework is institutionalised as a core component of clinical governance and risk management, embedded within the NSQHS Standards.⁴ This approach positions open disclosure as a system-level intervention, with enforcement tied to the accreditation process. As the ACSQHC states, the framework is intended to

“assist health service organisations to communicate with patients when care does not go to plan.” This system-level focus is further supported by the presence of apology laws in various Australian jurisdictions,¹⁸ which are designed to protect expressions of regret from being used as admissions of liability in legal proceedings.⁶

From a regulatory governance perspective, the ACSQHC plays a central oversight role, providing guidance and monitoring the implementation of the framework. Clinical leadership is identified as a key driver of open disclosure, with a focus on fostering a “just culture” that encourages reporting and learning from errors. However, the framework has been criticised for its lack of specific sanctions for non-compliance, which are primarily limited to accreditation outcomes and potential professional disciplinary actions.

The ethical dimension of the Australian framework is centred on the principles of empathy, respect and honesty in communication with patients and their families. The framework emphasises the importance of providing support to both patients and staff involved in adverse events. However, the systematic integration of patient and staff feedback into continuous improvement loops is not explicitly detailed, and psychological support mechanisms are generally implicit within broader support services.

The implementation of the Australian framework has faced a number of challenges, including medico-legal concerns, reputational damage, limited resources and a lack of consistent training and awareness.⁷ However, the framework has also been praised for its flexibility and its focus on organisational learning.

The New Zealand open disclosure framework: a rights-based approach

In contrast to the Australian model, the New Zealand open disclosure framework is legally mandated under the *Code of Health and Disability Services Consumers' Rights*.⁵ This approach establishes open disclosure as a fundamental consumer right, with a strong emphasis on individual accountability. The HDC is the primary regulatory body responsible for enforcing the framework, and non-compliance can lead to formal complaints and investigations.⁸ As the HDC has stated, “*The Code of Rights gives every consumer the right to be fully informed.*”

The legalistic nature of the New Zealand framework provides a clear and unambiguous basis for enforcement, with specific sanctions for non-

compliance, including recommendations for apologies, changes in practice or referral to professional bodies for disciplinary action. This rights-based approach is further strengthened by the absence of separate apology laws, as the legal mandate for disclosure is the primary driver of the process.¹⁹

The ethical dimension of the New Zealand framework is centred on the principles of sincere, compassionate and thoughtful communication.²⁰ The framework focusses on consumer rights, ensuring that patients are fully informed and supported. It also acknowledges the emotional impact of adverse events on both patients and staff, and it advocates for the provision of support mechanisms.²¹

The implementation of the New Zealand framework has been facilitated by its legal mandate, which has ensured a high level of consistency across the country. However, the framework has also been criticised for its potential to foster a “tick-box” mentality, which could detract from the relational aspects of open disclosure.

Comparative analysis: key trade-offs and implications

The comparison of the Australian and New Zealand open disclosure frameworks reveals a key trade-off between system-level governance and individual patient rights. Australia's system-focussed approach promotes continuous improvement and a learning culture, but it also risks creating variability in implementation and potentially de-prioritising individual patient experiences. In contrast, New Zealand's rights-based model ensures legal accountability and consistency, but it could foster a compliance-driven culture that focusses on legal obligations rather than genuine, patient-centred communication.

These differences have implications for clinical practice. In Australia, the focus on system-level governance may encourage a more proactive approach to risk management and quality improvement, but it may also lead to a more bureaucratic and less personal approach to open disclosure. In New Zealand, the focus on individual rights may encourage a more patient-centred approach, but it may also create a more adversarial environment.

The two frameworks also differ in their approach to legal specificity and enforcement. New Zealand's framework is more legally explicit, with clear sanctions for non-compliance. This provides a strong incentive for healthcare profes-

sionals to comply with the framework, but it may also create a fear of complaints. Australia's framework is less legally prescriptive, with a greater emphasis on professional self-regulation. This may create a more supportive environment for healthcare professionals, but it may also lead to a lack of accountability.

Finally, the two frameworks differ in their approach to ethical and relational issues. New Zealand's framework places a stronger emphasis on consumer rights and cultural competence, particularly for Māori health. Australia's framework also emphasises ethical principles, but it provides less specific guidance on how to integrate patient and staff feedback and psychological support into the open disclosure process.

Discussion

This comparative analysis of open disclosure frameworks in Australia and New Zealand reveals two distinct approaches to balancing system-level governance with individual patient rights. These differences, shaped by unique regulatory philosophies and healthcare system structures, offer valuable lessons for international healthcare systems grappling with the same challenges. The findings highlight the complex interplay of institutional, legal, ethical and implementation factors in shaping policy design and delivery, and they underscore the need for a nuanced approach that leverages the strengths of both models.²²

Australia's emphasis on system governance, driven by the NSQHS Standards⁴ and the accreditation process, is effective in fostering a culture of continuous quality improvement and organisational learning. This approach aligns with the principles of a just culture, which encourages reporting and learning from error without immediate blame.² However, as the implementation science framework reveals, this flexibility can lead to significant variability in the application of open disclosure, as well as in resource allocation and the integration of patient feedback. While clinical leadership is identified as a critical success factor, the framework lacks explicit mechanisms to ensure that this leadership is consistently translated into effective practice at the clinical level.

In contrast, New Zealand's rights-based model, which is legally mandated under the *Code of Health and Disability Services Consumers' Rights*,⁵ provides a clear and unambiguous framework for individual clinician accountability and prioritises individual patient entitlements. The strong

emphasis on cultural competence, particularly for Māori health, is a notable strength of this model. However, the legalistic nature of the New Zealand approach, while ensuring compliance, may inadvertently foster a tick-box mentality, which could detract from the relational aspects of open disclosure. The focus on individual rights may also create a significant administrative burden and may not be as effective in driving broader systemic improvements as a governance-focussed model.

The central trade-off between system governance (Australia) and patient rights (New Zealand) is a key finding of this study. Australia's approach, which promotes systemic learning, may at times deprioritise the experiences of individual patients. Conversely, New Zealand's strong legal mandate, while ensuring accountability, may not be as effective in fostering proactive systemic change or leadership accountability.

The proposed hybrid model: integrating strengths for a more robust framework

A hybrid model of open disclosure, integrating the strengths of both the Australian and New Zealand frameworks, could offer a more robust and effective solution. Such a model would combine the system-wide learning and quality improvement focus of the Australian approach with the legally mandated patient rights and strong ethical considerations of the New Zealand model. This would create a framework that is not only responsive to the needs of individual patients but also committed to continuous improvement at a systemic level.

The key components of this proposed hybrid model would include:

- A dual focus on system-level governance and individual patient rights: This would involve integrating open disclosure into a broader quality improvement framework, while also ensuring that individual patient rights are legally protected and enforceable.
- Clear and consistent standards for implementation: The model would include clear and consistent standards for the implementation of open disclosure, with a focus on ensuring that all patients, regardless of their location or circumstances, have access to the same high-quality process.
- Strong clinical leadership and a supportive organisational culture: The model would emphasise the importance of strong clinical

leadership and a supportive organisational culture in promoting a just and learning culture.

- Comprehensive training and support for healthcare professionals: The model would include comprehensive training and support for healthcare professionals, with a focus on developing their communication skills and their ability to respond to the emotional needs of patients and their families.
- A commitment to cultural competence and health equity: The model would be designed to be culturally competent and to promote health equity, with a particular focus on the needs of Indigenous populations and other vulnerable groups.

International implications and transferability

The findings of this study have implications for other countries seeking to develop or refine their own open disclosure frameworks. The proposed hybrid model, with its dual focus on system-level governance and individual patient rights, offers a potential solution for countries that are grappling with the same challenges as Australia and New Zealand. The model is designed to be adaptable to different national contexts, and it provides a framework for developing a more effective and equitable approach to open disclosure.

The successful implementation of such a model would require a strong commitment from policymakers, healthcare leaders and clinicians, as well as a willingness to invest in the necessary resources and infrastructure.²³ However, the potential benefits of a more robust and effective open disclosure framework, including improved patient safety, enhanced patient trust and a more just and learning culture, are significant.

Australia's emphasis on system governance, primarily through the NSQHS Standards⁴ and accreditation, fosters a culture of continuous quality improvement and organisational learning. This aligns with a just culture, encouraging reporting without immediate blame.² However, as highlighted by the implementation science framework, this flexibility can lead to variability in application, resource allocation and feedback integration. Clinical leadership, while critical, requires more explicit mechanisms to translate commitment into consistent practice.²²

New Zealand's rights-based model, legally mandated under the *Code of Health and Disability Services Consumers' Rights*,⁵ supports individual

clinician accountability and prioritises individual patient entitlements. This provides a clear framework, reducing ambiguity. Its strong emphasis on cultural competence, particularly for Māori health, is a notable strength. However, this legalistic approach, while ensuring compliance, may inadvertently foster a tick-box mentality, potentially detracting from relational aspects. The focus on individual rights may also place greater administrative burden and not inherently drive broader systemic improvements as effectively as a governance-focussed model.

The core trade-off between system governance (Australia) and patient rights (New Zealand) is central. Australia's approach, promoting systemic learning, may sometimes de-prioritise individual patient experiences. Conversely, New Zealand's strong legal mandate, while ensuring accountability, might not inherently foster proactive systemic change or leadership accountability. A hybrid model would ideally integrate Australia's robust quality improvement and systemic learning with New Zealand's commitment to patient rights and explicit ethical considerations, providing actionable insights for clinical practice and addressing interprofessional team dynamics.

Limitations

This study's limitations include its reliance solely on publicly available policy documents. While these documents provide a foundational understanding of the frameworks, they may not fully capture the nuances of real-world implementation, including informal practices, unwritten norms or day-to-day challenges faced by healthcare providers. In particular, the differences in tort law have not been explored in depth and may be an important factor in how differences in policy are realised. The dynamic nature of health policy means some aspects of the analysed documents may have evolved since their publication; efforts were made to acknowledge the most current available information. The interpretation of policy documents is inherently subjective, a limitation mitigated by the systematic application of theoretical frameworks and a multi-faceted analytical approach.

Future research

Future research should build upon this analysis by incorporating empirical data on actual implementation and outcomes. This could involve qualitative studies (e.g., interviews with patients, providers, policymakers) and quantitative studies

(e.g., impact on patient safety indicators, litigation rates, healthcare costs). This is important in both countries.

In New Zealand, the Accident Compensation Corporation's (ACC) no-fault scheme, which was introduced in the 1970s, effectively limits organisational liability for adverse events through its "treatment injury" programme. While legislation has been introduced to mitigate moral hazard (lack of incentive to guard against risk where one is protected from its consequences) related to this for worker safety, no equivalent legislation exists for patient safety. Professional regulation and the HDC's open disclosure framework focus on clinician compliance; however, no equivalent to worker health and safety legislation exists for boards and executives of healthcare organisations to ensure accountability for patient safety.²⁴ Around 2002, Australia experienced a major medical indemnity insurance crisis resulting in the Ipp report, which prompted tort law reforms across all jurisdictions.²⁵ This means that while litigation for healthcare-acquired adverse events and negligence occurs, there are limits to liability for both organisations and practitioners. While there is some understanding of the role of litigation in healthcare quality, further work is warranted in both Australia and New Zealand.^{26–28}

Further investigation into the economic implications, including detailed cost-benefit analyses and the broader economic burden of non-disclosure, is warranted—particularly given New Zealand's no-fault approach to treatment injury. Research exploring the effectiveness of specific training programmes, leadership interventions and patient engagement strategies in diverse healthcare settings would also be valuable. Studies focussing on the long-term impact on trust, transparency and a just culture,²⁹ and the operational integration of open disclosure with broader quality and safety systems, would provide important insights.

Conclusion

This comparative policy analysis of open disclosure frameworks in Australia and New Zealand highlights the distinct yet complementary nature of their respective approaches. Australia's framework, which is grounded in system-level governance and continuous improvement, fosters a strong learning culture. In contrast, New Zealand's legally mandated, rights-based model

emphasises individual consumer entitlements and clinician accountability. This study has identified the key trade-offs between these two models: Australia's flexible, system-oriented approach encourages broad leadership-enabled quality enhancement but can lead to inconsistencies in implementation, while New Zealand's prescriptive, rights-focussed model guarantees individual practitioner legal accountability but risks fostering a compliance-driven culture and moral hazard from health system and services leadership.

The findings of this study suggest that a hybrid approach, which integrates the strengths of both models, could provide a more robust and effective framework for open disclosure. Such a model would combine the system-wide learning and quality improvement focus of the Australian approach with the legally mandated patient rights and strong ethical considerations of the New Zealand model. This integrated framework would aim to achieve widespread systemic safety enhancements, while also promoting individual patient advocacy, transparency and redress.

For policymakers and healthcare administrators, the key recommendation is to move beyond a singular focus on either system-level governance or individual rights, and to instead embrace a dual approach that integrates both. This would involve developing a clear and consistent national framework for open disclosure that is flexible enough to be adapted to local contexts, while also ensuring that individual patient rights are legally protected and enforceable.

For clinicians, the key recommendation is to embrace a culture of open disclosure that is grounded in empathy, respect and a commitment to learning from error. This would involve developing strong communication skills, as well as a willingness to engage in open and honest conversations with patients and their families following an adverse event.³⁰

By fostering a culture that is learning-orientated, legally accountable, culturally sensitive and economically conscious, healthcare systems globally can move closer to realising the full potential of open disclosure as a transformative practice for patient safety and trust. Future research should focus on the empirical evaluation of hybrid models of open disclosure, with a particular focus on their impact on patient safety, patient satisfaction and healthcare costs.

Table 1: Summary of framework and key extraction points.

Framework	Key focus in open disclosure	Australian framework (key themes)	New Zealand framework (key themes)
Institutional theory	Legal and regulatory structures shaping policy.	Embedded in NSQHS Standards; ⁴ apology laws across jurisdictions; complex interplay of legal sources.	Legally mandated by <i>Code of Rights</i> ; ⁵ direct legal duty; clear hierarchy of legal instruments.
Regulatory governance framework	Policy enforcement, regulatory roles and accountability.	Enforcement via NSQHS accreditation; ACSQHC oversight; clinical leadership crucial; sanctions through accreditation/professional action.	HDC as primary enforcer; non-compliance leads to complaints/investigations; senior management support vital; specific sanctions (apologies, practice changes).
Ethics of care framework	Ethical and relational aspects of consumer-provider interactions.	Ethical imperative, empathy, honesty; support for patients/staff; feedback via surveys (less systematic integration); implicit psychological support.	Strong ethical imperative, sincere communication; explicit consumer rights; ⁵ emotional impact acknowledged; feedback via complaints; implied psychological support.
Implementation science framework	Translation of policies into practice; barriers and facilitators.	Barriers: medico-legal fears, resources, inconsistent training; facilitators: supportive culture, governance; challenges in workforce capacity/training effectiveness.	Emphasis on ongoing training/communication skills; recognition of systemic issues; less detail on specific barriers/facilitators or training effectiveness.

NSQHS = National Safety and Quality Health Service; ACSQHC = Australian Commission on Safety and Quality in Health Care; HDC = Health & Disability Commissioner.

Figure 1: Graphical abstract.

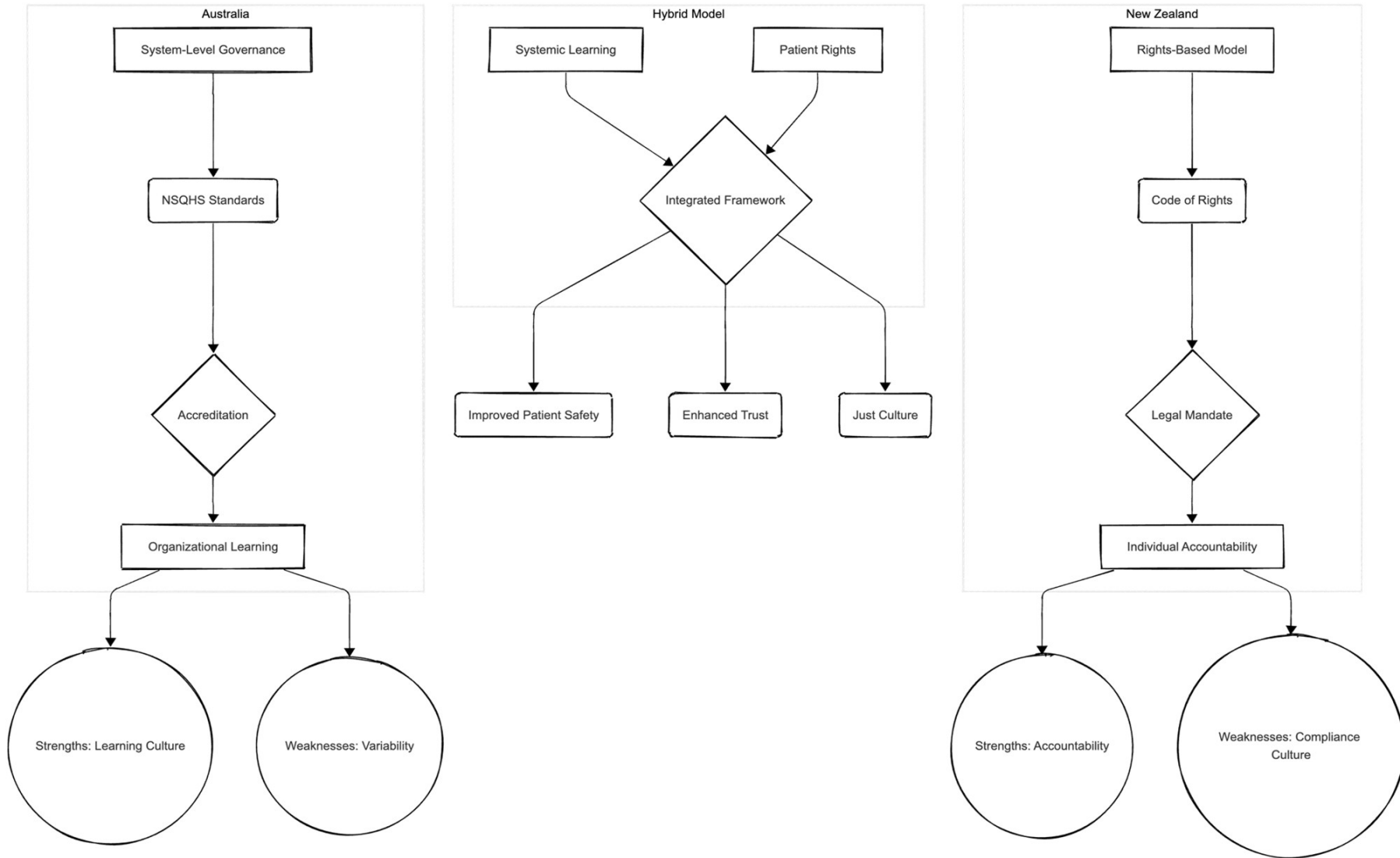


Figure 2: The Australian open disclosure framework: a system-level approach (conceptual diagram of the hybrid model).

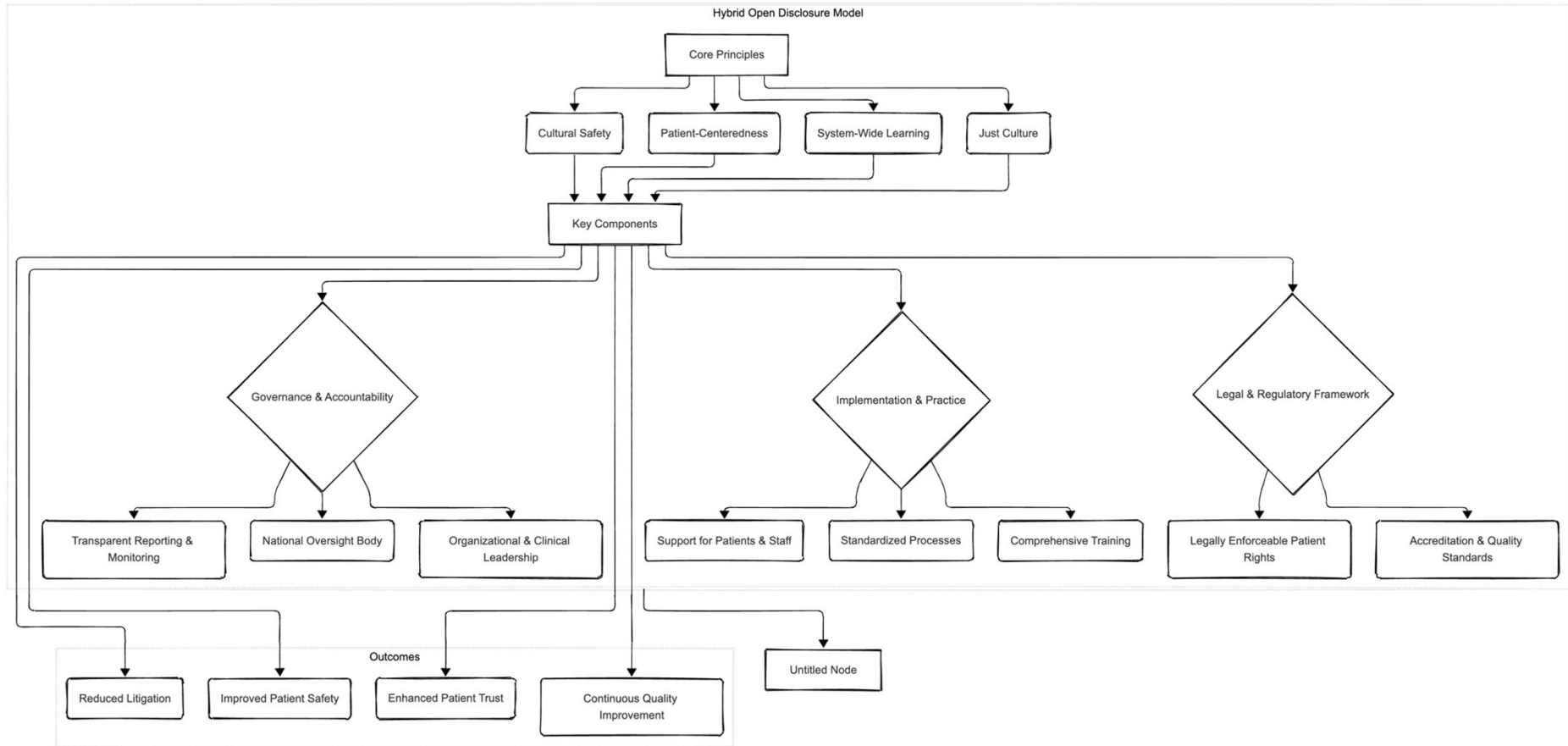
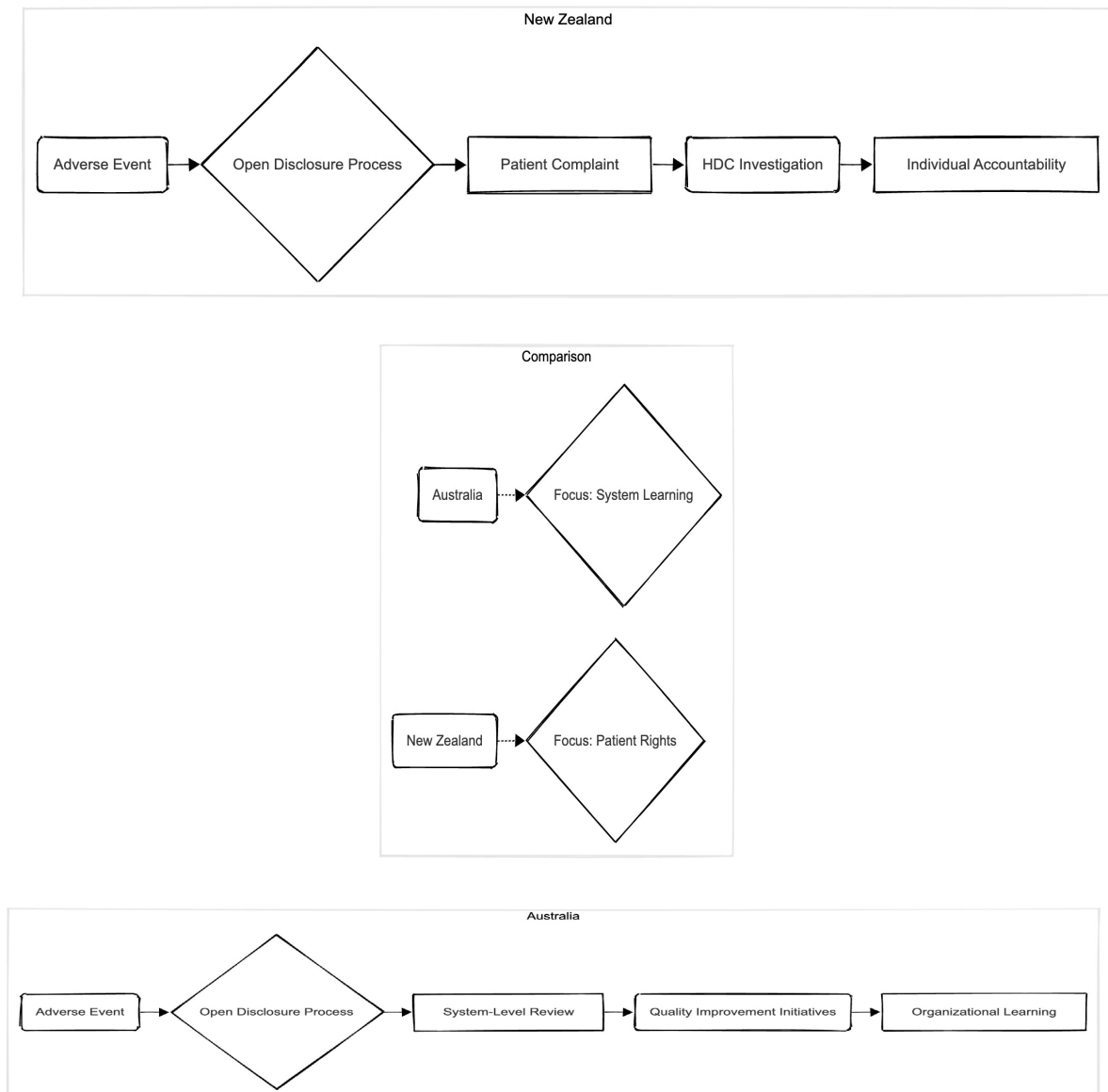


Figure 3: Conceptual workflow diagram.



COMPETING INTERESTS

The author has worked in clinical and clinical governance roles in both Australia and New Zealand.

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DATA

The final codebook, extractions and original documents are available as supplementary documents.

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Appendix: comparative analysis of open disclosure frameworks

1. Data extraction and coding guide

List of tables

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- Appendix Table 5: Regulatory governance framework.
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- Appendix Table 7: Implementation science framework.
- Appendix Table 8: Stakeholder theory.
- Appendix Table 9: Cultural competence and health equity framework.
- Appendix Table 10: Policy feedback theory.

This section provides a detailed guide to the data extraction and coding process used in this comparative policy analysis. The aim was to ensure transparency and auditable documentation of how information was extracted from primary policy documents and categorised according to the theoretical frameworks.

1.1. Policy documents reviewed

The following primary policy documents were systematically reviewed:

Australia:

- Australian Open Disclosure Framework (2014).¹
- *Review: Implementation of the Australian Open Disclosure Framework – Final consultation report* (February 2020).²
- Implementation of the Australian Open Disclosure Framework (2013).²
- Relevant sections of the National Safety and Quality Health Service (NSQHS) Standards. The NSQHS Standards are a set of eight standards that provide a nationally consistent statement of the level of care consumers can expect from health service organisations.³

New Zealand:

- *Guidance on open disclosure policies* (2019) by the Health & Disability Commissioner (HDC).⁴
- Relevant sections of the *Code of Health and Disability Services Consumers' Rights*. The *Code* establishes the rights of consumers, and the obligations and duties of providers to comply with the *Code*. It is a regulation under the *Health and Disability Commissioner Act 1994*.⁵

1.2. Data extraction template

For each document, information was extracted and categorised under the following headings, corresponding to the theoretical frameworks and key areas of interest identified during protocol development and expert feedback:

- Document information: file name, date, source.
- Institutional theory: legal/regulatory structures (statutory law, common law, regulatory instruments, professional codes), formal rules/informal norms, impact on organisational behaviour.⁶
- Comparative health systems framework: system structure (centralised vs decentralised, public vs private), efficiency/resource allocation, service delivery models.
- Policy diffusion theory: international models, cross-national learning, policy transfer mechanisms.⁷
- Regulatory governance framework: enforcement mechanisms, roles of regulatory bodies, clinical

leadership (role in driving/supporting policy), specific sanctions for non-compliance.^{8,9}

- Ethics of care framework: ethical considerations, relational aspects of care, patient rights/remedies, patient/staff feedback (solicitation and integration), patient/staff psychological support.¹⁰⁻¹²
- Implementation Science Framework: barriers/facilitators to implementation, workforce capacity/training (effectiveness, gaps), organisational readiness (factors contributing/hindering).^{13,14}
- Stakeholder theory: interests/influence of various stakeholders, involvement in policy development/service design.^{15,16}
- Cultural competence and health equity framework: cultural diversity, Indigenous rights, equity/access considerations (disparities, specific provisions/gaps).
- Policy feedback theory: evolution of policies, feedback mechanisms (operational integration with quality/safety systems).¹⁷
- Health economics (detailed): cost-benefit analysis (implicit/explicit, conceptual framework), efficiency/resource allocation nuances, impact on healthcare utilisation/costs (hypothesised), funding mechanisms/sustainability (comparative), economic burden of non-disclosure (broader perspective).¹⁸

1.3. Coding process

Data extraction involved a systematic reading of each document. Relevant text segments were identified and coded under the most appropriate theoretical framework and subcategory. Direct quotes or paraphrased summaries were recorded, along with page numbers or section references where applicable, to ensure traceability and auditable documentation. The coding process was iterative, with initial themes refined as more documents were reviewed and as expert feedback was incorporated into the analytical approach.

2. Summary of all theoretical frameworks and key extraction points

This table provides a concise overview of all nine theoretical frameworks used in the comprehensive data extraction, along with their primary focus and key points relevant to open disclosure policy analysis. While the main manuscript focusses on four core frameworks for in-depth discussion, this table serves as a complete reference for the broader analytical lens applied.

Appendix Table 1: Summary of theoretical frameworks and key extraction points for open disclosure policy analysis.

Framework	Primary focus	Key extraction points relevant to open disclosure
Institutional theory	How formal and informal rules shape policy design and implementation.	Legal/regulatory structures (statutory, common, regulatory, professional codes); formal rules/informal norms; impact on organisational behaviour.
Comparative health systems framework	Influence of healthcare system structures on policy design and outcomes.	System structure (centralised vs decentralised, public vs private); efficiency/resource allocation; service delivery models.
Policy diffusion theory	Influence of international models and cross-national learning on policy adoption.	International models; cross-national learning; policy transfer mechanisms.
Regulatory governance framework	Mechanisms of policy enforcement and roles of regulatory bodies.	Enforcement mechanisms; roles of regulatory bodies; clinical leadership (role in driving/supporting policy); specific sanctions for non-compliance.

Appendix Table 1 (continued):

Ethics of care framework	Ethical considerations and relational aspects of consumer-provider relationships.	Ethical considerations; relational aspects of care; patient rights/remedies; patient/staff feedback (solicitation and integration); patient/staff psychological support.
Implementation science framework	Translation of policies into practice; barriers and facilitators.	Barriers/facilitators to implementation; workforce capacity/training (effectiveness, gaps); organisational readiness (factors contributing/hindering); implementation fidelity and adaptation.
Stakeholder theory	Interests, power, and influence of various stakeholders on policy.	Interests/influence of various stakeholders; involvement in policy development/service design.
Cultural competence and health equity framework	How policies address cultural diversity, Indigenous rights and health equity.	Cultural diversity; Indigenous rights; equity/access considerations (disparities, specific provisions/gaps); patient journey and touchpoints.
Policy feedback theory	How policies evolve over time based on feedback and shape future behaviour.	Evolution of policies; feedback mechanisms; organizational learning and improvement cycles; operational integration with quality/safety systems.

3. Detailed comparative analysis tables

Appendix Table 2: Institutional theory.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key insights
Regulatory body	The ACSQHC oversees the policy within the NSQHS Standards framework.	The HDC is the main regulatory body, enforcing the <i>Code of Rights</i> .	Different institutional structures: Australia focusses on system governance; New Zealand is rights-based and legally mandated.
Implementation method	Accreditation-based, with flexibility for local adaptation across states and territories.	Legally mandated under the <i>Code of Rights</i> , ensuring consistency across the country.	Australia allows for regional flexibility; New Zealand has uniform legal enforcement.
Focus of governance	System-wide quality improvement, with an emphasis on organisational learning.	Patient-centred legal accountability, ensuring transparency and patient rights.	New Zealand's framework is more rigid and legally enforceable; Australia's is more adaptable but potentially variable.

ACSQHC = Australian Commission on Safety and Quality in Health Care; HDC = Health & Disability Commissioner; NSQHS = National Safety and Quality Health Service.

Appendix Table 3: Comparative health systems framework.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key insights
Healthcare system structure	State-based systems with healthcare services and policy implementation vary by state and territory.	A centralised healthcare system with uniform governance across the country.	New Zealand's centralised system ensures consistency, while Australia's federal structure can lead to variability.
Governance model	The ACSQHC oversees national standards, but local implementation varies due to state autonomy.	The Ministry of Health oversees the entire health system, with the HDC ensuring compliance across all regions.	New Zealand's centralised model enables more uniform policy application compared with Australia's decentralised model.
Impact on policy implementation	Varies across regions, particularly in rural and resource-limited settings.	More uniform implementation across both urban and rural settings due to centralised governance.	Australia's model allows for flexibility but may be less consistent across regions.

Appendix Table 4: Policy diffusion theory.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key insights
International influence	Influenced by the NHS Being Open Policy and international best practices in patient safety.	Adapted from international models (including Australia), but with stronger legal obligations added.	Both countries are influenced by international best practices, but New Zealand has strengthened legal accountability.
Policy evolution	Updated periodically based on organisational feedback and global best practices in clinical governance.	Adapted lessons from Australia and other international frameworks to create a rights-based legal model.	New Zealand's legal framework reflects a more rigid adaptation of international best practices.
Adaptation to national context	Adapted to fit Australia's federal structure, allowing for local flexibility within the accreditation system.	Adapted to New Zealand's centralised governance and legal obligations under the <i>Code of Rights</i> .	Australia's system allows for local adaptation, while New Zealand's is uniform and legally enforceable.

NHS = National Health Service.

Appendix Table 5: Regulatory governance framework.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key insights
Compliance mechanism	Compliance is enforced through the accreditation process under the NSQHS Standards.	Compliance is enforced through legal mandates under the <i>Code of Rights</i> , with the HDC having investigative powers.	Australia's compliance is tied to accreditation, while New Zealand uses legal enforcement.
Consequences of non-compliance	Loss of accreditation and potential reputational damage.	Legal consequences include potential disciplinary actions and public accountability.	New Zealand's consequences are more severe due to legal enforcement, while Australia's are less punitive.
Focus on organisational learning	Focuses on self-regulation and continuous quality improvement rather than punitive measures.	Emphasises legal compliance and patient rights, with less emphasis on organisational learning.	Australia emphasises organisational improvement, while New Zealand emphasises strict legal compliance.

Appendix Table 6: Ethics of care framework.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key Insights
Patient-centred care	Focuses on empathy, apologies and patient communication, but also integrates risk management and system improvements.	Focuses on full disclosure, acknowledgment of harm and sincere apologies as core elements of care.	Both frameworks promote patient-centred care, but Australia also balances system-level improvement.
Balancing ethics with governance	Emphasises balancing patient needs with broader system learning and governance to improve future outcomes.	Focuses primarily on individual patient rights, with less emphasis on system-wide governance.	New Zealand's framework emphasises patient care and healing, while Australia balances this with system governance.
Relational vs procedural care	Relies on organisational learning to improve patient care but may prioritise procedural governance in some cases.	Strong emphasis on relational care and patient rights, but the legal nature can create a compliance-driven culture.	Australia prioritises system improvement, while New Zealand's focus on rights may lead to procedural care.

Appendix Table 7: Implementation science framework.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key insights
Primary implementation mechanism	Relies on training, organisational preparedness and accreditation processes to implement open disclosure policies.	Implementation is enforced through legal mandates, ensuring uniform compliance across healthcare providers.	Australia relies on training and accreditation, while New Zealand uses legal mandates for uniform implementation.
Variability in implementation	Varies across regions and organisations, depending on institutional resources and commitment to compliance.	Implementation is consistent across the country due to the legal framework and the HDC's enforcement powers.	Australia's implementation is more variable, while New Zealand's legal framework ensures consistency.
Support for staff	Emphasises organisational support and training programmes to ensure staff understand and comply with disclosure policies.	Legal requirements place greater emphasis on compliance, potentially reducing focus on ongoing staff training for relational care.	New Zealand's legal framework ensures compliance but may place less emphasis on continuous staff training.

Appendix Table 8: Stakeholder theory.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key insights
Primary stakeholders	Balances the interests of patients, healthcare providers and organisations, with a focus on system improvement.	Patients are the primary stakeholders, with healthcare providers legally obligated to meet their rights.	Australia balances the interests of multiple stakeholders, while New Zealand prioritises patient rights.
Organisational vs patient focus	Focusses on organisational learning and quality improvement to benefit future patients.	Emphasises individual patient rights, ensuring patients receive full disclosure and legal protections.	New Zealand's framework emphasises individual patient needs, while Australia focusses on organisational improvements.
Potential for adversarial relationships	Less likely to create adversarial dynamics due to the focus on accreditation rather than legal compliance.	More likely to create adversarial dynamics due to the legal framework and potential for patient complaints.	New Zealand's legal framework may foster adversarial relationships, while Australia's is more collaborative.

Appendix Table 9: Cultural competence and health equity framework.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key insights
Focus on Indigenous populations	Acknowledges cultural competence, particularly for Aboriginal and Torres Strait Islander populations, but provides general guidelines.	Strong focus on Māori health and cultural safety, integrating Te Tiriti o Waitangi into the framework.	New Zealand's framework is more robust in addressing Indigenous health and cultural competence.
Specific cultural guidance	Provides general guidance on cultural sensitivity but lacks specific directives for addressing the needs of diverse populations.	Ensures culturally appropriate care through the legal mandate and specific guidance on Māori health.	New Zealand provides more specific guidance on cultural safety, ensuring equitable care for Māori populations.
Health equity focus	Promotes cultural competence but lacks an explicit focus on health equity for diverse populations.	Ensures cultural safety and health equity, particularly for Indigenous and marginalised groups.	New Zealand's framework places a greater emphasis on health equity and culturally appropriate care.

Appendix Table 10: Policy feedback theory.

Subcategory	Australia (ACSQHC)	New Zealand (HDC)	Key Insights
Source of feedback	Primarily driven by feedback from healthcare organisations and accreditation bodies.	Primarily driven by consumer complaints submitted to the HDC by patients and their families.	Australia's feedback is system-oriented, while New Zealand's is more patient centred.
Policy evolution mechanism	Feedback is used to update the NSQHS Standards based on lessons learned from organisational practices.	Feedback from patients is used to inform policy changes and ensure patient rights are upheld.	Australia's policy evolution focusses on organisational learning, while New Zealand's is more reactive to patient concerns.
Type of feedback loop	Focusses on proactive improvements based on system-wide feedback, encouraging organisational learning.	Focusses on reactive changes based on legal complaints and patient grievances.	Australia's feedback loop is proactive, while New Zealand's is more reactive, driven by consumer complaints.

4. Concluding summary

This supplementary document provides a detailed overview of the methodological approach and the comprehensive data analysis that underpins the main manuscript. By presenting the full data extraction and coding guide, along with the complete set of comparative tables for all nine theoretical frameworks, this document aims to enhance the transparency, rigor and depth of the research. The detailed comparative analysis presented in the tables offers a granular view of the similarities and differences between the Australian and New Zealand open disclosure frameworks, providing a rich evidence base for the arguments and recommendations made in the main manuscript.

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Maintaining patient trust as artificial intelligence's role in healthcare grows

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ABSTRACT

Patient trust is key to the delivery of healthcare and realisation of artificial intelligence's (AI) benefits in health. Trust in health institutions and the health professionals working within them directly impacts patient engagement with health services and their health outcomes. Patients want to be able to trust the health system and health services to respect, protect and use their data responsibly to minimise any potential harms. Further, when integrating AI within health services, patients want to be able to trust that this is done with good governance, including the correct approvals and processes, to ensure equitable and safe care. Due to the complexity and fast-changing landscape of AI and the varied levels of AI literacy, trust is arguably even more important. Patients need to be able to trust services to use their health information responsibly and integrate AI in care appropriately regardless of whether they fully understand the technology. Through transparency and good AI governance, trust can be built and maintained, but if broken or lost, it will be difficult to repair and will have wider implications. This paper provides recommendations for actions to be taken to build and maintain trust in health institutions within the context of the evolving AI landscape.

Patient trust in health institutions and health professionals has long been recognised as key to effective healthcare delivery.^{1,2} While definitions and measures of this complex concept have varied, it is theorised that a patient's level of trust in health professionals is largely based on the domains of competence, compassion, privacy, confidentiality, reliability and communication.² It is also considered that trust in healthcare is tied to expectations that health professionals will prioritise the patients' best interests while adhering to the principles of beneficence, fairness and integrity.³ Patient trust in their healthcare professionals is thought to be distinct from patient satisfaction, and is a stronger indicator of the relationship between the patient and their clinician, defining a patient's expectations for their clinician's motivations.⁴ A patient's level of trust in healthcare institutions, influenced by the media and the broader atmosphere of social trust, is also important to consider in the framing of individual patient-clinician rapport.² Studies have shown that patient confidence in health professionals to act in their best interest is associated with more positive health behaviours, improved quality of life and reduced symptoms.⁵⁻⁸ Conversely, low levels of trust or mistrust in health professionals and services are linked to non-engagement in services, low compliance with care recommendations and poorer health outcomes.^{9,10}

Trust in health institutions is easily lost, and once damaged can be hard to repair. Evidence

for predictors of patient trust suggests that demographic characteristics such as gender,¹¹ ethnicity¹¹⁻¹⁴ and age¹¹ may play a role in one's level of trust; however, other individual factors such as past personal experiences with healthcare appear to be a strong and consistent predictor of trust levels.¹¹⁻¹³ Research in Aotearoa New Zealand has demonstrated that any past experiences of racism, regardless of the source, negatively impact patients' confidence and trust in their general practitioner (GP).¹⁵ COVID-19 provided the world with a sobering example of the fundamental nature of people's trust in health professionals, systems and agencies in determining care-seeking behaviours and vaccine uptake.^{1,16} Critically, trust in key institutions among New Zealanders continues to decline in the post-COVID pandemic era,¹⁷ with just over half of New Zealanders (53%) reporting in 2023 that they trust the Aotearoa New Zealand health system to give them the best treatment.¹⁸

It is worth noting that declining trust in health professionals and healthcare institutions is not occurring in isolation. Declining trust in public institutions has been documented in democratic countries internationally in recent years and may be attributed to numerous uncertainties including the COVID-19 pandemic, rising inflation and economic downturn, wars, major geopolitical upheavals and major weather events.¹⁹ These issues, while significant in their own right, may be exacerbated by the visibility of political

polarisation, misinformation and disinformation and political disengagement.¹⁹ A complexity of individual and societal factors may therefore contribute to people's sense of government inability to respond to complex policy issues—including healthcare-related issues—appropriately and in people's best interest.

Legitimate use of personal data is considered to be one major driver of trust in public institutions.¹⁹ While already used routinely for research and quality improvement, and to inform planning and policy, secondary use of patient data and its impact on patient trust is under renewed spotlight with the rapid advancement and public awareness of artificial intelligence (AI) in the healthcare setting. For the purpose of this viewpoint, the Organisation for Economic Co-operation and Development (OECD) definition of AI is used:

“An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment.”²⁰

AI is thought to have the potential to transform medical practice with applications spanning nearly all aspects of healthcare, from risk prediction to treatment monitoring.²¹ It also has the potential to improve equitable outcomes by increasing access and affordability of medical care and addressing biases.²² However, to fully realise this potential, it requires the availability of large amounts of contextually relevant patient data to train and test new AI tools,²³ for which individual patient consent has often not been obtained. While many AI tools are developed through research with well-established approval and ethics procedures, health services are increasingly responsible for deciding whether to provide access to patient data for AI training and testing in the real-world setting.²⁴ They also must decide whether and how the resultant AI tools should be integrated into clinical care.²⁵

In this rapidly evolving environment, building and maintaining patient trust is of growing importance as it is not only essential for permitting AI development and implementation to continue, but it also has implications for

AI's potential to positively impact healthcare provision and patient outcomes once implemented. Moreover, public levels of knowledge about AI appear to be low,^{26,27} and thus trust in health professionals and healthcare institutions to be good stewards of their sensitive health information and care in the face of AI-based health technologies is critical.

In terms of secondary use of patient data for AI, emerging evidence suggests that while healthcare consumers are supportive of the use of their data in certain circumstances, this acceptance comes with conditions: that the data are used primarily for public benefit rather than commercial gain; that they are well informed and given a choice about the use of their data where possible; and that their data are kept secure and their privacy maintained through de-identification when shared with external parties.^{26–28} In short, patients want to be able to trust that their data will be used ethically and responsibly, and will be kept safe.

Appropriate regulation and responsible use of AI are also considered key drivers of trust in public institutions.¹⁹ Regarding the integration of AI into clinical practice, research shows that while patients anticipate benefits such as improved diagnostic accuracy, increased efficiency, reduced errors and reduced workload for health professionals, there are also a number of concerns and doubts.^{27,29} These include a reduced emphasis on clinicians' own expertise and agency, potential for biases and increased health inequities, care interactions lacking human compassion, transparency and communication, the inappropriateness of AI for some situations and a lack of confidence in AI's readiness and reliability for effective and safe healthcare delivery.^{27,29}

The potential for AI to improve healthcare can only be achieved with patient and public trust that their health services and professionals will use their data and apply AI technologies safely, ethically, effectively and appropriately. The remainder of this paper will discuss our own explorations into patient perspectives on the secondary use of personal health information and the implementation of AI in healthcare in Aotearoa New Zealand, with a focus on the role of trust in healthcare consumers' comfort with the development and implementation of these technologies. This is followed by a set of recommendations to researchers, policymakers and health service providers on how to prioritise and maintain patient trust in this rapidly evolving environment.

AI in healthcare and patient trust: evidence from Aotearoa New Zealand

The evidence base for patient or consumer perspectives on the use of patient data for AI development and integration into healthcare in Aotearoa New Zealand is small but growing.^{30–32} To date, our group has conducted research to explore consumer views on this topic and on the secondary use of data more broadly, with some findings already published.^{32,33} Findings have been used to inform national guidelines and policies in our national public health service (Health New Zealand – Te Whatu Ora) including in the development of the AI Governance Framework used by the National AI and Algorithm Expert Advisory Group (NAIAEAG).³⁴

Two of the studies involved individual interviews with potential AI end users (adult health service users and health professionals) of Health New Zealand – Te Whatu Ora (combined n=63) between October 2021 and February 2024. The interviews were semi-structured and scenario-based, as prior work with consumers revealed differing levels of literacy with regards to AI. Interviews were recorded, de-identified and transcribed. Both studies received ethical approval (New Zealand Health and Disability Ethics Committee reference numbers 20/NTA/2; 2023 EXP 18411). Recruitment methods varied based on COVID-related restrictions but included clinicians approaching patients, sharing the study flyer through clinical and academic networks and posting about the study on relevant patient forums. Analysis methods were specific to each study and included thematic analysis³⁵ and the rapid assessment process.³⁶ During the interviews the participant was read a series of hypothetical scenarios in which de-identified patient data were collected to inform the development of an AI tool and the tool subsequently used in clinical practice. Participants were asked to provide their thoughts on the scenarios and potential issues.

Participants across both studies ranged in age from 22 to 77 years and included representation of priority ethnic groups (including 20.6% Māori, 6.3% Pacific and 7.9% Asian). Our interviews revealed several key themes in which maintaining patient trust was central to participants' overall sentiments about AI in healthcare. In particular, participants felt that the following conditions must be present in order to maintain patient trust in an AI-enabled environment:

- The sharing of patient data for AI development is only allowed where the primary benefit is to the Aotearoa New Zealand public.
- Health institutions have strong oversight and governance processes over the continuum of AI development and implementation, with health professional involvement throughout.
- Strong data protection and data governance procedures are in place and prioritised.
- Patients are given choices around AI's role in their care and, where possible, asked for consent to the use of their data for AI development purposes, regardless of how benign the data might appear.
- Health professionals should be the “face” of this, meaning they must be willing to initiate conversations with individual patients about the use of their data and the use of AI in their care.
- Full transparency must be provided around any use of patient data in AI development including who will be involved, how data will be used and how data are being protected.
- External partnerships should be carefully considered. Universities and Aotearoa New Zealand-based organisations are seen as more trustworthy AI development partners than commercial companies or overseas institutions.
- There is Māori representation in work to develop or train AI tools, and governance over AI implementation in healthcare.
- AI is not expected to replace the human connection between health professionals and patients, nor should it over-ride human expertise and contextual knowledge.

Throughout these interviews and in line with the broader evidence on patient trust, it was apparent that participants place high value on their relationships with health professionals as a proxy for trust in the health institutions. Additionally, consistent with recent studies done elsewhere on patient perceptions of AI,^{27,29} the rapport and quality of interactions with health professionals was seen as vital and superior to potential interactions with AI-based technologies. For this reason, AI was not viewed as a trustworthy replacement for clinicians possessing the “human touch” and should instead be viewed as a tool in the clinician's toolbox to

improve accuracy and efficiency, and allow them to spend more time providing patient care.

While the work to date has provided valuable information, more evidence is needed to understand how patient levels of trust vary under different circumstances. As we interviewed patients belonging to a variety of groups, it became clear that group-level emphases were nuanced (for example, patients with rare conditions had different views on international involvement than patients with mental health conditions). More research to clarify and deepen our understanding of consumer views on these issues is needed. It was apparent in this research that understanding and perceptions of AI were changing over time; therefore, as AI becomes more commonplace within society, it is likely that patient trust in these technologies will evolve. Ongoing engagement with end users will ensure health institutions can adapt to accommodate the advances in AI while maintaining patient trust.

Recommendations

These findings have led to the following recommendations for maintaining patient trust in health institutions and their health professionals as AI's role in healthcare grows. Importantly, there must be collaboration between government, researchers and clinical leadership to ensure that health professionals are equipped to support patients and prevent AI-related concerns from interfering with quality healthcare provision.

Recommendation 1: Ensure there is a culture of transparency around AI in health, including secondary data use and AI involvement in healthcare. Transparency means that sufficient information is available to all interest holders, at all stages of the AI lifecycle (from development and design to evaluation and monitoring), to facilitate meaningful public discussion and debate on how an AI tool is designed and deployed. This includes accurate information about the potential limitations and risks of the technology, the nature and extent of patient data use and algorithms used for training and testing.²⁵

- a. Due to the complexity of AI integration and the breadth of datasets needed for AI development/training/testing, the principle of transparency must be adopted and led nationally rather than be the responsibility of individual health professionals and services.

- b. Transparency must be coupled with education to ensure adequate general AI literacy is achieved across the population through combined governmental (as stewards of the healthcare system) and sectoral approaches, so that the public has a clear understanding of not just what AI is but also how it may be used in their healthcare.
- c. Health professionals must receive the necessary training to ensure they have the language and skills to communicate and be transparent with their patients around AI.

Recommendation 2: Support and enable good governance over AI in health in Aotearoa New Zealand following best-practice guidelines and the latest evidence. This will ensure that ethical, legal and privacy considerations are met (see³⁷⁻³⁹), tools are reliable and safe and development and use of AI in health is appropriate.

- a. Governance must include representation of end users, including health professionals and patients.
- b. Good governance must be enabled to establish or update guidelines, policies and regulations (e.g., ethics guidelines) according to emerging international best practices (e.g., from the World Health Organization and other global agencies^{20,40}).

Recommendation 3: Ensure that AI is developed and used in health for the benefit of the Aotearoa New Zealand public. This includes that its development and use are safe and culturally and clinically appropriate, as well as for the primary purpose of improving health outcomes rather than commercial gain. This is particularly important for AI tools developed outside of Aotearoa New Zealand.

- a. Use of patient data for AI development and testing should be only endorsed where there is clear benefit to New Zealanders. This includes that, where the sharing of data occurs with external or overseas organisations, there is sharing of benefits in return.
- b. Health data from New Zealanders should be protected as taonga and commitment to Māori data sovereignty must be maintained.⁴¹
- c. AI use in care should benefit those who need

it most and not disadvantage population groups, nor be a blanket replacement for in-person care.

Conclusions

AI's potential contributions to healthcare cannot be realised without a high degree of patient and societal trust that their health services and professionals are acting in their best interests. The rapid emergence of AI in health has not been coupled with consistent increases in AI literacy among the general public, so it is vital

that patients can trust their institutions to make decisions on their behalf through good governance over patient data for AI development and implementation of AI in care settings. Alongside governance, transparency in the use of data and AI will be fundamental to maintaining and building trust in health institutions. Our research has shown that with good governance and transparency we can help to ensure that health services are equipped to support health professionals and patients through the safe and timely implementation of AI into care.

COMPETING INTERESTS

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Is a clinician-researcher career viable in New Zealand?

Mark J Bolland, Andrew Grey

ABSTRACT

Recently the Health Research Council of New Zealand (HRC) announced the prioritisation of projects that enhanced the development of clinician-researchers. In this viewpoint article, we argue that a clinician-researcher career involving publicly funded, investigator-led clinical research with meaningful end points to inform clinical care is currently not sustainable in New Zealand.

Recently the Health Research Council of New Zealand (HRC) announced that they would prioritise 2026 Project Grant applications that enhanced the development of clinician-researchers.¹ This welcome change led us to ask whether a clinician-researcher career is currently viable in New Zealand. Our short answer is “No”, but the longer, more nuanced version is not if you want to do continuous, consistent, adequately powered, publicly funded, investigator-led clinical research with meaningful end points that inform clinical care. Here we describe why we think such a clinician-researcher career is not feasible. We will focus on doctors in hospital medical practice, but the same arguments broadly apply to all clinicians whether they work in private practice or primary care, or whether they are other health professionals. We will take as our starting point a doctor who has completed their medical specialty training and undertaken and completed a PhD or similar academic degree. They would likely be 30–35 years old, and thus a sustained career as an independent researcher would last 30–35 years.

Clinical research backgrounds

Our views are informed by our experience. We have conducted clinical research continuously in Auckland alongside clinical roles of at least 0.5 FTE in endocrinology (and general medicine initially) for 25 years (AG, total 29 years) and 22 years (MB). Our salaries were funded throughout by an academic position at The University of Auckland (AG) and external funding solely (grants, fellowships, scholarships, MB). Collectively, we have applied for numerous grants, been the principal investigator (PI) on four HRC project grants, co-investigators on three HRC programme grants and been awarded a number of other national and local research grants. We have not been investigators

in industry-funded trials. Collectively, we have more than 450 publications in peer-reviewed journals, including >20 randomised controlled trials, >20 systematic reviews or meta-analyses and >100 original clinical research articles. AG stepped away from leading clinical trials or being the PI for research that required specific funding in mid-career for many of the reasons discussed below. MB has now largely exhausted the possibilities for a fully funded research salary from external funding. We both were lucky at the outset to join an established, very successful research group, which gave us opportunities that a researcher looking to start a group or move into a new field would not have.

Clinical component for a clinician-researcher

When starting as a consultant, we think the minimum clinical job size is 0.5 FTE for most people to obtain sufficient experience in a timely fashion to bridge the gap between functioning as a senior registrar/fellow and a junior consultant. With accumulating clinical experience and expertise, it may be possible to eventually reduce this clinical component without compromising clinical care, although that might entail a narrowed focus. There are essentially two methods for obtaining a consultant position in the public health system: working directly for Health New Zealand – Te Whatu Ora or working as a university academic, whose clinical work is contracted to Health New Zealand – Te Whatu Ora.

Research time and salary funding

If working full-time (1.0 FTE) with 0.5 FTE clinical, this leaves at most 0.5 FTE for research. If in a university academic position, the remaining

0.5 FTE is usually split 40% teaching (0.2 FTE), 40% research (0.2 FTE) and 20% service (0.1 FTE), meaning there is 8 hours/week available for research. This job structure is fixed at The University at Auckland, but there may be more flexibility at other institutions.

An alternative approach is to fund the component of the salary for research using external funding obtained from commercial research or from grants and scholarships. The commercial research option is currently used regularly by many research groups: contract research is performed doing industry-funded studies and excess revenue that accrues can be used to fund research staff, equipment and investigator-led studies. The viability of this approach is highly variable among specialties, being heavily dependent on industry interest in the field, which can change rapidly. For example, our own speciality, osteoporosis, had great industry interest from the 1980s on with firstly preclinical research followed by the introduction into clinical practice of progressively more potent bisphosphonates from around 1995–2008. This was followed by similar programmes for selective oestrogen receptor modulators, strontium, PTH analogues and more recently RANKL and sclerostin inhibitors with the last major industry-sponsored phase three trial in 2017. There are currently no new osteoporosis agents on the horizon and industry activity has all but disappeared. While many research groups have successfully incorporated this commercial-funding option into their work, the ability to consistently fund a 0.5 FTE research salary over a career would likely be challenging for any group. At best, a fortunate alignment of career stage with industry investment is required. In addition, while undertaking industry-sponsored research can provide funds to support a research career, it also requires considerable time commitment, which impacts on the ability to conduct investigator-initiated research.

Funding a career from external grants and scholarships is even more challenging. The only

large funder of grants and scholarships in New Zealand is the HRC, but there are only two major scholarships available for junior- to mid-career academic clinicians that fund salaries for up to 5 years: Clinical Practitioner Fellowships, for “*experienced clinicians to sustain and expand a programme of research*”² and Sir Charles Hercus Health Research Fellowships, for “*emerging scientists who have demonstrated outstanding potential to develop into highly skilled researchers*.”³ Both are extremely competitive, with 16 Clinical Practitioner and 64 Sir Charles Hercus fellowships awarded over the last 10 years. There are few other opportunities from national cross-discipline funding bodies. Individual specialties and regional funders may provide some scholarships, but these too are limited in number, highly competitive, short-term and might target a specific career stage, usually early career.

For HRC project and programme grants, the situation is equally challenging. While such awards can be used to support clinical investigators’ salaries, the reality is that the funder’s budgetary constraints and institutional overhead costs severely limit the extent of such support (see below). In addition, the success rate is <10% for applications. Table 1 shows details of projects and programmes awarded between 2015 and 2025 taken from the HRC research repository.⁴ Over these 11 years, there were 413 projects and 52 programmes funded, approximately equally split between preclinical and clinical research. The majority of projects (73%) and programmes (93%) are led by professors or associate professors. Few individuals in this 11-year span had more than one project or programme awarded. Seventy-one percent of PIs for projects and 84% for programmes had only one project or programme grant as PI respectively, and similarly between 2020 and 2025 when the HRC reported all named investigators (NIs) for their funded grants, 78% and 88% of individuals were NIs on only one project or programme grant respectively.

Regardless of whether the salary funding

Table 1: Details of Health Research Council of New Zealand (HRC) funded projects and programmes.

HRC-funded projects		HRC-funded programmes
	N (%)	N (%)
2015–2025	413	52
Category ^a		
Preclinical	184 (45%)	19 (37%)
Clinical	229 (55%)	33 (63%)

Table 1 (continued): Details of Health Research Council of New Zealand (HRC) funded projects and programmes.

Institution		
University of Otago	170 (41%)	20 (39%)
The University of Auckland	146 (35%)	20 (39%)
Other ^b (23/7 institutions)	97 (23%)	12 (23%)
Principal investigators (PI)		
Professor	153 (53%)	37 (82%)
Associate professor	57 (20%)	5 (11%)
Doctor	73 (26%)	3 (7%)
Other	3 (1%)	0 (0%)
Number of projects for a PI		
6	2 (0.7%)	
5	1 (0.3%)	
4	5 (1.7%)	
3	23 (8%)	
2	52 (18%)	7 (16%)
1	203 (71%)	38 (84%)
2020–2025		
Named investigators (NI)		
Professor	1,193	321
Associate professor	317 (27%)	104 (32%)
Doctor	152 (13%)	41 (13%)
Other	570 (48%)	126 (39%)
	154 (13%)	50 (16%)
Number of projects for a NI		
7	3 (0.3%)	
6	7 (0.6%)	
5	10 (0.8%)	
4	19 (1.6%)	1 (0.3%)
3	57 (4.8%)	4 (1.2%)
2	169 (14%)	34 (11%)
1	928 (78%)	282 (88%)

^a Determined by one author (MB) reading the title and lay summary and classifying as preclinical or clinical. Where both categories of research co-existed in the same research grant, the dominant one was allocated.

^b Twenty-three institutions for projects and seven for programmes.

path taken was university or externally funded, funders—and in particular the HRC—will require evidence of existing successful research by applicants for all these scholarships and grants. Prior funding will have been necessary to do such research and is also required to develop new research protocols and submit applications. Eight hours per week as a university academic is barely sufficient time to undertake literature reviews, develop protocols, write and submit funding applications, submit ethics applications and do the related university administrative tasks, at least when a researcher is starting out, and completely inadequate if at the same time the researcher is conducting ongoing studies. For externally funded researchers, funding will be required to do all these tasks, but either way, it is likely a lot of this work, probably the majority, will be done out-of-hours in the researcher's free time. Having invested a large amount of time into putting funding applications together, repeatedly being declined for funding has a considerable detrimental effect on morale, regardless of funding source.

Overall, even the most successful clinician-researcher is unlikely to be able to achieve sufficient repeated success from publicly funded research grants and scholarships to fund their own salary for a substantive period of time.

Research funding

Between 2020 and 2025, the HRC research repository⁴ lists all the NIs for the funded project grants. Over these 6 years, there were 227 funded project grants. The median number of NIs was seven, with a median of two professors, one associate professor and three doctors per project. Ninety-nine percent of projects had a professor or associate professor as an NI. The funding available for a project grant is NZ\$1.2 million over 3–5 years (or NZ\$1.44 million for clinical trials), which has not changed since 2010 (when it increased from “*proposals are not restricted in value but are generally less than \$900,000 over 3 years*”), despite the increase in salaries of about 75%⁵ and the consumer price index by about 45%⁵ over this time.

Table 2 shows the budget for a hypothetical HRC project grant for clinical research with five NIs. Three are academics (a senior clinical professor, a clinical associate professor and a junior- to mid-career clinician as PI) and two run the study (one research nurse, one research officer/technician). Salaries are taken from relevant Association of

Salaried Medical Specialists (ASMS), New Zealand Nurses Organisation (NZNO) or The University of Auckland websites. A 3-year grant with 0.16 FTE academic and 1.5 FTE non-academic gives a total salary budget of >NZ\$500,000. Overheads are charged at 115%, totalling >NZ\$600,000. The total budget for salaries alone is NZ\$1.18 million without including any research expenses. MB's first successful HRC grant was in 2010 and budgeted NZ\$453,000 over 4 years (8.56 FTE) for salary, NZ\$516,000 at 114% for overheads and NZ\$191,000 for research expenses (total NZ\$1.16 million). Taking into account the increases in salaries (75%) and research expenses (45%) since 2010, the corresponding figures would be NZ\$792,000 for salary, NZ\$910,000 for overheads at 115% and NZ\$277,000 for research expenses for a total budget of approximately NZ\$2 million. The difference between what could be funded previously and what can be funded currently, both for salaries for academics and non-academics and research expenses, is stark.

Another factor contributing to funding difficulties is that previously “Time-Only” was allowed on applications where the contributions of senior academics in a university role would be listed as time-only and no funding would be required for their salaries. Some universities no longer permit this. Additionally, the HRC project rules require that the PI contribute at least 0.1 FTE and NIs at least 0.03 FTE. Table 2 shows the cumulative effect of all these requirements, meaning that there is insufficient funding in HRC project grants to undertake significant clinical research projects. The same argument applies to programme grants with clinical research components.

The overhead rate is another area where research funding is squeezed. The rate is negotiated between the institution and the HRC, and for The University of Auckland it is currently 115% of salaries. There are differing views on these overhead rates. For example, Universities New Zealand (a committee comprising all eight vice-chancellors of New Zealand universities) submitted to the University Advisory Group (an independent body established in response to a government directive and tasked with providing evidence-based advice on university operations and funding) that “*the need to charge overheads is unavoidable*” and that overheads “*are similar to those in other comparable research systems overseas and much lower than the rates charged by large private consultancies.*”⁶ Whereas The University of Auckland states that “*our [New Zealand's] overhead structure is*

Table 2: Hypothetical budget for a 3-year clinical research proposal.

Research staff FTE (%) and FTE-adjusted salaries (NZ\$)								
Named investigators	Grade	FTE (%)	Year 1	FTE (%)	Year 2	FTE (%)	Year 3	
Clinician	Scale 5 ^a	10	20,898	10	21,488	10	22,078	
Professor (clinical)	Scale 15 ^a	3	8,039	3	8,039	3	8,039	
A/professor (clinical)	Lowest ^a	3	5,561	3	5,738	3	5,915	
Research nurse	Step 6 ^b	100	103,750	100	106,344	100	109,002	
Research officer/ technician	Mid-range ^c	50	35,000	50	35,875	50	36,772	
Annual total FTE and salary		166	173,249	166	177,485	166	181,807	
Total research staff FTE and salaries (all years)							498	532,540.37
Research working expenses								
Materials and research expenses								
Salary associated costs (Superannuation, ACC, etc.)—include rates below								
Superannuation			11,694		11,980		12,272	
ACC levy			277		284		291	
Total annual expenses			11,971		12,264		12,563	
Research working expenses (all years)							36,799	
Overhead rate (OHR)								
Enter negotiated OHR for your institution (contact Health Research Council of New Zealand [HRC] if this is not available):							1.15	
Total cost of research								
Total salaries (all years)							532,540	
Overheads								
HRC budget includes an overheads component calculated from total salary multiplied by OHR. This funds indirect costs such as infrastructure							612,421	
Total research working expenses (all years)							36,799	
Total cost of research							1,181,760	

Adapted from the standard HRC budget template. Salaries are taken from the published salary scales for ^aAssociation of Salaried Medical Specialists (ASMS), ^bNew Zealand Nurses Organisation (NZNO), ^cThe University of Auckland professional staff. Superannuation was calculated at 6.75% for all staff. The maximum budget is NZ\$1.2 million; thus, NZ\$18,240 is available for research expenses after salary costs are accounted for.

significantly higher than in other funding jurisdictions.”⁷⁷ The University Advisory Group noted that New Zealand has “a very high overhead rate compared to many other jurisdictions.”⁷⁸

Part of the difficulty in comparing New Zealand’s overhead rates to other countries is that different funding models are used. Nevertheless, such comparisons support the view that overheads in New Zealand are high.⁹ For example, Australian universities typically use rates of 20–35%, United Kingdom funders will fund 80% of the full cost of the research expecting the university to fund the remaining 20%, and in the United States of America rates vary widely but typically are in the range of 30–70%. From the perspective of the researcher(s), overheads are punitive. If a research grant is not obtained, the university still provides the services that overheads fund, but if they succeed in obtaining a grant, a large proportion of it is taken for overheads and salaries that the university funds regardless. It is not clear why research success should turn a researcher into the “meat in the sandwich”, caught between a university requiring more funding than they currently receive and a system that uses researchers’ success to patch institutional shortfalls.

Past research success

New Zealand has a strong reputation for performing publicly funded clinical research.¹⁰ Figure 1 shows the number of publications by year from the Scopus database, categorised as articles or reviews, published between 2000 and 2024, with a first or last author with an affiliation to New Zealand published in the four highest ranked medical journals. There were 358 publications meeting these criteria, with 353 individual authors. There appears to be a slow downward trend in such publications.

Table 3 shows the list of authors by number of publications. Of the 358 publications, 33% had a funding statement in Scopus (21% prior to 2018 and 73% in 2018 or later). Of the publications with funding statements prior to 2018, 22/60 (37%) were funded by the HRC, 18/60 (30%) by other New Zealand funders and 29/60 (48%) by either. From 2018 on, 30/57 (53%) were funded by the HRC, 18/57 (32%) by other New Zealand funders and 34/57 (60%) by either. Although there are a lot of missing data, the data suggest that a higher proportion of papers since 2018 have been at least partly funded by the HRC. Overall, the suggestion

Figure 1: Number of publications by year from 2000 to 2024 in the Scopus database, categorised as articles or reviews, with a first or last author with an author affiliation to New Zealand and published in *The New England Journal of Medicine*, *The Journal of the American Medical Association*, *The Lancet* or *The British Medical Journal*. The number above each bar is the number per year. The dotted line is a smoothed line of best fit (by loess) and the grey shading the 95% confidence intervals.

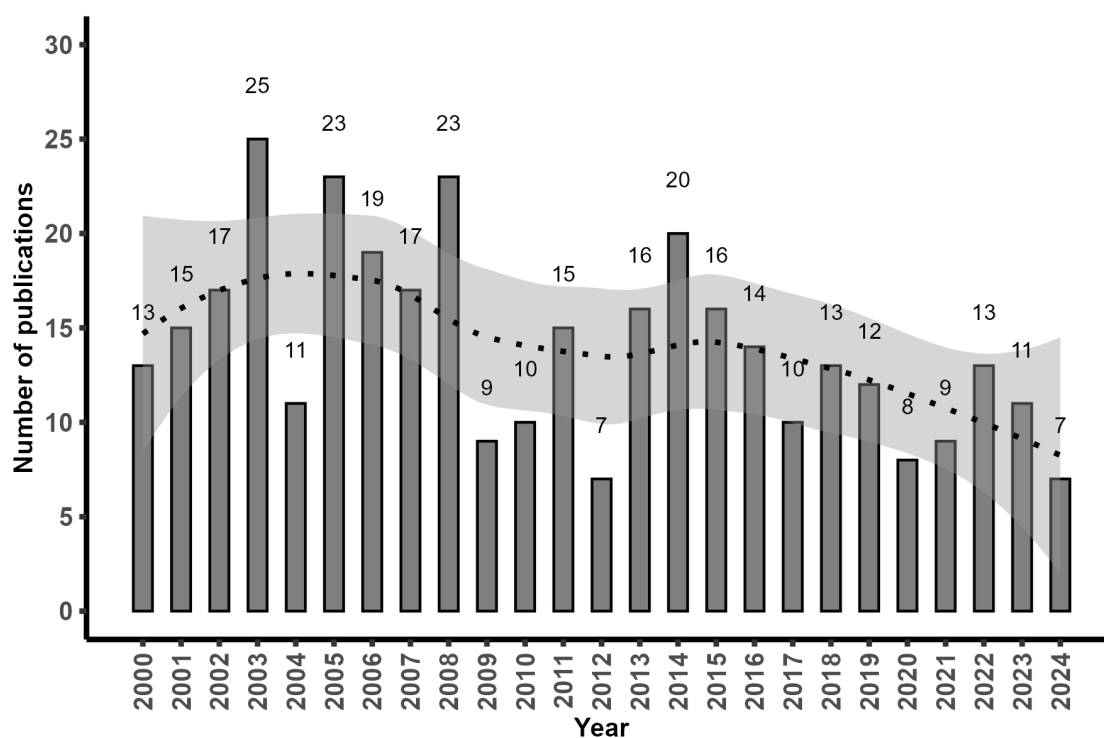


Table 3: First or last authors with New Zealand affiliations published in high impact journals 2000–2024.

n=14	n=2	n=1	n=1	n=1	n=1	n=1
Arroll, B.	Anderson, N.E.	Alawami, M.	Dobson, R.	Hodgson, C.	Mitchell, K.	Srinivasa, S.
n=11	Asher, M.I.	Alduhailib, H.J.	Douwes, J.	Hofman, P.L.	Mitchell, S.J.	Stacey, T.
Bolland, M.J.	Ashton, T.	Alexander, J.H.	Dowell, A.	Holden, A.	Moore, M.P.	Stamp, L.K.
Reid, I.R.	Bullen, C.	Alexander, T.	Duncanson, M.	Huang, Q.S.	Moore, P.	Stephenson, S.C.
n=10	Casswell, S.	Aljishi, M.	During, M.J.	Hudson, B.	Moyes, S.	Stewart, A.W.
Beasley, R.	Coulter, D.M.	Allen, J.	Eastwood, G.	Hughes, I.	Mpe, M.	Stewart, R.
n=9	Crane, J.	Ameratunga, R.	Eberhart-Phillips, J.	Hume, P.A.	Muir, P.	Stewart, R.A.H.
Beaglehole, R.	Croxson, M.	Ameratunga, S.	Ebmeier, S.	Jackson, R.T.	Mulder, R.	Sundborn, G.
n=8	Cundy, T.	Andersen, V.	Edwards, T.	James, P.	Murphy, R.	Surgenor, G.
Jackson, R.	Cutfield, W.S.	Anderson, T.J.	Ekramul Hoque, M.E.	Jardine, D.L.	Myburgh, J.	Swinburn, B.
n=7	Dalbeth, N.	Ardagh, M.W.	Elley, C.R.	Johnson, N.	Nowitz, M.	Swinburn, B.A.
Grey, A.	Davis, P.	Atkinson, J.	Ellison-Loschmann, L.	Jordan, A.	O'Grady, G.	Tai, V.
Harding, J.E.	Faasse, K.	Baker, S.	Feigin, V.L.	Jutel, A.	Oakley-Browne, M.	Tan, K.
n=6	Francis, P.A.	Barrow, C.	Fergusson, D.M.	Keall, M.D.	Ormiston, J.A.	Tawfiq, E.
Dalziel, S.R.	Frith, R.	Beasley, D.M.	Fernando, A.	Kendall, N.	Parry, G.J.	Taylor, D.R.
Farquhar, C.	Frizelle, F.	Bellomo, R.	Fitzharris, P.	Kenealy Prof, T.	Peake, S.L.	Taylor, R.W.
Rodgers, A.	Gluckman, P.	Bennett, H.	Flenady, V.	Kenealy, T.	Pearce, J.	Te Morenga, L.
n=5	Good-year-Smith, F.	Black, P.N.	Fletcher, L.	Kerr, J.A.	Peris-John, R.	Te Morenga, L.T.
White, H.D.	Gunn, A.J.	Bloomfield, A.	Foliaki, S.	Khan, M.I.	Petousis-Harris, H.	Than, M.
n=4	Hales, S.	Boden, J.M.	Forbes, J.F.	Kiro, C.	Pickering, N.	Thomson, G.
Baker, M.G.	Hancox, R.J.	Braun, V.	Franz, E.	Kypri, K.	Pokorny, V.	Thomson, W.M.
Blakely, T.	Holt, S.	Brogan, K.	Fukuzawa, R.	Langley, J.D.	Poole, P.J.	Tonkin, S.L.

Table 3 (continued): First or last authors with New Zealand affiliations published in high impact journals 2000–2024.

Chapman, P.	Hughes, R.J.	Brown, J.	Furness, S.	Lawes, C.M.	Porter, G.F.	Tran, K.B.
Falloon, K.	Janes, S.E.J.	Brownlee, W.J.	Fyfe, C.	Lawton, B.	Proctor, M.	Travis, E.
Gale, C.	Jull, A.	Bryder, L.	Gamble, G.D.	Lay-Yee, R.	Quarrie, K.L.	Troughton, R.W.
Murdoch, D.R.	King, J.S.	Buenz, E.J.	Gane, E.J.	Lensen, S.	Ramrakha, S.	Tunncliffe, G.
Poulton, R.	Lawton, B.A.	Burnside, M.J.	Gane, Ed.	Lill, M.M.	Reeve, A.E.	Vernall, A.J.
Woodward, A.	Longhurst, H.J.	Campbell, P.J.	Ganeshalingham, A.	Lillie, J.	Reynolds, A.	Wallis, K.
n=3	Mangin, D.	Carr, J.	Ganly, P.	Logan, R.	Rizwan, S.B.	Waters, J.
Bloomfield, F.H.	Mann, J.I.	Carter, P.J.	Gentles, T.L.	Lucassen, M.F.G.	Roberts, H.	Weatherall, M.
Bonita, R.	McCowan, L.M.E.	Chan, B.C.Y.	Germann, R.	MacKle, D.	Robinson, E.M.	Webb, R.H.
Campbell, A.J.	McKinlay, C.J.	Chapman, M.	Gillespie, L.D.	Macmillan, A.	Roskvist, R.	Webb, S.A.
Campbell, D.	McKinlay, C.J.D.	Chisholm, N.	Gillespie, W.J.	Maessen, S.E.	Rowan, J.A.	Wells, J.E.
Crowther, C.A.	McNaughton, H.	Clark, H.	Gimpel, D.	Major, T.J.	Royds, J.A.	Wheeler, B.J.
Gane, E.	Mitchell, E.A.	Clark, M.A.	Gluckman, P.D.	Mann, J.	Sadleir, L.G.	Wilkinson, T.J.
Gillett, G.	Moyes, S.A.	Collins, M.G.	Gott, M.	Marks, G.B.	Savage, R.	Williams, B.F.
Kerse, N.	Newton-Howes, G.	Connor, J.	Grant, C.C.	Matheson, A.	Schep, L.J.	Williams, P.
Palmer, S.C.	Ng, J.	Coppell, K.J.	Grant, P.	Matlawene, M.	Scott, A.	Williams, S.
Paul, C.	Parkin, L.	Cormack, B.E.	Grant, V.J.	Maurice, P.	Scragg, R.	Williams, S.M.
Petrie, K.J.	Pearce, N.	Corwin, P.	Gurney, J.	May, C.S.	Selak, V.	Williamson, A.
Richards, A.M.	Potter, J.D.	Cox, B.	Gwynne-Jones, D.G.	Mays, N.	Shah, R.	Wilson, D.
Robertson, M.C.	Pylypchuk, R.	Crampton, P.	Hale, L.A.	McCormack, D.J.	Sharpe, N.	Wilson, P.D.
White, H.	Sadler, L.	Crozier, I.	Hardy, J.	McCowan, L.	Shaw, C.	Wong, C.
Wilson, N.	Schauer, C.	Cumming, J.	Harper, G.	McMahon, J.A.	Shedda, S.	Wong, C.-K.
Young, P.	Short, T.G.	Cunningham, C.	Harris, D.L.	McPherson, K.M.	Sheriff, A.	Woodward, L.J.
	Singh, S.	Dai, S.	Harris, R.	Mcintyre, P.B.	Simkin, S.K.	Yandle, T.G.

Table 3 (continued): First or last authors with New Zealand affiliations published in high impact journals 2000–2024.

	Skegg, D.C.G.	Daubé, J.	Hatcher, S.	Mcmillan, J.	Simon-Kumar, R.	Yeh, J.S.
	Sutherland, M.	Davidson, O.	Hatter, L.	Meissner, W.G.	Sizeland, P.	Yeoman, S.
	Walker, N.	Davie, G.	Herbison, G.P.	Menkes, D.B.	Skinner, J.R.	Young, P.J.
	Wells, S.	Deely, J.M.	Highton, J.	Menzies, R.	Slow, S.	Zacharias, M.
		Devlin, G.	Hill, A.G.	Merriman, T.R.	Smith, A.D.	de Bock, M.I.
		Devlin, N.	Hill, S.E.	Merry, A.F.	Smith, J.	
		Dickson, N.	Hills, T.	Merry, S.N.	Soh, M.C.	
		Dijkstra, B.	Hitchen, N.	Mills, G.D.	Soule, S.	

From the Scopus database, restricted to articles or reviews published in *The New England Journal of Medicine*, *The Journal of the American Medical Association*, *The Lancet* or *The British Medical Journal* between 2000 and 2024 with the first or last author having a New Zealand affiliation. Names and initials were used directly from Scopus with no attempt to confirm affiliations or identify duplicates.

is that while the HRC is funding a higher proportion of higher impact publications, the overall number of such papers is falling steadily, which is likely to affect New Zealand's reputation around clinical research.

Conclusion

In summary, while the HRC is now prioritising clinician-researchers, the combination of university job structures giving insufficient time for research, the lack of alternative options for long-term sustainable research salary funding, the low success rates for HRC research grant and scholarship funding applications, the low repeated success rates for HRC grants and

programmes and the lack of increases in research funding for more than 15 years despite large increases in wage and research expense costs mean that, currently, sustaining a career as a clinician-researcher in New Zealand is not viable. Clinician-researchers may have some success with research grants, but these will likely be only available for short-term, relatively small clinical projects. Relying on industry-funded research may be a possibility in some fields, but it is unlikely to be sufficiently sustainable to fund a salary for an entire career. When asked by junior colleagues about pursuing research-based careers, our standard approach is to caution them about the near-impossibility of fulfilling such an ambition in even the medium term.

COMPETING INTERESTS

Nil.

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Cerebral venous sinus thrombosis secondary to otomastoiditis: an unusual presentation

Denise A Gomes, Guilherme S Cabral, Rafael D Almeida, Bruno F B B Abreu, Marcelo Q P Silva, Márcio L Duarte

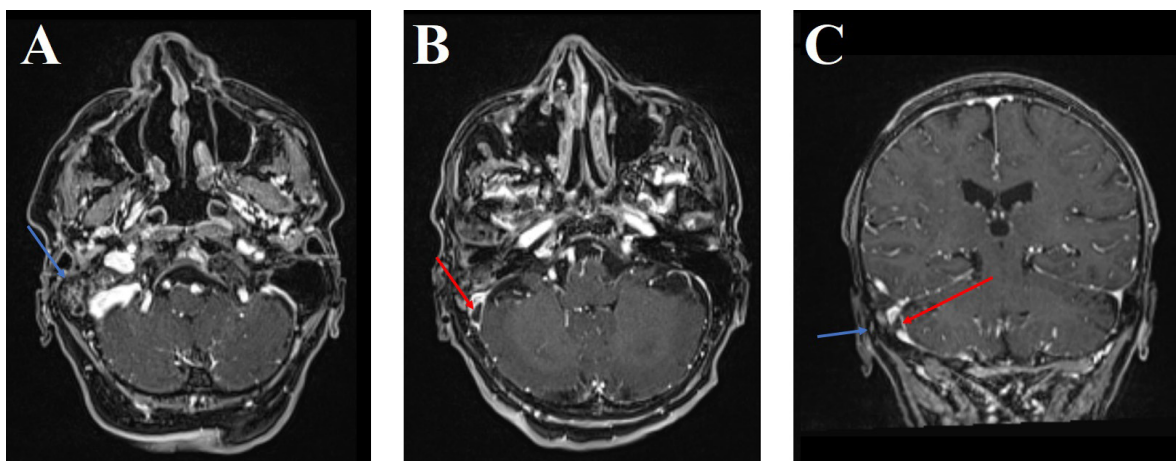
A 44-year-old man presented with headache, dizziness, confusion and a fainting episode. He became disoriented, unable to walk, and showed speech and hearing difficulties. History included diabetes mellitus and coronary catheterisation 2 years earlier. Magnetic resonance imaging (MRI) of the brain and temporal bones demonstrated left otomastoiditis, while MRI with venography detected segmental thrombosis involving the superior sagittal sinus and partial involvement of the left transverse sinus (Figure 1), a rare site compared to the usual sigmoid sinus involvement.^{1,2} The patient started physiotherapy, improving gait and mental status, though speech and hearing deficits persisted.

Before antibiotics, craniofacial infections were a common cause of cerebral venous sinus thrombosis (CVST), with mortality near 100%, now reduced

to less than 10%.³ Pathogenesis involves infection spreading through mastoid venules to adjacent sinuses, leading to mural thrombus formation.⁴ Headache, mental status changes and motor deficits are common clinical findings.³ MRI with venography is the most sensitive test for diagnosis, though some cases remain subtle.³

Management includes broad-spectrum antibiotics, typically ceftriaxone with clindamycin or metronidazole,^{1,3} and anticoagulation with low molecular weight heparin for 3–6 months, extended in prothrombotic states.³ This case highlights the importance of considering intracranial complications of otomastoiditis, even at atypical sites such as the superior sagittal sinus, and the pivotal role of MRI with venography in diagnosis and management.

Figure 1: Volumetric post-contrast magnetic resonance imaging (MRI) in axial (A, B) and coronal (C) planes demonstrates left otomastoiditis (blue arrows) and intraluminal filling defect within the left transverse sinus (red arrows), consistent with venous thrombosis. Subtle contrast opacification along the thrombus margins suggests partial recanalisation.



COMPETING INTERESTS

No specific funding was received for this work. The authors declare that there are no conflicts of interest relevant to this work.

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No institutional review board (IRB) was requested for this case report.

Informed patient consent was not necessary for this work.

Informed consent for publication was obtained from the patient's legally authorised representative.

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Grim findings: when the Reaper haunts the radiograph

Stephen Rowlands

Figure 1: Grim Reaper appearance within radiograph of atlas bone of the neck.



This article explores the rare—and entirely incidental—appearance of a Grim Reaper-like figure within a radiograph, highlighting the fascinating intersection of medical imaging and the tricks of human perception such as the psychological phenomenon of pareidolia. As part of a trauma scan following a road traffic accident, a rather chilling silhouette emerged from within the trabecular of an odontoid process. Despite the funereal appearance, no harm was caused by the accident and the patient was discharged home.

Pareidolia is the tendency to perceive recognisable patterns, such as faces or figures, in complex stimuli.¹ In radiology, pareidolia may aid in pattern recognition but can also contribute to diagnostic pitfalls, such as over-reading or under-reading findings based on subconscious visual biases.

The human brain's tendency for facial and figure recognition is evolutionarily advantageous but can yield humorous or eerie interpretations. Cases of pareidolia in medicine are rare but not unprecedented, with reported examples including the Star Wars "Baby Yoda" character being seen in sacral magnetic resonance imaging

and computed tomography scans.²

The "Grim Reaper" observed in this case did not influence patient management but can serve as a teaching example.

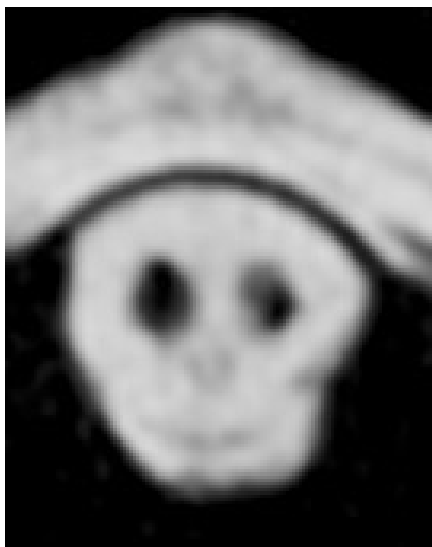
The odontoid is a protuberance of the axis, which articulates with the anterior arch of the atlas, forming a pivot joint. Degenerative changes of the periarticular odontoid can sometimes appear as a cluster of cysts, in this case resembling that of a gothic skull.³ These types of bone cysts often develop in areas of focal bone pressure.⁴ Despite this patient having no acute injury, these cysts can indeed increase the risk of cervical injury after relatively minor trauma, and those with odontoid fractures are nearly eightfold more likely to have an interosseous cyst.⁵

This case highlights how pareidolia can arise in medical imaging, producing striking but incidental appearances such as the Grim Reaper-like silhouette seen within the odontoid process. While such findings are visually compelling, they carry no diagnostic significance and should not distract from accurate interpretation. Awareness of pareidolia is important for radiologists and clinicians alike, as it underscores the influence of subconscious visual biases on image

reading. At the same time, these cases offer unique opportunities for teaching, both to reinforce anatomical knowledge, such as the structural

and pathological features of the odontoid, and to illustrate the cognitive pitfalls that can affect radiologic practice.

Figure 2: Zoomed-in Grim Reaper appearance within radiograph of atlas bone.



COMPETING INTERESTS

Nil.

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CPR training needs reviving in Aotearoa New Zealand

Daniel Harvey, Jonathon Webber, Daniel O'Brien

To the editor,
We read with interest the letter titled "Time to make CPR and first aid training compulsory in New Zealand schools" by Dr Clive Solomon.¹

We wholeheartedly support the view that life-saving cardiopulmonary resuscitation (CPR) training, including automated external defibrillator (AED) use, should not be limited to healthcare professionals and should be mandatory in the Aotearoa New Zealand school curriculum. Children aged 13–14 have been shown to perform chest compressions comparable to adults, and younger children can be taught basic skills, such as calling emergency services or instructing an adult how to perform CPR.²

Survival from out-of-hospital cardiac arrest (OHCA) depends on the quick actions of bystanders to initiate CPR and locate an AED. Bystander CPR significantly improves survival rates, and training every school-age student would help all New Zealanders respond effectively during emergencies and strengthen the country's overall public health resilience.

Notwithstanding this, we remind readers of the variability in CPR training requirements among New Zealand health professionals. An audit we conducted in 2022 of the 17 regulatory bodies under the *Health Practitioners Competence Assurance Act 2003*, 13 Australasian colleges of medicine and seven New Zealand vocational medical training and recertification providers accredited by the Medical Council of New Zealand found that less than half had either initial registration or ongoing mandatory CPR training requirements.³ There is inconsistency across New Zealand healthcare professions, health settings and workplaces, leaving gaps in readiness to respond to medical emergencies. Addressing this variability could also improve patient outcomes.

The New Zealand experience highlights the substantial benefits this change in CPR training could achieve for patients and their whānau/family. The latest Out-of-Hospital Cardiac Arrest Registry national annual report states that 2,547

people, or seven people every day, were treated by ambulance services in 2024 for an OHCA: a 3.6% increase from the previous year. Of these, 72% occurred at home, emphasising the importance of all family members knowing how to perform CPR. Encouragingly, 83% of witnessed cases received bystander CPR, and 24% had a pulse upon arrival at the emergency department. However, only 11% survived to 30 days after the event. Worryingly, this rate has decreased from 13% since 2020.⁴

In New Zealand, the median ambulance response time is 9 minutes in urban areas and 12 minutes in rural and remote regions. Only 7% of cardiac arrest patients received defibrillation from a community responder before emergency services arrived. There was a 2.8-fold higher chance of survival when a witnessed OHCA was received with bystander CPR, and a 2.3-fold higher chance when community defibrillation occurred.⁴ As survival falls by ~10% for every minute that defibrillation is delayed, strategic placement of AEDs and empowering lay-rescuers to use them before emergency services arrive should be seen as a critical weak link in the Chain of Survival that could be strengthened by teaching CPR in schools.

Research from 20 years ago showed that while most New Zealand high school students were willing and motivated to learn CPR, a smaller proportion held negative attitudes towards it, which could act as a barrier to future learning or to performing resuscitation.⁵ The survey demonstrated that students had poor theoretical knowledge; however, most (84%) indicated they would be willing to perform CPR on a family member, with nearly two-thirds (64%) prepared to do so on a stranger. Of interest, in New Zealand, persons aged 14 years or older can become qualified surf lifeguards and are trained in CPR and AED use.⁶

Although AEDs are not mandatory, they are widely present across New Zealand schools, and high school students are more than capable of using them.⁷ Schools in the United States of America with an AED on campus have demonstrated high survival rates for students and adults who suffer cardiac arrest.⁸ Community access to AEDs in New

Zealand is not universal, and even where present, they may not be obtainable or ready for use. An audit of 50 registered AED locations in Hamilton found that several listings were outdated or duplicated, and far fewer were actually visible and publicly accessible. Only 7% were available 24/7.⁹

As noted in Dr Solomon's letter, many countries overseas currently require CPR training in schools, and the World Health Organization has endorsed CPR training for schoolchildren for the past decade.¹⁰ New Zealand risks falling behind if CPR training is not included in the school curric-

ulum. We urge a coordinated effort between the Ministry of Education, health authorities, the New Zealand Resuscitation Council and regulators to mandate frequent, accessible CPR and AED training for both school students and registered health professionals. Furthermore, targeted funding and policy support should be extended to schools, workplaces and community hubs to ensure widespread CPR proficiency and immediate access to AEDs. Echoing Dr Solomon's words, implementing CPR and AED training in schools will equip all school leavers with the skills to save lives.

COMPETING INTERESTS

DH is the president of Bethells Beach Surf Lifesaving Patrol.

As a resuscitation training advisor for the New Zealand Resuscitation Council, JW receives personal fees to deliver instructor courses. JW is the director of AquaSafe New Zealand Limited, a company that sells automated external defibrillators (AEDs).

DOB is a full-time academic at the Auckland University of Technology and wrote this letter as part of their academic role.

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First-in–New Zealand RAMIO: launching a robotic oesophago-gastric surgery programme in a general surgical unit

James Z Jin, Yazmin Johari, Michael Rodgers, Suheelan Kulasegaran

We report the successful implementation of a robotic oesophago-gastric surgery programme at our tertiary centre and describe New Zealand's first robotic-assisted minimally invasive oesophagectomy (RAMIO). RAMIO combines the benefits of minimally invasive surgery with enhanced precision and surgeon ergonomics. This is particularly relevant in oesophago-gastric surgery, where complex anatomy and challenging access can be addressed using robotic surgery's enhanced three-dimensional visualisation and highly articulating instruments, resulting in improved surgeon ergonomics and control.¹ This development was built on a minimally invasive oesophagectomy (MIO) programme established by the senior author in the preceding year.

A 74-year-old man with locally advanced distal oesophageal adenocarcinoma underwent RAMIO following four cycles of neoadjuvant chemotherapy. The abdominal phase was performed robotically and the thoracic phase thoracoscopically. Total theatre time was 515 minutes. Post-operatively, he required a 4-day ICU stay and developed transient delirium and rapid atrial fibrillation, with a negative septic workup. There was no conduit necrosis or anastomotic leak. Histopathology confirmed residual adenocarcinoma with clear resection margins and 4/19 positive lymph nodes (ypT2N2). All oncological benchmarking parameters were achieved. The patient was discharged on post-operative day 7 and referred for adjuvant chemotherapy.

New Zealand's first RAMIO was led by the senior author and built on an established minimally invasive oesophagectomy programme. The implementation of RAMIO represents a milestone in the evolution of minimally advanced surgery. Adoption necessitates a long-term vision and co-ordinated departmental collaboration with the aim to develop industry-leading service provision. Successful

introduction needs to be underpinned by meticulous planning, interdisciplinary collaboration and strict protocolised driven peri-operative care. Patient safety is always the number one priority, and this is ensured by continuous monitoring of quality indicators including failure-to-rescue.² Implementation of a robotic programme must be done gradually, with careful audit of key outcomes to ensure oncological standards are maintained.³

Compared with conventional laparoscopy, there is promising evidence that RAMIO is associated with a lower incidence of post-operative complications and a trend toward higher lymph node yield. Oncological outcomes appear equivalent; however, long-term survival data remain under investigation.^{4–6} Current evidence suggests greater precision during lymphadenectomy and the potential for improved resection margins in anatomically complex or advanced cases.^{7,8} Extended or high mediastinal lymphadenectomy is enhanced by superior articulation and three-dimensional visualisation. In addition, there are ergonomic and exposure benefits, especially in patients with very high BMI, allowing stable visualisation and improved dissection.⁷ Adoption of RAMIO not only has pragmatic benefits leading to better patient outcomes and surgeon experience, but also enhances the global recognition and reputation of the institution, thereby attracting leaders in minimally invasive surgery.⁶

This report aims to document the first RAMIO performed within New Zealand's public health system and to outline how it can be safely adopted locally. The case involved a publicly funded patient and was performed by the senior author, who has formal oesophago-gastric and robotic training and certification. The senior author had successfully implemented a formal MIO programme at the institution and demonstrated its safety and feasibility prior to progressing to a robot-assisted oesophagectomy. Given that this was the

first case nationally, a stepwise introduction was undertaken to ensure safe implementation. This began with the demonstration of good MIO outcomes (laparoscopic abdominal and thoracoscopic chest phases), followed by the gradual introduction of the robotic phase in the abdominal component while maintaining a thoracoscopic chest phase. We highlight the prerequisites for wider adoption in New Zealand, including structured training

and proctoring, as well as institutional support. While cost savings are unlikely in the current health environment, RAMIO may offer clinical value through more precise lymphadenectomy, improved access in complex cases and technical advantages in high-BMI patients.^{5,7} These considerations provide a feasible pathway for replication in other centres with appropriate expertise.

COMPETING INTERESTS

Nil.

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Cancer Mortality in New Zealand

NZMJ, 1926

The New Zealand Official Year-book, 1926, contains a very valuable article on "Cancer in New Zealand," an elaboration of a previous article which appeared in 1917, and which reflects great credit on the Census and Statistics Office. The year 1872 marks the beginning of our statistical knowledge of the mortality of cancer in New Zealand, but in a form by no means complete. However, in the year 1899 statistics begin to reveal the location of fatal cancer in the human system, and the year 1914 marks the beginning of a statistical survey of cancer cases treated in public hospitals. The number of cases of this disease in New Zealand is too small to provide a sufficient basis for definite conclusions as to the causation and incidence of cancer, but conclusions based on New Zealand figures serve to confirm results obtained from the study of the disease in more populous countries. In 1924 in New Zealand 1245 people died of cancer, and if the total deaths for the previous fifty-two years are added, the fact is revealed that 26,532 people lost their lives through cancer, a number greater than the combined populations of the Boroughs of Napier and Hastings. There is consolation in the fact that cancer, unlike epidemic influenza or consumption, in the main cuts off people in advanced age, when their life's work is likely to end in the ordinary course of nature. Cancer as a cause of death is mainly confined to the period of life after the forty-fifth year, and the proportion of population above that age in New Zealand is steadily increasing. Alteration of sex-proportion is also an important factor. On a basis of standardisation more detailed than the method employed in arriving at the international index of mortality the Government Statistician shows a very rapid upward movement in the age-distribution at death, which means, of course, that death from cancer is on the average now occurring later in life than formerly. At the same time there has been an increase for the age-group under 20, and the New Zealand figures support the conclusion drawn in America that juvenile cancer is increasing. The average age at death from cancer is considerably higher for men than women. The death-rate of females from cancer has increased at a much lower rate than that of males; the average rate among

females was 34 per cent. higher than among males in the period 1875-84, but 4 per cent. lower in the period 1915-24. Cancer of the uterus is much more frequent in married women than in single women, and the death-rate of cancer in women falls with a decline in the birth-rate, as is shown by the statistics for New Zealand. For the period 1875-79, 39 per cent. of the total defined deaths from cancer in women were cases of cancer of the uterus, and in this quinquennium the birth-rate was high, whereas in the period 1908-24, when the birth-rate was falling, cancer of the uterus accounted for only 16 per cent. of the defined deaths from cancer. Careful midwifery and the efficient surgical treatment of severe lacerations of the cervix have an important bearing on this aspect of the cancer problem. Although married women suffer more frequently than single women from cancer of the uterus, the New Zealand statistics confirm the view, based upon English statistics, that single women are more liable to concern of the breast and ovaries.

Sex-proportions for most non-malignant diseases of individual organs vary in the same direction as in the case of cancer. In New Zealand for every sixty-five women who die of cancer there are a hundred deaths among men. Occupation, habits, manner of living and many other factors enter into a consideration of the possible reasons for the different rate in the sexes.

In the buccal-cavity class it is not unexpected that there should be a higher mortality in men than in women. It is also not surprising that men predominate in cases of cancer of the bladder and women in cancer of the thyroid gland. Cancer of the stomach is responsible for three-fifths of the total cancer deaths, and, like cancer of the oesophages, throat and rectum, is much more common in men than in women. Men drink more alcohol than women, and up to the present time smoke more tobacco, but they drink less very hot tea. If constipation be a prime factor in the causation of rectal cancer it is surprising that women do not suffer so much as men from this form of cancer.

The statistical study of cancer in New Zealand has extended to geographical distribution of the disease, but without obtaining any very definite conclusions. Questions of rainfall, temperature,

topography, altitude and so on, are very complex and not so important as the factor of age-constitution, and no investigation on a large scale has been attempted in New Zealand. Statistics of cancer in the Maori race are not reliable, but sufficient to show that, compared with tuberculosis and typhoid, cancer is not a common cause of death in the Maoris.

The valuable report to which we have referred throughout shows that the diagnosis of cancer has become much more accurate in later years, and also statistics are fuller and better collated than in former times. Yet, while all allowances are made for error, there is no doubt that there is a definite and substantial increase of cancer in New Zealand. The Statistician very shrewdly remarks: "Paradoxical though it may seem, even this real increase is in large part a reflection of the progress that has been made in the science of medicine

and sanitation," and our statistical co-worker, leaving aside for the nonce his figures, tables and percentages, falls into a genial philosophic vein that shows the inner man, and in somewhat Aeschylean phrase concludes:—"But by an unalterable law of nature a man must die in due course, and if he survives the years of childhood and reaches middle life without having fallen a victim to accident, epidemic disease, tuberculosis, or some other cause, he finds his selection of diseases in his older age considerable limited, being largely confined to heart-disease in some form or other, arterial degeneration, cancer and old age. If we could eliminate or reduce cancer, this would have no effect on the death-rate after the first few years, and little immediate effect even, as the average death from cancer occurs after age sixty."