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Are we just dishing out pills constantly to mask their pain? Kaiāwhina Māori health workers' perspectives on pain management for Māori

Hemakumar Devan, Bernadette Jones, Cheryl Davies, Meredith Perry, Leigh Hale, Rebecca Grainger, Tristram Ingham

We asked 13 kaiāwhina (Maori community health workers) working in Takiri Mai Te Ata Whānau Ora Collective in Greater Wellington region about their views on online resources for pain management and their challenges in supporting whānau living with chronic pain accessing primary health services. We found four main themes from the interviews. (1) Whānau were predominantly managed by pain medications by their GPs and they developed side-effects due to long-term use. (2) Whānau were not told why they experience chronic pain and kaiāwhina recommended the importance of listening and kōrero with whānau educating about pain mechanisms using simple explanations and culturally tailored online resources (e.g. depression.org.nz). (3) Whānau often use Rongoā (eg, mirimiri) to manage their pain, because they not only improved tinana (physical health) but also wairua (spiritual) and hinengaro (psychological wellbeing). Yet, whānau were never asked about rongoā in their clinical consultations. (4) Kaiāwhina were not aware of specialised pain services and reported none of their supporting whānau were referred to specialised services for pain management. Our results suggest potential gaps in healthcare pathways and culturally responsive care for Māori living with pain, which invariably contribute to inequities of outcomes for this population. As Māori adults are 1.4 times more likely than non-Māori adults to report chronic pain, we recommend health professionals moving away from a biomedical model of pain management in to more complex but relevant paradigms of achieving pae ora and holistic health outcomes. Community-based solutions are urgently needed to achieve equitable outcomes: for example, kaiāwhina could be trained to provide chronic pain assessment and management in the community.

Pacific Islands Families Study: adverse impact of food insecurity on child body composition

Sakura Oyama, El-Shadan Tautolo, Collin Tukuitonga, Elaine C Rush

Food insecurity is not having enough food or an uncertain supply of nutritionally adequate foods to eat. We show from the Pacific Islands Families Study that food insecurity during pregnancy is associated with adverse growth in boys at age 14 years. Currently in Aotearoa, COVID-19 is increasing inequities in access to food and therefore malnutrition. Early life food security is fundamental to future health and physical development.

Visual impairment and its correction among Pacific youth in Aotearoa: findings from the Pacific Islands Families Study

Lisa M Hamm, Isabel A Johnson, Robert J Jacobs, Janis E Paterson, El-Shadan Tautolo, Leon Iusitini, Nick Garrett, Suzanne C Purdy

Data were collected about visual impairment and its correction for participants in the Pacific Islands Families Study, which is a longitudinal study of Pacific children born in Auckland. Visual acuity was measured at 9 and 18 years of age. Although prevalence of visual impairment was relatively low, most participants who had visual impairment did not report having refractive correction, and few reported regular eye exams. This suggests that much of the visual impairment in this group of Pacific young people would be avoidable if access to eyecare services was better. Because untreated childhood visual impairment may have life-long impacts, establishing equitable access to eyecare could substantially improve outcomes throughout the lifespan for Pacific communities.

The inequity of access to health: a case study of patients with gout in one general practice

Leanne Te Karu, Matire Harwood, Bruce Arroll, Linda Bryant, Tim Kenealy

The nature and extent of barriers to access of health services has received insufficient attention and the depth is therefore not fully appreciated. Our study demonstrated that, despite the heavy burden of gout and comorbidity, there were obstacles to people accessing care. This was even though there were extensive efforts to assure cultural safety. Service delivery must be resourced to partner with communities to factor in and mitigate these obstacles.

Selection of Māori students into medicine: re-imagining merit. Exploring some of the sociological reasons that might explain the exclusion of Māori from the medical workforce

Peter Crampton, Jo Baxter, Zoë Bristowe

In this paper we explore sociological reasons that might explain why Māori have been severely under-represented in New Zealand's medical workforce for the entirety of the country's colonial history. By understanding these explanations, we have a better chance of changing policies and approaches in order to achieve wider and more representative participation in tertiary education and the health workforce.

Which demographic factors influence Pacific women's attendance at colposcopy clinics in New Zealand?

Georgina S McPherson, Priya Parmar, Deborah Payne,
Tagaloatele Peggy Fairbairn-Dunlop

Pacific women living in the most deprived areas in New Zealand are less likely to be seen by colposcopy services following a high-grade cytology. Overall attendance was higher than previously reported in the National Cervical Screening Programme independent monitoring reports. It is important that consideration is given to how we engage with Pacific women from the most deprived areas in New Zealand to improve access to colposcopy care and reduce cervical cancer risk.

Māori and Pacific peoples' experiences of a Māori-led diabetes programme

Taria Tane, Vanessa Selak, Kimiora Hawkins, Vanita Lata, Jonathan Murray,
DeAnn Nicholls, Amelia Peihopa, Ngaraiti Rice, Matire Harwood

This study used qualitative methods to explore barriers, facilitators and motivators for Māori and Pacific participants of the Mana Tū Diabetes programme in their journey to live well with type 2 diabetes mellitus (T2DM). Four key themes were constituted: (1) whānau experience of T2DM, (2) cultural safety in healthcare interactions, (3) whānau ora (collective family well-being) and (4) Kaupapa Māori approaches to health interventions. Our findings suggest that Māori-led health interventions can better support Māori and Pacific people living with T2DM and are needed to ensure these communities receive appropriate, responsive, and equitable healthcare.

Cigarette smoking and e-cigarette use among university students in New Zealand before and after nicotine-containing e-cigarettes became widely available: results from repeat cross-sectional surveys

Ben Wamamili, Pat Coope, Randolph C Grace

This research assessed the patterns of cigarette smoking and electronic cigarette use (vaping) among university students in New Zealand at two time points: first (or T1, March 2018) when it was illegal to sell nicotine-containing e-cigarettes in New Zealand, and second (or T2, March 2019) twelve months after nicotine-containing e-cigarettes could legally be sold in New Zealand. The study found: similar patterns of smoking at T1 and T2; significantly higher prevalence of vaping at T2 compared with T1; significantly lower prevalence of non-use in smoke-free spaces at T2 compared with T1, and significantly fewer students perceiving e-cigarettes as less harmful than tobacco cigarettes at T2 compared with T1. These results suggest that university students may be vaping for other reasons other than to quit smoking.

Shear wave elastography to predict oesophageal varices, morbidity and mortality in chronic liver disease

Hayneil Solanki, Lucy Mills, Ashok Raj

Chronic liver disease (CLD) is a growing problem worldwide and may lead to complications such as oesophageal varices (OV), veins in the oesophagus that can result in life-threatening bleeding. Screening for varices with endoscopy is invasive and resource intensive. This study found that shear wave elastography (SWE), a technique used to measure the stiffness of the liver, can be used to identify patients with CLD who do not need to undergo endoscopy to screen for varices. It also found correlation between liver stiffness measurements and hospital admissions and mortality.

Review of the Accident Compensation Corporation's radiation therapy injury claims, 1 July 2009–30 June 2019

Aubrey L Stones, Patries M Herst

The Accident Compensation Corporation (ACC) is a unique New Zealand compensation system that provides financial and rehabilitative support to injured New Zealand citizens, residents and visitors on a no-fault basis. This study reports that, in the last decade, radiation therapy injury claims made up only a very small proportion of the total number of ACC treatment injury claims. Low acceptance rates were caused mainly by many of injuries considered normal side effects of radiation therapy. Increased awareness and understanding of ACC treatment injury cover in relation to radiation therapy injuries could increase appropriate claim lodgement and better assist injured individuals.

COVID-19: what comes after elimination?

Des Gorman, Murray Horn

Although the delta variant of Covid emerged last year and was detected in our managed isolation and quarantine (MIQ) facilities five months ago, we were poorly prepared for and have struggled to control this current outbreak. Our experience undermines the credibility of a long-term elimination strategy, and three other observations are warranted prior to considering, “what comes after elimination?” First, our management of the Covid epidemic has been largely reactive. Second, management has been politicised and centralised, and has been neither adaptive nor agile. And third, our approach to managing Covid infections differs from our approach to managing other health conditions.

The approach to Covid has been inconsistent with the generic approach to healthcare in New Zealand

Most New Zealanders have little understanding of how our health system operates.[1] They view it like they do insurance and assume that it will meet their needs when the time comes. However, our “universal” coverage is founded on affordable rationing. Outside publicly funded and accessible services, healthcare is privilege-based. Cancer drug availability is illustrative. Core services that warrant public funding have never been “defined.” The most determined (yet unsuccessful) attempt to achieve such a definition was undertaken in the early 1990s by Simon Upton when he was the Minister of Health.

Consequently, we “tolerate” avoidable adverse health outcomes. The approach to Covid is in conflict with this reality; the current political rhetoric is “one Covid-death is one death too many.” This has resulted in significant delays and deferrals of care for many people for conditions that are not directly related to Covid.[2] This will be exaggerated by the government decision to completely restructure our health system in the middle of a pandemic.[3]

An elimination approach to Covid is popular

Our current elimination approach is defined by the Director-General of Heath as “zero tolerance towards new cases, rather than the goal of no new cases.” It implies that we will do everything reasonably practicable to reduce cases, knowing that this will not guarantee zero cases. A “reasonably practicable” test is useful here and underpins the Health and Safety at Work Act. “Zero tolerance” reflects an unvaccinated public’s extreme anxiety expressed as a very limited appetite for the risk of Covid infections.

The cost of elimination is spread unevenly across different parts of the economy and generations of New Zealanders. For example, young people will shoulder a disproportionate share of the burden and yet are at a relatively low risk of hospitalisation or death from Covid. Nevertheless, elimination has proved popular with voters, which suggests that collectively we are prepared to bear these costs in order to support the zero tolerance approach.

However, the ground is shifting

The combination of the delta variant and vaccination is starting to change this calculus. This variant makes elimination harder, especially with the existing public health measures. The impact of relatively few instances of non-compliance seems exaggerated. It is no surprise that the latest lockdown has needed to be longer. Although widespread vaccination is unlikely to prevent infection or transmission, it will significantly reduce the risk of Covid-related hospitalisations and death.[4] Once every eligible person has had the chance to be vaccinated, we will inevitably expect a return to something approaching normality.

This change in calculus is reflected in a change in government focus from avoiding cases to avoiding deaths. There is also increasing attention on a path to normality that allows a phased opening of the border, avoids higher-level lockdowns and puts more emphasis on hospital capacity and pre-hospital treatment of Covid.

It is hard to gauge the extent of any change in the public's appetite for risk—although the government is either reflecting, anticipating or trying to lead such a change. Moving from zero tolerance for Covid cases to zero tolerance for Covid-related deaths is a sea change.

Managing endemic Covid is harder and requires a dedicated effort

As we move away from relying on border closure and lockdowns, effective management of Covid risks will become more challenging. A "hard" border and high-level lockdowns are disruptive and costly but effective and easy to implement. They also reduce reliance on other public health measures. Living with "endemic Covid" and a zero tolerance for Covid-related deaths requires more effective application of a wider range of public health and other measures. That makes it even more important that our efforts are better co-ordinated and proactive. A standalone management agency is essential.[2]

Given the infectivity of the delta variant, if we have no tolerance for Covid-deaths and a limited appetite for isolation and high-level lockdowns, then it is essential New Zealand has purpose-built quarantine facilities for higher-risk travellers and more effective surveillance, testing, contract tracing and targeted isolation, as well as increased hospital capacity and better pre-hospital treatment.[2] That, in turn, will require us to make some difficult choices.

For example, the efficacy of contact tracing is determined by the number of subjects of interest who can be traced, tested and isolated quickly. The quicker, the better. Our current "high-trust, low-tech" approach was quickly overwhelmed in this delta-variant outbreak. A system based on human honesty and memory—two of our most fallible qualities—was never going to be adequate.

Using electronic tracking, including via wearable devices, to identify, trace and isolate a large number of close contacts quickly is reasonably practicable. Electronic tracking is also likely to be needed to support self-isolation at home and free up MIQ spaces. Similarly, using "vaccine passports" to allow the vaccinated and "naturally" immune to enjoy greater freedoms than the unvaccinated is also reasonably practicable and being employed in other countries. Finally, both routine and random mass-testing (using saliva and eventually exhaled breath samples) will need to become part of everyday life, especially for the more vulnerable, essential workers and younger people, who are the most potent vectors of the virus.[5]

Managing endemic Covid creates trade-offs that will test the appetite for risk

These options are causing concern. There is a trade-off: the more successfully these sorts of measures are resisted, the less credible it is to maintain a zero tolerance for Covid-related deaths. The relevant public risk-appetite will be revealed as such measures are debated and any compromises are worked through. We may well discover that, once everyone has had the chance to be vaccinated, we have a higher risk tolerance than we currently assume.

Our attitude to influenza is illustrative. This infection usually results in about 500 deaths annually in New Zealand.[6] This was dramatically reduced last year as a biproduct of the Covid elimination strategy, which proves that it is possible to reduce influenza deaths. The fact that we have chosen not to do so previously suggests we have a higher than zero tolerance for these deaths. One can imagine us eventually tolerating a similar number of Covid-related deaths.

Business needs to be more actively engaged

There are fewer trade-offs facing business. Currently, the freedom to operate is determined by a combination of the alert level and a business's status as "essential." This creates distinctions between businesses at different times that are often hard to justify. The Health and Safety at Work Act requires each business to identify its health and safety risks, have a plan for mitigating these risks as far as reasonably practicable and ensure that this plan is implemented effectively. This approach allows each business to take their unique circumstances into account, and so should reduce the cost of taking the necessary precautions to protect their employees and others working on their premises. It would be reasonably practicable to require businesses who want to avoid additional Covid-related restrictions to have their plans audited for the effectiveness of Covid risk management and, if adequate, be so registered. Registered businesses would be free to operate even if specific Covid-related restrictions were imposed on non-registered businesses.

Business also has an incentive to play a more active role in our management of Covid if their participation can speed our path to normality, as primary industries do in New Zealand's management of biosecurity risks. It is reasonably practicable to expect government to identify those businesses that can help prevent incursions and contain outbreaks and to enter into government—industry agreements modelled on those used for biosecurity purposes.

Increasing the capacity of the health system is also critical

Finally, endemic Covid will put more pressure on our health system at a time when it is already distressed and when extra demand is arising from delayed diagnoses and treatment.[1,3] Creating a standalone pandemic management agency should help free-up the rest of the health sector to focus on addressing these broader health issues.[2] We also need to take advantage of the options for better treating Covid cases in the community and reducing the need for hospitalisation.[7] Postponing the planned reform of the health system, at least until we have mastered the ability to live with endemic Covid, would also avoid the distraction from what would otherwise be a massive structural change.[3]

Although these measures will help, we also must increase the capacity of our hospitals. This will require some investment in facilities, but the rate limiting factor is undoubtably the available workforce. Training a specialist workforce from scratch, which takes at least a decade, will not be much help in the nearer term. We are also unlikely to be able to recruit sufficient migrant health workers, even once we start to reopen the border. Indeed, there is a real risk of losing some of the extant migrant health workforce.

New Zealand is more reliant on migrant health workers than any other OECD country. The World Health Organization warned us 13 years ago that this reliance was unsustainable.[8] Recruitment will be increasingly unreliable as we compete with better funded and larger health economies. Our recent treatment of skilled migrants and their families is unlikely to help. As at the end of July, the media reported that more than 200 overseas-trained doctors and almost 1,000 nurses were on work visas because invitations to apply for residence have been suspended. Many were contemplating returning home.

If we cannot train the necessary health professionals fast enough and migrant workers cannot fill the gap, then we need to make the most of our existing workforce. Retaining these workers, such as by accelerating the residency applications of migrant workers, is pressing. Encouraging those working part-time to increase their work commitments and getting recently retired workers to return to the workforce would also help.[9] However, any meaningful response will require a new workforce that is trained just-in-time and for-purpose and micro-credentialed in tasks that will extend the reach of our traditional health workers. The utility and practicability of the micro-credentialling approach has already been successfully demonstrated by Careerforce (the health industry training organisation).[10]

Conclusion

Once everyone has had the chance to be vaccinated, we will inevitably move from an elimination strategy for Covid to one of minimisation and mitigation. There is a lot to be done differently, and not much time. We have already incurred large and avoidable human and economic costs by not being well prepared. We cannot continue to make that mistake.

Competing interests:

Nil.

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Closing the gaps: health equity by 2040

Lyndon Keene, Sarah Dalton

The main goals of the "once in a generation" Health and Disability System Review, which has led to a major system restructuring that's now in its early stages, included better health outcomes for all and greater health equity, despite the review accepting that most of a person's health status is determined by factors outside the system. In July this year, the Association of Salaried Medical Specialists (ASMS) and the Christchurch Charity Hospital Trust (CCHT) co-hosted a conference of health professionals to discuss the broader range of policies that are needed to address health inequities and improve health outcomes for all. This article outlines some of the key issues and recommendations to government emanating from that conference and contained in our report, *Creating Solutions Te Ara Whai Tika: a roadmap to health equity by 2040*.

Health inequities

Health inequities have existed in New Zealand since records began. They have been described as immoral because for many years governments have known what is needed to address them. Two decades ago, the New Zealand Health Strategy 2000 included the goal of addressing health inequities as priority, recognising the "clear international evidence" supporting policies focusing on the broad economic and social determinants of health, including access to healthcare.[1]

There have been some improvements, such as a drop in the number of smokers, but in general the public health issues requiring attention today are the same ones identified in 2000. In the period 2005–2007, average life expectancy at birth for Māori males was 8.6 years less than for European/other males; for females the gap was 8.1 years. By the period 2017–2019 the gaps had narrowed by just 1.3 years and 0.7 years.[2]

The life expectancy gap between Pasifika and European/other in 2017–2019 was 5.6 years for males and 5.5 years for females—an improvement of 0.5 years and 0.3 years respectively over the 12-year period.

At this rate of progress, Māori males would achieve equity in life expectancy with European/other males by around 2090—approximately 70 years. For Māori females and Pasifika males, equity with European/other would not be achieved until well into the 22nd century—approximately 127 years and 134 years, respectively. Pasifika females would need to wait approximately 220 years.

Comparisons of life expectancy between the poorest and wealthiest New Zealanders over the same 12-year period show a widening gap. In 2005–2007, males in the wealthiest decile could expect to live 7.2 years longer than those in the poorest decile. By 2017–2019 the gap had widened to 10.6 years. Life expectancy gaps for females were 5.4 years in 2005–2007 and 9 years in 2017–2019.

The widening gaps are owing to a life expectancy increase in the wealthiest groups, especially over recent years, and a drop in the life expectancy of the poorest groups (including a disproportionate number of Māori) in recent years.

It is well recognised that health, wellbeing and equity are strongly influenced by the socioeconomic, political and cultural environments that people are exposed to. This includes the quality of education, food, housing, employment, transport and physical environment, along with factors such as race, gender and social exclusion. Also, as emphasised by the World Health Organization (WHO), health is influenced by the distribution of power, money and resources, which influence conditions of everyday life.[3]

Research has found the health status of different groups classified by deprivation produce social gradients where the more deprived the neighbourhood the worse the health—and worse still when the effects of institutional racism and cultural alienation are added to the mix.[4,5]

In New Zealand, health inequities have been exacerbated by widening income gaps in large part owing to the ongoing cumulative effects of the economic downturn in the 1970s, the neoliberal policies introduced in the 1980s and benefit cuts in the 1990s. Between 1985 and 2013 New Zealand had one of the biggest increases in income gaps among developed countries in the OECD.[6]

Although the government announced in this year's budget a hike in the weekly main benefit rates, by between $32 and $55 per adult, as part of its stated commitment to addressing poverty, an analysis of the budget by the Child Poverty Action Group found few families receiving benefits will be lifted over the poverty line. With the changes announced in the budget, Treasury forecasts that child poverty will reduce from 18.4% to only 17.0% by 2023.[7,8]

In other areas highlighted in our report, the urgent need for more housing—and especially health housing—continues to grow faster than the government can build. The government's state house build programme well exceeded its plan to build or acquire 2,282 houses in the year to June 2021. However, the growing demand for housing is far outstripping new supply. Well over 24,000 households were on the public housing waiting list in June this year. Meanwhile, rents continue to rise steadily across the country.[9,10]

In education, according to UNICEF, New Zealand has one of the most unequal systems in the world and the gap between the highest and lowest performing students is being made worse by poverty. In its 2018 Innocenti Report Card, UNICEF ranked New Zealand 33rd out of 38 countries for educational inequality across preschool, primary school and secondary school levels. The report's author commented that under-resourced and stressed families and communities, combined with racism and bias in the educational system, contributed to these inequities.[11]

Health inequalities for Māori are characteristic of Indigenous peoples in colonised countries, even when socioeconomic factors are considered. The underlying causes reflect systematic social, political, historical, economic and environmental factors, accumulated during a lifetime, and transferred across multiple generations. For individuals, they lead to cultural misunderstanding, unconscious bias and racism.[12–15]

To the extent that health professionals engage with patients with positive intent, misperception and lack of connection between patients from non-dominant ethnic groups and medical professionals is not uncommon. Studies have consistently demonstrated that doctors treat Māori differently from non-Māori to their detriment. Lack of cultural awareness, latent biases and institutional racism lead to poorer health outcomes.[16]

The health system itself is inaccessible to many. Around 1 in 8 European/other adults and 1 in 5 Māori and Pasifika adults report an unmet need for a GP service due to cost. As a conservative estimate, nearly 1 in 10 people have an unmet need for hospital care.[17,18]

The Health and Disability System Review acknowledges "the system is facing severe workforce shortages for some professions." The Covid-19 pandemic has revealed the fragility of the thin white line that separates a safe system from an unsafe one.

The planned health system restructuring, depending on the yet-to-be-announced detail, may go some way to addressing health inequities and facilitate more consistent access to services nationwide and enable better integration of services. However, given most of the solutions to good health lie outside the health system, the efforts to improve the effectiveness of health services are likely to struggle to make significant headway until the broader determinants of ill-health are addressed.

Is health equity achievable?

In all societies there will be the poor, relatively and absolutely. All societies have social and economic inequalities. Which raises the question: if the health-needs gradient arises because of these inequalities, won't there always be health inequities?

Sir Michael Marmot, one of the world's leading authorities on health equity and a keynote speaker at the ASMS-CCHT conference, responds to this question with evidence that the health of those most in need can be improved markedly over 10 years. The hitch is that at the same time the health of those least deprived also tends to improve at approximately the same rate, so the health equity gap remains. Says Marmot: “The lesson I take from this is that if the health of the poor can be improved quickly, then there is nothing fixed about inequalities in health. The fact that the slope of the health gradient did not change despite overall improvements in health suggests we need to look upstream to social determinants of health inequity.”[19]

In addition, while all societies do have social gradients in health, the slope varies. A European review of health inequalities that looked at life expectancy at age 25 found Central and European countries had low average life expectancy and big inequalities. Sweden, Norway and Mediterranean countries had long average life expectancy and smaller inequalities. Says Marmot: “We need to move from an Estonian and Hungarian level of health inequity to a Nordic or Mediterranean level… We [the Marmot Review] were convinced by the evidence that one of the secrets to good health in Nordic countries is a commitment to universalism.”[20,21]

Proportionate universalism, the approach introduced in the Marmot Review, involves universal interventions that are implemented with a scale and an intensity that is proportionate to the level of need across the social gradient as opposed to solely targeting the least disadvantaged groups, a common response from governments focused on cost-containment. This approach aims to improve the health of the *whole* population while simultaneously improving the health of the most disadvantaged fastest.

The solutions

Proportionate universalism is gaining a lot of international attention, including in New Zealand. A 2018 cabinet paper co-signed by Prime Minister and Minister for Child Poverty Reduction Jacinda Arden, proposing a child wellbeing strategy, explained: “A programme of joined-up (across sector *and* life-stages) evidence-based interventions supported by the state… and delivered according to proportionate universalism principles, is empirically supported.” Consequently, the Child and Youth Wellbeing Strategy, released in 2019, takes a proportionate universalism approach. So why not adopt this approach for the whole population?[22]

The approach “implies a need for action across the whole of society, focusing on those social factors that determine health outcomes.” It requires a whole-of-government response with strong partnerships across six key areas: early child development, education, employment and working conditions, having enough money to live on, healthy environments in which to live and work, and a social determinants approach to prevention. This in turn requires great investment in the health system and in addressing the social determinants of ill health.

To put this into context: to follow the Nordic approach, as recommended by Marmot, New Zealand would need to lift its public social spending (including health spending) from around 19% of GDP to around 25%, based in 2019 data.[23]

This would require political leaders, policymakers and local management to relinquish old ways of thinking and stop viewing health services in narrow financial terms, as an expenditure that needs to be controlled. Rather, they need a broader social and economic perspective that recognises the overwhelming evidence for investing in health for potentially substantial social and economic gains.[24–29]

As the United Nations’ High-Level Commission on Health Employment and Economic Growth points out that not only is investment in health good for population health and wellbeing, but that the health sector is also a key economic sector, a job generator and a driver of inclusive economic growth.[30]

With the right level of investment to match the government’s vision for New Zealanders’ wellbeing, addressing challenges such as those outlined above becomes much more achievable.

The aim of improving the standards of living of those most in need would be greatly advanced, for example, if benefits are set so people who depend on them are not living in poverty, and if the minimum wage is set at the same level as the voluntary “living wage.”[31]

Pressures on young families would be lifted if the current policy of 20 hours of free early childhood education (ECE) for 3–5-year-olds is extended to 1–2-year-olds as a first step towards addressing the cost barriers to accessing ECE in New Zealand, which UNICEF reports is among the most unaffordable in a list of 41 countries.[32]

In education, we recommend that policies are introduced for schools to close the gaps in educational performance between the lowest and highest educational performers. Solutions include fairer distribution of high-quality learning across different communities, increasing resources and reducing stress in families and communities. There is also an urgent need for significant improvement in health literacy and health competencies, which should be addressed early on in schools.

In housing there is no silver bullet to solve multiple issues. Many things need to happen at once, but there is a common view that much greater public investment is needed along with stronger measures to ensure compliance with healthy homes standards, including a mandatory rental housing "warrant of fitness."

In the health sector, although free access to GPs for under-14s has improved primary care access for children, many adults continue to miss out, in part because of the service fees. Those with the greatest need (ie, the poorest groups, Māori and Pasifika) have higher preventable hospitalisation rates than other groups. Accordingly, we recommend abolishing user charges for primary care. Alternative funding arrangements for GPs are needed that ensure incomes are not negatively affected. Other cost barriers (such as prescription charges, travel costs and dental fees) also require attention, and solutions will necessarily involve social welfare and other sectors.

Improving access to hospital care requires, as a first step, regular independent and comprehensive population surveys of unmet need for hospital services, with funding decisions being based on meeting those needs. Without such information, how can we know how well the system is performing?

A comprehensive health and disability workforce plan is critical for informing the investment needed to address workforce shortages, education, training, distribution, recruitment and retention, along with workforce equity and diversity. Training places for health professionals must be increased, based on a workforce census and current and forecast health and disability needs.

There is strong international consensus that, to meet the challenges facing today's healthcare systems, traditional top-down managerial leadership approaches are not fit for purpose. A new type of leadership, which is distributed to those with intimate knowledge of the day-to-day workings of healthcare, is needed. These leaders—healthcare professionals—are best placed to understand how to improve organisational performance and influence care practices.

We recommend that health policies support a leadership model to nurture a collaborative culture and create conditions in which responsibility, power and decision-making are distributed throughout organisations and communities rather than a "top-down" hierarchy.

To help address ethnic health disparities, we call on the government to require public health and social organisations to demonstrate how they are supporting health professionals to achieve culturally safe practice and address racism. Adequate resources must be provided for all government services to achieve cultural safety at every level, including sufficient staffing to allow time for learning and self-reflection.

To gain a better understanding of ethnic disparities and to monitor the effects of government policies that impact on them, the collection, monitoring, analysis and reporting of quality ethnicity data, from both organisational performance and workforce perspectives, must be substantially improved.

Other recommendations towards the overriding aim to achieve health equity by 2040 include ways to: improve whole-of-government collaboration to effectively implement wellbeing policies; strengthen actions concerning the impact of climate change on health; improve government accountability for delivering on policies; strengthen policies to address the commercial determinants of ill health; establish an independent health commission; and make health impact assessments mandatory, supporting "Health in All Policy" approaches.

Finally, an important issue that is not included in the report (as it is targeted at the government) concerns conference discussions around health advocacy. Feedback from conference discussion groups reasoned that governments will invest in and implement the transformational changes that are needed to improve health outcomes for all and achieve health equity if there is strong public support to do so, and this requires widespread public discussion. Health professionals, who see the effects of the determinants of ill health every day, are in a strong position to foster such public debate.

A key aim of *Creating Solutions Te Ara Whai Tika,* in addition to making recommendations to government, is to help stimulate that debate. It is available on the ASMS and CCHT websites.[33]

Competing interests:
Nil.
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Are we just dishing out pills constantly to mask their pain? Kaiāwhina Māori health workers' perspectives on pain management for Māori

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ABSTRACT

AIM: To explore kaiāwhina (Māori community health workers) perspectives on supporting whānau Māori with chronic pain, and to understand their views on the use of online resources for pain management.

METHOD: A Māori-centred, qualitative design using focus groups as the primary data collection method. Analysis using the general inductive approach.

RESULTS: Thirteen kaiāwhina working in the Greater Wellington region took part in the focus groups. Four key themes were identified: (1) treatment of chronic pain in primary health relies exclusively on medication, (2) health literacy approaches to pain management are urgently required, (3) Māori have significant unmet need for culturally responsive pain management, and (4) the availability of, and referral practices to, specialist pain services are inadequate for Māori communities.

CONCLUSION: Current chronic pain management was predominantly biomedical, and educational strategies lack health literacy approaches. Primary health services exclude traditional Māori methods of treating chronic pain and do not focus on whānau wellbeing. The lack of referral for Māori to specialist services highlights the existing health inequities for Māori. Developing new initiatives (both in-person and online) to address chronic pain management for Māori must be Māori-led and co-designed with whānau to result in holistic solutions for Māori.

Chronic non-cancer pain is the leading cause of disability worldwide[1,2] and disproportionately affects Māori and their whānau, as Māori adults are 1.4 times more likely than non-Māori adults to self-report chronic pain.[2] Despite the disproportionate burden, Māori are less likely to visit their general practitioner for pain management.[3] Māori report a sense of stigma and stoicism towards expressing their pain and are therefore less likely to report their symptoms and seek primary healthcare for pain management.[4]

In addition to access issues in primary healthcare, Māori experience barriers accessing specialist pain services in Aotearoa New Zealand.[5] Previous experiences of racism in the healthcare setting and a lack of culturally responsive services, along with barriers such as sparse community-based support for accessing pain services and the high costs of transportation, have been posited to contribute to health disparities.[4] To address these inequities, culturally appropriate primary care and specialist pain management services are needed.[4]

Online health resources (eg, apps, websites and social media) have the potential to provide cost-effective health information and foster healthy behaviours in people with long-term health conditions,[6] such as chronic pain.[7] Despite the promise of online health resources, endorsement of these resources by healthcare providers is crucial for uptake and use by end-users. A 2019 survey with New Zealand health providers showed only 53% (111/210) recommended online resources (eg, websites and apps) for pain management.[8] Some also expressed concerns around safety and lack of specificity of online information resulting in not addressing individual health needs.[8] Lack of culturally tailored information was also seen as a barrier to recommending online pain management resources.[9] Evaluations of international online pain management resources (apps and websites) showed none of the available apps provided culturally tailored information[10] and only one of the 27 evaluated websites was culturally appropriate for Australian Aboriginal people.[11] This highlights that existing online pain management resources do not meet the needs of Māori with chronic pain.

Internet connectivity in New Zealand is high (90%).[12] However, internet access remains comparatively low for some population groups, such as Māori, Pasifika, people living in rural areas, people with disability and older adults (age >75 years).[13] Thus, to mitigate this digital divide, co-designing digital solutions with end-users from marginalised communities is recommended for increased uptake and achieve digital inclusion.[14] Some online resources, specifically those co-developed and tailored to Māori communities, have shown promise in improving maternal health[15] and obesity.[6] For example, OL@-OR@, an app-based personalised intervention, co-designed using Kaupapa Māori Research processes, aimed to foster healthy eating and physical activity for Māori and Pasifika communities.[6] Although there was no significant improvement in initial adherence to behavioural guidelines between the groups at 12 weeks,[16] the co-design process and significant community engagement led to increased uptake of the intervention after trial completion.[17] Thus, online resources co-developed with Māori living with persistent pain have the potential to improve access to specialised services and may help address inequities in pain management.

The New Zealand Māori Health Strategy: He Korowai Oranga is the guiding document for the health and disability sector to improve health outcomes for Māori.[18] The overarching aim is to foster Pae Ora (Healthy Futures), with Whānau Ora (Healthy Families) as a foundation and Mauri Ora (Healthy Individuals) and Wai Ora (Healthy Environments) as key elements.[18] The Whānau Ora programme, implemented by district health boards (DHBs) in collaboration with community-based Māori health providers, places whānau at the centre of service delivery.[19] Community-based health services delivering Whānau Ora programmes often contract kaiāwhina (Māori community health workers) to deliver services. The kaiāwhina play complex roles to meet the aspirations of the whānau by working closely with whānau supporting them with information related to health, education and social services in the community.[20] They are viewed as an integral part of the New Zealand health system workforce by linking the health sector and Māori communities.[20] Kaiāwhina often accompany whānau during clinical consultations to assist whānau to communicate their healthcare needs. After the consultation, they also ensure whānau have a full understanding of the clinical information discussed with the healthcare providers.[20]

Understanding the perspectives of kaiāwhina on how they currently support whānau to access healthcare for chronic pain management may be an important step in addressing health inequities in chronic pain. The initial aim of the study was to focus on kaiāwhina attitudes toward online resources for pain management. In partnership with the kaiāwhina from Kokiri Marae and Tu Kotahi Māori Asthma and Research Trust (Tu Kotahi), a secondary aim was included to explore the challenges kaiāwhina faced when supporting whānau to access health services for pain management.

Methods

Study design

We used a qualitative study design underpinned by Kaupapa Māori Research principles,[21] recognising Māori values and customs, following tikanga processes throughout the research project and meeting the aspirations of participants.[21] This was a

Māori-centred research project, as defined by the Te Ara Tika Guidelines for Māori Research Ethics.[22] Senior Māori researchers from our team (BJ and TI) with expertise in Kaupapa Māori Research,[23] together with our Māori community partner (CD) from Tu Kotahi, were involved collaboratively with non-Māori researchers (HD, MP, RG, LH) throughout all phases of the research project. The focus group was chosen by our Māori community partner (CD) as the preferred method of data collection because it facilitates interactive discussion. The Consolidated Reporting of Qualitative Studies (COREQ) checklist was used to guide reporting of this study.[24]

Ethical approval and cultural consultation

Before study commencement, we consulted with Ngāi Tahu (a Māori iwi (tribe) with an existing mana whenua relationship with the University of Otago). We also consulted Tu Kotahi, who are a respected Māori provider in the local community. Our senior Māori researchers (BJ and TI) and Māori community partner (CD) guided the study design and informed the interview guide, data collection procedures, data interpretation and dissemination of study results. The University of Otago Human Ethics Committee – Health (H18/028) approved the study protocol.

Participants and sampling

The inclusion criteria consisted of kaiāwhina from the Greater Wellington region who self-identified as Māori and were currently working for any health service within Takiri Mai Te Ata Whānau Ora Collective. Participants meeting these criteria were invited to take part in the study by our Māori community partner (CD), who also led the kaupapa Māori (ie, by, for and with Māori) approach throughout the entire research process. Purposive sampling was chosen to maximise the range of viewpoints from kaiāwhina with a variety of health backgrounds and experience (novice to expert).

Cultural considerations and procedures

A kanohi ki-te-kanohi (face-to-face) focus group was held in a marae based in Lower Hutt, Wellington. The focus group started with a mihi whakatau (formal introduction by our Māori community partner, CD) and a mihimihi, with both researchers and participants formally introducing their whakapapa (identity and heritage). CD has worked in this community for over 25 years and is a well-respected and trusted member of the community. Semi-structured interview questions were used to encourage participants to talk through their experiences. The opening question asked how kaiāwhina assist and support whānau with chronic pain and what their views were towards online resources for pain management. During the focus group, the Māori section of the national depression website (https://depression.org.nz/maori/) was presented to guide the conversation on online resources. Our Māori community partner (CD) led the focus group with the senior Māori researcher (BJ) and HD took field notes. To ensure accuracy of interpretations, key messages were presented back to participants for clarification and endorsement. The focus group discussion was audio-recorded and transcribed verbatim by a professional transcription service fluent in te reo (Māori language).

Data analysis

The general inductive approach was used to analyse the qualitative data, as our study aims were exploratory. We used a constant comparative framework that systematically categorised and compares qualitative data for analysis purposes.[25] This approach was chosen as it allows for a greater understanding of similarities and differences between participant perspectives.[25] Transcription of the digitally recorded focus groups was completed by professional transcribers who were fluent in te reo Māori. HD initially coded the transcriptions and presented the initial summary to Māori researcher BJ and community partner CD, who led the focus group. BJ and CD verified the initial summary with the transcript to provide a te ao Māori worldview that ensured the cultural sensitivity of the data interpretation. HD, BJ and CD had a meeting to discuss and agree on the initial sub-themes and draft interpretations. In keeping with the inductive approach, the agreed draft sub-themes and interpretations were then circulated to other research team members (MP, TI, LH and RG). Following iterative discussion, the final themes and interpretations were agreed upon under the guidance of senior Māori researchers (BJ and TI) and our Māori community partner (CD). A draft summary of results was presented to all focus group participants in a subsequent hui for feedback and endorsement.

Results

Thirteen kaiāwhina working in the Lower Hutt region took part in the focus group at Kokiri Marae. All the kaiāwhina were women (aged between 23 and 65 years) from different professional backgrounds, such as nursing and social work. Some of the kaiāwhina also had lived experience of chronic pain and/or were supporting someone with pain in their whānau. Although the interview guide was mainly focused on the primary aim of the study, which was to understand kaiāwhina perspectives of online resources to support pain management, the participants focused more on the secondary aims, highlighting the challenges they experienced while supporting whānau to manage their chronic pain. None of the participants had experience or knowledge of online pain management resources. All participants have agreed with our summary findings requesting no further changes.

Four main themes emerged from the focus groups:

- Treatment of chronic pain in primary health relied exclusively on medication.
- Health literacy approaches to pain management are urgently required.
- Māori have significant unmet need for culturally responsive pain management.
- The availability of, and referral practices to, specialist pain management services are limited for Māori communities.

Treatment of chronic pain in primary health relied exclusively on medication

Kaiāwhina held the view that whānau were predominantly managed with pain medications at the primary healthcare level and expressed a lack of holistic understanding about the causes of pain.

> *"They [whānau] do not even understand their own pain, and where it's coming from; they are just given, dished out pills constantly to mask their pain, and they don't even know where it's coming from."*

Some whānau diligently took the medications as advised by primary healthcare providers and consequently developed side effects because of that treatment (eg, depression).

> *"I found with my sister, so she's been in chronic pain for years, for years, and it actually went from chronic pain to depression. She ended up on tramadol, and now they've upped that, and now she's depressed. Because, she's tries to explain to them how she's feeling to the doctor, the pain she's experiencing, and then he [doctor] just gives her; treat the cause not the symptom. Now she's on happy pills to help her to get by."*

One of the kaiāwhina reported that she had referred someone with chronic pain to their primary healthcare provider, and that they were treated solely with long-term pain medications despite its limited effectiveness.

> *"It worries me, it's gone too long, and it's gone too far, and now she's [the whānau] psychologically… religiously taking these medications, and I think she's getting really sick even more."*

Some participants discussed the adverse effects whānau experienced from prescribed long-term pain medication. As an alternative to seeking primary health services, some whānau were self-medicating with substances such as marijuana, as a more effective way of managing pain and sleep.

> *"And so, I have come across a couple of clients, probably during the last two years, that their whānau were buying them marijuana, and I'm like, 'Oh no, that's no good for your breathing.' But it helps with the back pain every now and again; they can sleep. I mean, it's not ideal, but it works for them now and again, and their breathing is already compromised anyway, quite severely."*

Health literacy approaches to pain management are urgently required

Some participants felt the need for healthcare providers to use effective educational approaches when discussing chronic pain with whānau. One kaiāwhina explained how she used her health literacy skills for managing someone with asthma-related chest pain to help improve her self-management.

> *"She's on Spiriva and Breo and the doctor said, 'You should be fine with that, but then just use your blue inhaler if you need it.' Well, she hadn't been; she said, 'I didn't think I could. I didn't think I needed to really…' I said, 'If you're hurt on your chest, you might have a chest infection, or your asthma's just not controlled. So, how about using your reliever, and to start with just use four puffs every four hours, and I'll come and check you in a couple of days.' Well, she had the best sleep she'd had in a long time."*

Kaiāwhina also talked about whānau *not being listened to* by their healthcare provider, which acted as a barrier to building good health literacy. As one kaiāwhina explained, it was vital to spend the time needed and listen to whānau to get a complete understanding of their health situation.

> *"With one of our whānau, it ended up to be a lack of sleep, really, in the end, and that was just by us looking at it—you know the whānau—and so, a lot of lack of sleep with the breathing, with the asthma, and you get worse, and, 'Have you slept?' 'We get about two hours a night.' So, once you get down to the kōrero, but that could take a long time."*

Kaiāwhina valued the need for educating whānau suffering from disabling pain and distress. They felt culturally tailored online resources (eg, a website like depression.org.nz) could help facilitate the kōrero on chronic pain with whānau. They recommended having waiata and karakia and using short videos with less jargon of whānau stories of living with pain. However, participants acknowledged that kaumātua might not be familiar with technology and gadgets and suggested smartphone-based resources (eg, apps and text) may be more helpful. Kaiāwhina valued having other whānau stories about managing pain as part of the online resource because it can be a useful educational tool for the whole whānau. As a kaiāwhina stated after looking at the depression.org.nz website:

> *"What a great thing for the whole family though, like for example my sister's children; they don't understand what their mother's going through. They're like, 'Oh gosh, it's just that again auntie complaining, blah-blah-blah.' If they see other people, like my mum and how their family are dealing with it. 'Oh, he's like mum.' Yeah, 'like my mum,' and how their family are dealing with it, because we all deal with it someway; it's a great way for them to learn too."*

Māori have significant unmet need for culturally responsive pain management

The kaiāwhina explained that although whānau might use traditional Māori methods of healing (rongoā) for pain management, they did not usually share this information with their healthcare providers.

> *"Often they'll say, 'I don't really want to tell the doctor; I'll just live with it.' 'I just grin and bear with it,' and of course the doctor will just give more Panadol or tramadol, or more prednisone, and they don't want any more medication. So they kind of make their own remedies; might use some rongoā; that's quite useful for bringing inflammation down in your body, and they kind of ease the pain that way."*

Other traditional healing methods, such as mirimiri (massage), were highly valued by some whānau for pain management, because they not only improved physical (tinana) health but also spiritual (wairua) and psychological (hinengaro) wellbeing.

> *"My sister [with chronic pain] had huge benefits from [mirimiri]; so, you know how we have healers out at Orongomai, and when we have them over at Wainuiomata, and she'd go*

> *there for mirimiri, and honestly she felt awesome, because it didn't just mirimiri her tinana, but her wairua as well, and hinengaro. She just felt really, really good. Those things have been great in our community for whānau with chronic pain."*

The availability of, and referral practices to, specialist pain management services are limited for Māori communities

The kaiāwhina unanimously reported that to their knowledge primary healthcare providers were not referring whānau Māori to pain management services. None of the kaiāwhina were aware of whānau that were referred to a specialised pain service and were thus unaware of what services pain clinics offer. As kaiāwhina could only refer whānau with pain to their primary healthcare providers, they were interested to know about the criteria for referring whānau to specialised pain services from primary healthcare.

When asked whether they were aware of any pain management service, the responses were:

> *"No, I've never heard of it before. How long has it been around; why didn't they say something?"*
>
> *"So, although we don't know about the service, first I've heard of the service; are GPs aware of this service?"*
>
> *"I've never heard that anybody who had some success because I don't know anybody that [was] referred."*

Discussion

The primary aim of this investigation was to explore the clinical perspectives of kaiāwhina with respect to the accessibility and effectiveness of online resources for chronic pain management for Māori whānau in the Greater Wellington region. However, the findings highlighted the secondary aim, that is, the challenges witnessed by kaiāwhina supporting whānau experiencing chronic pain within the current health system. These challenges included that chronic pain management appeared predominantly biomedical at the primary care level, and educational strategies were observed to lack health literacy approaches for supporting whānau with chronic pain. Kaiāwhina participants considered that health services exclude traditional Māori methods of treating chronic pain to maintain hauora (wellbeing).

The kaiāwhina in our study observed that whānau living with chronic pain were predominantly managed through pharmacological treatments, even though the current best practice for pain management for all of the chronic non-cancer pain conditions is through non-pharmacological management strategies.[26] Recommended non-pharmacological strategies include pain education, self-management, encouraging meaningful physical activity, cognitive behavioural therapy and distraction techniques. For Māori, this could also include mirimiri and therapeutic massage, as hands-on treatment was perceived to be an effective, holistic approach to pain management.[27] Pharmacological management strategies are recommended only for specific pain conditions such as chronic neuropathic pain and cancer-related pain.[28] That we found a primary reliance on pharmacological management strategies is discordant with the recommendations of the Ministry of Health equity framework,[29] whereby healthcare professionals should be committed providing evidence-based and culturally safe care to address health inequities for Māori.

As poor health literacy is highly prevalent among the New Zealand population, including Māori,[30] whānau with chronic pain require effective educational strategies on chronic pain mechanisms and management. Health literacy is the ability of an individual to understand, interpret and make informed decisions about their health condition and associated symptoms.[31] Although evidence for the association between health literacy and pain self-management is inconsistent,[31] health literacy interventions specifically designed for Māori, targeting patients with low health literacy and training healthcare professionals are effective in improving patient knowledge of long-term condition management (eg, cardiovascular diseases).[32] Healthcare providers and health systems thus may have a key role in building the health literacy skills of Māori and thereby improving equity.[32] More routine use of health literacy strategies that include adult learning principles, teach-back and reinforcement may be encouraged. Such health literacy approaches could be used to help Māori with chronic pain better understand their condition and make more informed choices on pharmacological and non-pharmacological pain management strategies. This strategy would require the health systems and healthcare workforce to be trained in the use of health literacy approaches for management of long-term conditions, including chronic pain.

The exclusion of traditional Māori methods for pain management indicates an unmet need for culturally responsive care for Māori. A previous study that explored the lived experience of Māori adults living with chronic pain (n=10) identified the use of rongoā Māori by many of the participants.[4] The use of rongoā was believed to treat the *person as a whole*—physically, psychologically, emotionally and spiritually. The use of Māori traditional methods, such as rongoā, is in line with incorporating Māori models of health, such as Te Whare Tapa Whā,[4] into routine clinical practice. A recent meta-synthesis of qualitative studies exploring Māori consumer experiences in Aotearoa healthcare services also suggests the need for upskilling clinicians to provide culturally responsive care to address inequities.[33]

Our finding of limited specialist referrals for whānau with chronic pain is similar to a previous study that reported lower referral rates for Māori compared to non-Māori by primary healthcare providers.[34] Some patients with chronic pain need a referral from a primary healthcare provider to be assessed and/or managed by a tertiary pain service, or other relevant specialist services. Existing tertiary pain services consider the biopsychosocial influences underpinning chronic pain, but they are largely individually focused and lack a holistic Māori-centred approach.[4] A recent audit of patients attending tertiary pain services in New Zealand reported Māori, Pasifika and Asians were underrepresented compared to New Zealand Europeans.[35] Lack of focus on the role of spirituality in health and the absence of whānau-centred care were suggested as contributing to existing inequities for Māori with chronic pain.[5,35] Incorporating tikanga Māori into health services, along with whānau-centred care, would help to improve the healthcare experiences of Māori and help to provide culturally responsive care in healthcare settings.[33]

This study provides important clinical recommendations for pain management. To mitigate some of the challenges, the kaiāwhina suggested the potential for collaborative care pathways with primary care and pain specialists in training and upskilling them in chronic pain assessment and management. Kaiāwhina-led pain educator services could then provide whānau with educational resources and facilitate communication with their primary care providers for referrals to specialist services.

In an increasingly digitally connected world, online public health initiatives offer the potential to enhance the access to, and cultural relevance of, chronic pain management approaches.[36] Broadly, relevant examples such as depression.org.nz could provide scalable, culturally tailored pain education resources for improving health literacy around pain mechanisms and management strategies.[11]

This is the first investigation exploring the perspectives of kaiāwhina supporting whānau with chronic pain. One of the strengths of this study was the process of reflexivity, whereby participants were verbally presented with a summary of the key messages for sense-checking at the end of the focus group, and in a subsequent hui they were asked to contribute to, edit or endorse the accuracy of the draft results. The study has some limitations. As the kaiāwhina were recruited from the Lower Hutt region of Greater Wellington, they may not reflect the perspectives of kaiāwhina working in other regions in New Zealand, where access to pain management services may differ. However, the limited representation of the Māori workforce, lack of specialist referrals for Māori and the absence of specialist pain services suggest that the perspectives from the Lower Hutt region are likely to be similar across New Zealand. This study was limited to kaiāwhina only, and further research is needed to incorporate the perspectives of other primary care providers (eg, general practitioners, physiotherapists, psychologists and occupational therapists) working in pain management. We also acknowledge that our findings reflect kaiāwhina views on supporting whānau with chronic pain, and we recommend future research directly exploring whānau views on accessing pain services, barriers to pain management and the use of digital solutions to pain management.

This qualitative study has identified potential gaps in healthcare pathways and culturally responsive care for Māori living with pain, which invariably contribute to inequities of outcomes for this population. Digital solutions have the potential to address some of the existing inequities due to the lack of access to in-person services. However, developing new initiatives (both in-person and online) that are culturally unsafe can result in the unintended consequence of perpetuating existing inequities. To mitigate this risk, any digital pain management resources developed in New Zealand need to be co-designed with Māori and community focused. The clinical care pathways for Māori with pain and their whānau should be examined in future research to identify access issues and gaps at the community, primary and tertiary levels of the health system, to address inequities and to provide Māori with holistic, integrated and coordinated care.

Competing interests:

Nil.

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Pacific Islands Families Study: adverse impact of food insecurity on child body composition

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ABSTRACT

AIM: COVID-19 has exacerbated food insecurity, unemployment, inequities and poverty in Aotearoa. Here, we tested the hypothesis that exposure to malnutrition due to household food insecurity during foetal life and early infancy is associated with body composition in adolescence.

METHODS: As part of the Pacific Islands Families Study, 1,376 Pacific Island mothers were asked questions about food security at six weeks postpartum in the year 2000. At age 14 years, 931 youth completed in-school assessments of height and weight. Of these youth, 10 girls and 10 boys from each weight decile were randomly selected to participate in a nested sub-study involving dual x-ray absorptiometry measurements, which included appendicular skeletal muscle mass (ASMM) and visceral adipose tissue (VAT).

RESULTS: Boys born to families experiencing food insecurity had greater birthweights and greater % fat, less % ASMM and greater % VAT of total weight at age 14 years compared to boys born into food secure households. In contrast, there were no differences in birthweight or body composition at age 14 years by household food insecurity status among girls.

CONCLUSION: This study shows that household food insecurity during early development is associated with higher abdominal and visceral fat in boys, which may have health risks in later life.

The global recession caused by COVID-19 has exacerbated unemployment, inequities and poverty in Aotearoa. Particularly alarming is the growing proportion of New Zealanders facing food insecurity, defined as an insufficient or uncertain supply of nutritionally adequate foods and/or limited ability to acquire culturally appropriate foods in socially acceptable ways.[1] The economic burden of COVID-19 is particularly heavy for Pacific families, who were already disadvantaged before the pandemic. The 2015/16 New Zealand Health Survey found that 37.1% of Pacific children live in food-insecure households, compared to 16.2% of non-Pacific children.[2] Pacific children disproportionately experience food insecurity, with Pacific children 2.3 times more likely to live in food-insecure households compared to non-Pacific (including Māori) children.[2]

Pacific Island people in New Zealand also face a disproportionately high burden of obesity, diabetes and related cardiometabolic disease. The 2019/20 New Zealand Health Survey found that overweight/obesity prevalence among Pacific Island people aged ≥15 years was 89.2% compared to 66.0% among Europeans.[3] These disparities are further magnified among children aged <15 years, with Pacific children being 2.43 times more likely to be overweight/obese compared to non-Pacific children. There exists an extensive body of research linking food insecurity in the first 1,000 days to the development of obesity and related cardiometabolic diseases.[4] Consumers with limited resources may select low-cost, energy-dense foods to conserve money.[5] Approximately 56% of Pacific Islanders in New Zealand live in the most deprived areas of the country.[6] This statistic is higher than for all other ethnic groups. Nationally, access to fast food outlets and exposure to related advertising are greater in more deprived neighbourhoods.[7] Thus, Pacific

Island people in New Zealand are disproportionately exposed to highly obesogenic environments. Indeed, the 2019/20 New Zealand Health Survey found that the prevalence of overweight/obesity among the most deprived quintile (73.6%) was higher than among the least deprived (62.7%).[3] These findings suggest that food insecurity is a key contributor to the high prevalence of obesity among Pacific Island people.

A large body of evidence suggests that foetal life and infancy represent periods of development that are highly sensitive to programming by metabolic factors that influence obesity risk in later life.[8] Indeed, a recent study conducted among American infants found that household food insecurity was associated with greater risk of being overweight and more adipose.[9] Food security for the mother and child in the first 1,000 days of life is crucial for optimal growth and development and lifelong health.[4] During adolescence, a second growth spurt occurs along with the development of secondary sexual characteristics. Patterns of growth and maturation during adolescence may be explained by previous life-course events and influence future cardiometabolic health.[10] However, how food insecurity during the perinatal period influences body size and composition in adolescence is still largely unknown.

In the year 2000, a prospective birth cohort, titled the Pacific Islands Families Study (PIF study), was established to provide insight into the growth and development of Pacific children and their family environments.[11,12] This longitudinal investigation includes 1,398 Pacific infants born at Middlemore Hospital in South Auckland. This number represents between a quarter and a third of all eligible children.[13] South Auckland is home to the highest density (37%) of Pacific Island people in New Zealand. The community is relatively young and has high levels of deprivation.[14] Maternal home interviews covering topics including sociodemographics, culture, child development, family dynamics, lifestyle and health were conducted at approximately six weeks and 1, 2, 4, 6, 9, and 14 years postpartum. Findings from maternal surveys conducted at six weeks postpartum showed that 43.6% of Pacific Island families either “sometimes” or “often” ran out of food in the preceding year.[15]

The unique longitudinal design of the PIF study presents an opportunity to examine how food insecurity experienced *in-utero* is associated with child growth and development. Hence, in this analysis, we report body size and composition among Pacific Islander youth at age 14 years in relation to household food insecurity during pregnancy.

Method

The initial study design and research methods have been reported elsewhere.[11, 12] Briefly, 1,398 children born at Middlemore Hospital in South Auckland between 15 March and 17 December 2000 were recruited to establish the PIF study birth cohort. Infants were deemed eligible for participation in the study if at least one parent was a permanent resident of New Zealand and self-identified as Pacific Islander ethnicity. The cohort is estimated to represent between a quarter and one third of all eligible children born in the region. Birth weight was recorded from hospital records.

When infants were six weeks old, 1,398 mothers answered questions about food security over the last year.[16] Seven questions were asked about food security, all concerning the affordability of food (Table 1). To each question, mothers responded “never,” “sometimes” or “often,” which were scored 0, 1 and 2 respectively. A total score was derived by summing all seven individual question scores. Total score ≤3 was categorised as food secure and ≥4 as food insecure. These questions have demonstrated the ability to rank households according to severity of food insecurity and construct validity in relation to nutritional status.[17] Mothers were also asked whether they had been diagnosed with diabetes, their household income and the usual number living in their house.

In 2014, 931 (66%) of the original cohort participated in field assessments involving physical measurements and a self-administered online questionnaire. From the 931 youth, a nested subsample of 204 children was drawn by randomly selecting 10 males and 10 females from each decile of body weight. Profiles of the cohort and a nested sub-study at 14–15 years have been reported previously.[18] Heights of the

204 sub-study participants were measured using a SECA 206 stadiometer (Hamburg, Germany). Weights were measured in light clothing using a SECA 703 scale. Body mass index (BMI) was calculated as weight (kg) divided by height (metres) squared. Waist circumference was measured using an inelastic plastic fibre tape and waist-circumference-to-height ratio was calculated as a proxy for abdominal visceral fat. Age, in years, was determined from date of measurement minus date of birth. Body composition was assessed using dual-energy X-ray absorptiometry (DXA, model iDXA, GE-Lunar, Madison, Wisconsin, USA). System software (version 13) outputs were total and regional body mass, fat mass, lean mass and bone mineral content. Percent (%) fat was calculated as 100×total body fat mass/total mass. Appendicular skeletal mass (ASMM) was determined by total limb mass minus the sum of limb fat and wet bone mass, estimated as bone mineral content divided by 0.55.[19] Percentage ASMM was calculated as 100×ASMM/total mass. Further analyses of adiposity were conducted in the android (central) region, delineated caudally by the superior-most aspect of the iliac crest and the cephalad limit defined by 20% of the distance between the caudal limit and the base of the skull.[20] Total abdominal adipose tissue (AAT) and visceral abdominal adipose tissue (VAT) mass were estimated within this region of interest. Percentage VAT of total AAT was calculated as 100×VAT mass/total AAT mass, and % VAT of total weight was calculated as 100×VAT mass/total body mass. Protocols for the nested sub-study were approved by the Central Health and Disability Ethics Committee (ref. 8/CEN/108).

Chi-squared tests were used to examine differences in food insecurity question responses by sex. Depending on normality, independent two-sample t-tests or Mann–Whitney U tests were used to compare body size and composition at 14 years by whether mothers reported food insecurity at six weeks. Statistical analyses were conducted in RStudio version 1.2.1335 (www.rstudio.com). Reported probabilities are two-sided, and p-values <0.05 were considered statistically significant.

Results

In the year 2000, 78% of the cohort reported household size of five or more and 84% reported household income of less than $40,000 per annum. Only 41 mothers (2.9%) in the original cohort (n=1,398) self-reported a “diagnosis of diabetes.” There were no differences in income status or household size between food secure and insecure households.

There was no significant difference in prevalence of food insecurity between the original cohort and sub-study (Table 1). In the full cohort, mothers of boys were less likely to report food insecurity compared to mothers of girls (χ^2(1, N=1,398)=5.13, p=0.025). This tendency was also observed in the sub-study but did not reach statistical significance (χ^2(1, N=204)=3.633, p=0.057). In the full cohort, mothers of boys were more likely to report being unable to provide food for special occasions due to lack of money (χ^2(1, N=1,398)=4.70, p=0.034). Within the sub-study, mothers of boys reported fewer occasions of relying on others for food (χ^2(1, N=204)=5.03, p=0.025) and eating less variety of foods due to lack of money (χ^2(1, N=204)=4.374, p=0.036). In the full cohort, birthweight was recorded for 1,381 children (17 missing). Mean birthweights among girls born to food secure households (n=439, 3,488±606(SD)g) and girls born to food insecure households (n=235, 3,571±696g) were not significantly different (mean difference=84g, 95%CI[-185, 17], p=0.104). Mean birthweight among boys born to food secure households (n=500, 3,581±630 g) was 124g lower (95%CI[-222, -26], p=0.013) compared to boys born to food insecure households (vs n=207, 3,705±547g).

Neither boys nor girls exhibited differences in birthweight by food insecurity status in the sub-study (Table 2). At age 14, boys born into food insecure households exhibited 5.5% (95%CI[1.7, 10.6], p=0.008) greater % fat, 1.8% less % ASMM (95%CI[0.2, 3.5], p=0.038) and 0.201% greater % VAT of total weight (95%CI[0.044, 0.429], p=0.013) compared to boys from food secure households. Among girls, body composition at age 14 did not differ significantly by household food insecurity status during gestation.

Table 1: Maternal responses to food security questions at six weeks postpartum.

Question	**Sub-study (N=204)**			**Full cohort (N=1,398)**		
	Girls (N=100)	**Boys (N=104)**	**p**	**Girls (N=681)**	**Boys (N=717)**	**p**
	% who responded sometimes or often					
Food runs out due to lack of money	51	40	0.160	45	42	0.195
I/we eat less because of lack of money	47	35	0.087	39	34	0.076
The variety of foods I am (we are) able to eat is limited by lack of money	46	32	0.036	42	37	0.071
I/we rely on others to provide food and/or money for food for my/our household when I/we don’t have enough money	33	19	0.025	32	28	0.162
I/we make use of special food grants or food banks when I/we do not have enough money for food	14	12	0.837	15	13	0.491
I feel stressed because of not having enough money for food	33	31	0.765	37	32	0.064
I feel stressed because I can’t provide the food I want for social occasions	19	15	0.578	27	22	0.034
	% food insecure					
Total score for 7 questions ≥4	33	21	0.057	35	29	0.025

To each question, mothers responded either “never,” “sometimes” or “often.” For each question the proportion responding never is presented. The three responses were scored 0, 1 and 2 respectively. A total score was derived by summing all seven individual question scores. Total score ≤3 was categorised as food secure and ≥4 as food insecure.

Table 2: Physical characteristics of sub-study children by gender.

	Girls			**Boys**		
	Food secure (n=67)	**Food insecure (n=33)**	**P**	**Food secure (n=82)**	**Food insecure (n=22)**	**P**
Birthweight, g	3493 (593)	3666 (696)	0.227	3615 (487)	3744 (615)	0.379
Age, y	14.9 (0.5)	15.0 (0.5)	0.271	14.9 (0.4)	14.8 (0.4)	0.243
Weight, kg	*75.4 (64.6, 89.0)*	*80.8 (67.0, 95.1)*	*0.248*	*77.0 (64.7, 100.8)*	92.1 (23.5)	*0.126*
Height, cm	166.5 (5.5)	166.7 (5.8)	0.826	*175.8 (172.3, 180.4)*	175.3 (7.0)	*0.604*
Waist, cm	*81.5 (71.8, 94.8)*	*81.2 (76.6, 96.2)*	*0.399*	*81.1 (71.0, 98.9)*	94.0 (17.2)	*0.077*
Waist/height	*0.49 (0.43, 0.55)*	*0.49 (0.45, 0.59)*	*0.326*	*0.46 (0.42, 0.56)*	0.54 (0.09)	*0.061*
Bone mineral content, g	2639 (375)	2708 (406)	0.415	2976 (557)	2934 (494)	0.724
Lean mass, kg	46.3 (7.6)	48.9 (8.7)	0.146	56.8 (10.7)	58.2 (13.5)	0.606
Fat mass, kg	30.2 (11.5)	33.6 (15.6)	0.261	24.6 (16.0)	30.9 (13.5)	0.070
% fat	37.1 (6.2)	37.8 (7.3)	0.609	24.9 (20.2, 35.1)	**32.2 (8.4)**	0.008
% ASMM	26.4 (2.1)	26.3 (2.4)	0.823	32.6 (29.2, 34.7)	**30.4 (3.4)**	0.038
AAT, kg	2.178 (1.217)	2.582 (1.643)	0.216	1.859 (1.799)	2.453 (1.455)	0.115
% VAT of AAT	15.3 (8.8)	*16.3 (12.4, 24.0)*	*0.177*	*21.98 (12.1, 31.3)*	*23.0 (17.5, 32.4)*	*0.361*
% VAT of total weight	*0.360 (0.145, 0.610)*	*0.505 (0.205, 0.713)*	*0.173*	0.266 (0.144, 0.606)	0.601 (0.230, 829)	**0.013**

Mean (SD) is provided for normally distributed variables, with p-values corresponding to two-sample t-test results. Median (IQR) is provided in italics for non-normally distributed variables with p-values corresponding to Mann–Whitney U test results. Bold text indicates significant difference by food insecurity status at age six weeks. AAT abdominal adipose tissue, ASSM appendicular skeletal muscle mass, VAT visceral adipose tissue.

Discussion

Here, we tested the hypothesis that exposure to malnutrition due to household food insecurity during foetal life and early infancy is associated with body composition in adolescence. In the PIF sub-study, we found that boys born into food insecure households exhibited less % ASMM and greater % fat and % VAT of total weight at age 14. In contrast, body composition of girls at age 14 did not differ significantly by whether mothers reported food insecurity at six weeks postpartum.

These results are significant because skeletal muscle is the primary source of insulin-dependent glucose uptake, and abdominal VAT is associated with increased risk of insulin resistance and metabolic syndrome in adulthood.[21,22] Thus, our results suggest that food insecurity in early development may be associated with serious cardiometabolic health consequences in later life.

Our findings are in line with previous studies indicating sexually dimorphic responses to early metabolic programming. Many[23] (but not all[24–26]) studies in humans and rodents have shown that male offspring are more susceptible to changes in adiposity and body weight in response to maternal obesity during pregnancy. Sexual dimorphism in placental development may underlie sex differences in sensitivity to maternal nutritional status. Eriksson suggests that boys grow more rapidly *in-utero* than girls but invest less in placental growth, which makes boys more vulnerable to fluctuations in maternal energy availability during pregnancy.[27]

Sex differences in the timing of puberty may also contribute to why food insecurity during early development was associated with reduced muscle mass and greater fat mass at age 14 in boys only. Puberty is associated with adipose deposition and increase in % fat in girls. The impacts of food insecurity during early life may be masked by changes in body composition associated with puberty. However, in the full PIF study cohort, birthweight was increased in boys born into food insecure households, but not in girls, suggesting sex differences in sensitivity to maternal nutritional status *in-utero*.

It is also possible that food insecurity during early development affects adolescent body composition more subtly in girls compared to boys, and our subsample may be underpowered for detecting smaller effect sizes. Indeed, adolescent girls born to food insecure families exhibited greater weight and adiposity compared to girls born to food secure families, but these differences did not reach statistical significance.

Our analysis is not without other limitations. First, data concerning maternal BMI and gestational weight gain and hyperglycaemia were not available for inclusion in the analysis. Since food insecurity is broadly associated with obesity in New Zealand, when interpreting our results we have assumed that mothers who reported food insecurity at six weeks postpartum were more likely to have been overweight or obese. Mothers who report food insecurity may also be more likely to exhibit hyperglycaemia during pregnancy, which has been associated with adolescent obesity.[29] Variables including number of children, size of household and less income per household member are collinear and likely to correlate with the ability to access a reliable and nutritious supply of food for the family. Collection of longitudinal data on maternal nutritional status during pregnancy would have helped clarify the practical implications of our results.

Second, answers to food insecurity questions were only collected once during the study. Thus, our study design is not able to distinguish whether food insecurity during early development is sufficient to impact body composition during adolescence. Although foetal life and early infancy are considered critical periods of development, more precise longitudinal tracking of food insecurity status is necessary to understand how sensitivity to nutritional status changes throughout childhood. Among the PIF study cohort, it is likely food security not only persisted but perhaps intensified in adolescence as the quantity and cost of food consumed by the family increases. We have previously shown that food choices and frequency remained relatively consistent between ages four and six.[30] However, more breakfast cereal and less fruit were consumed at age six, indicating a potential increase in consumption of energy dense foods and decrease in nutritional quality as children age and gain weight. Increases in appetite may drive greater consumption of cheap, energy dense foods in adolescence, particularly among boys, and contribute to the significant association between food insecurity and adolescent body composition in boys.

Finally, we again recognise that our analysis is limited by a relatively small sample size for the sub-study of adolescents who underwent DXA scans.

In summary, food insecurity during early life was associated with greater adiposity and decreased ASMM in adolescent boys. Further longitudinal studies are necessary to understand the sex-specific effects of early metabolic programming. This study shows that household food insecurity during early development may continue to impact cardiometabolic health years down the line. As the COVID-19 pandemic continues to plunge more families into poverty, ensuring accessibility to nutritious foods is more important now than ever. Without action, we risk endangering a generation of children and increasing inequity by location and ethnic group.

Competing interests:

Nil.

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Visual impairment and its correction among Pacific youth in Aotearoa: findings from the Pacific Islands Families Study

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ABSTRACT

AIM: Childhood visual impairment has a life-long impact that, with early access to eyecare, is largely avoidable. We aimed to understand visual impairment and its correction among Pacific youth in Aotearoa New Zealand.

METHOD: The Pacific Islands Families Study is a birth cohort study that tracks an original sample of 1,398 Pacific children born at Middlemore Hospital (Auckland). This analysis focuses on assessed visual acuity (at 9- and 18-years, using 0.3logMAR or 6/12 as the cut-off for visual impairment) and participants' self-reports about accessing eyecare services.

RESULTS: Less than a fifth of children (111/729, 15.2%) and teens (86/457, 18.8%) reported having sought eyecare. The percentage of participants with refractive correction was 3.6% (32/887) at 9-years and 14.3% (66/463) at 18-years. At 9-years, 1.9% of children (16/853) had visual impairment in one eye only, and 0.9% (8/853) had visual impairment impacting both eyes. By 18-years these values increased to 7.9% (36/456) and 4.2% (19/456), respectively. Among those with visual impairment, most children (15/24, 62.5%) and teens (32/55, 58.2%) reported they did not have refractive correction.

CONCLUSION: Although prevalence of visual impairment is relatively low compared to non-Pacific youth, much of the reported impairment appears to be avoidable with improved eyecare.

Pacific people living in Aotearoa New Zealand experience disproportionately poor health outcomes,[1,2] and this extends to eye problems. Despite a relatively low propensity for refractive error during childhood,[3–6] Pacific people experience increased burden from eye problems throughout life.[6–17] There are reports of high rates of eye infections[15] and uncorrected refractive error[5] in Pacific children, high rates of suspected keratoconus in teenagers,[17] more complications from keratoconus in adulthood,[13,14] as well as a more substantial impact of cataracts[11,12] and diabetic retinopathy[7,9,10] later in life.

Many of the poor general health[1,2] and visual[7–14,16] outcomes in Pacific adults are due to socioeconomic deprivation and poor access to assessment and treatment.[1,2,10] This trend appears to extend to children's eye problems. For example, poor housing conditions are thought to be associated with eye infections,[15] and lower attendance at the Ministry of Health's B4 School Check amblyopia screening programme[18] reduces early detection of vision defects and postpones provision of refractive correction and other treatment for Pacific children. The timing of treatment for paediatric eye problems is critical because of the consequences for learning,[19] development of social skills[20] and the risk of amblyopia.[21,22]

A key metric of visual impairment is visual acuity (VA). Although many forms of visual impairment impact daily life, VA results have a key role across the life span, because the results are often used to determine whether children are funded for extra support in school, whether teens can be issued a driver licence and whether certain occupations are available as adults.

There is limited research estimating VA for children living in Pacific Islands, but older studies from Vanuatu,[3,6] and one more recent study in Tonga,[23] suggest less than 1% of school-aged children have visual impairment in both eyes[3,6,23] (using 0.3logMAR or 6/12 as a cut-off). Studies measuring VA in Pacific school children living in Aotearoa New Zealand suggest a similarly low prevalence.[5,24] During childhood, the most common cause of poor VA is uncorrected refractive error; however, not all significant refractive error is captured by the standard distance VA measure.[5] For example, Findlay et al noted that, for a group of 114 predominantly Māori and Pacific children, over 30% had significant refractive error (definitions used were myopia: ≤-0.50DS spherical equivalent, hyperopia: ≥2.00DS spherical equivalent, astigmatism: ≥0.75DC), whereas only 2.6% had distance VA at or worse than 0.3logMAR (6/12) in at least one eye.[5]

The goal of this research was to understand visual impairment and its correction among Pacific youth in Aotearoa New Zealand. We accomplished this through a longitudinal study and analyses of both VA and participants' self-reports about accessing eyecare services.

Methods

This analysis is reported according to relevant STROBE guidelines.[25]

Participants

The Pacific Islands Families Study is a longitudinal study tracking the health and development of a birth cohort of 1,398 Pacific children born at Middlemore Hospital in South Auckland in 2000. The sample size was chosen so findings would be specific to the predominant Pacific ethnic groups residing in Aotearoa New Zealand (Samoan, Tongan and Cook Islands Māori). Parents who consented were interviewed at six weeks postpartum, with follow-up interviews at ages 1-, 2-, 4-, 6-, 9-, 11-, 14-, 17- and 18-years. Children were assessed at all ages, starting at 1 year. At 18-years a subset of participants was invited for further follow-up (a convenience sample, by geographic area, capped by available funding). Further details of recruitment and procedures are available elsewhere.[26] As part of wider data collection, VA tests were also offered at school when the children were 9-years (Northern Y Regional Ethics Committee ref. NTY/08/12/119) and at a study clinic at 18-years (Health and Disability Ethics Committee ref. 17/CEN/262).

Self-reported data

Several interview questions related to participants' ability to access eyecare.

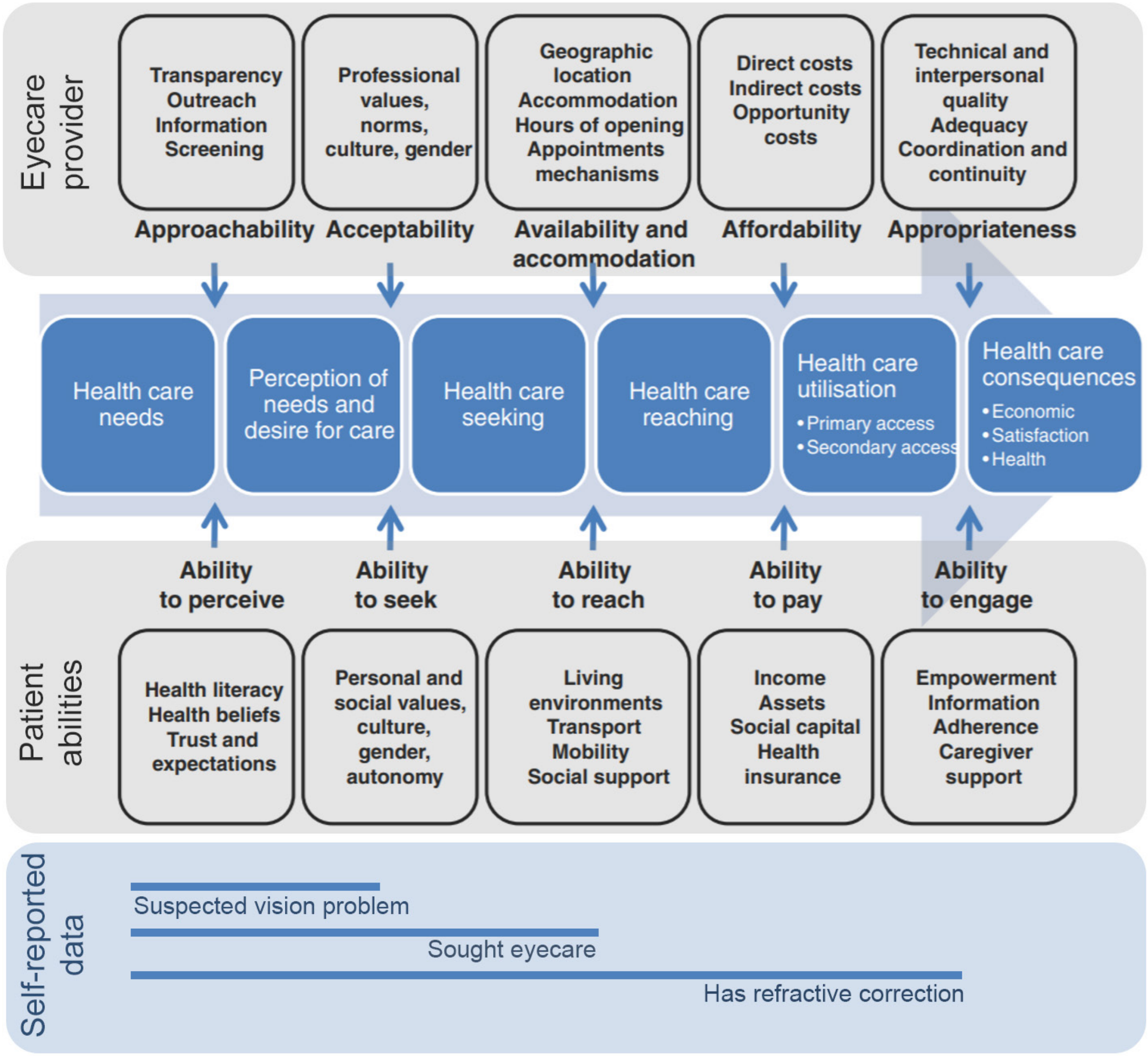
Two sets of relevant questions fell within the general component of the study. At 1-, 2-, 4-, and 6-years, parents were asked about the presence and frequency of vision problems since the last assessment. At 1-, 2-, 4-, 6- and 9-years, parents could note whether they had sought healthcare for their child within the last year for eye problems (an option within a comprehensive list of reasons for seeking healthcare). At 1- and 2-years, options for healthcare providers included healers, general practitioners and hospital/specialist/emergency clinic, whereas at 4-, 6- and 9-years, reasons for seeking healthcare were only queried for hospital/specialist/emergency clinic. We condensed each set of questions down to a single variable for each time point, summarised as "suspected vision problem" and "sought eyecare," respectively.

Additional relevant questions came from vision-specific components of the study at 9- and 18-years. At 9-years, children were asked whether they "normally wear corrective glasses or contact lenses." At 18-years, participants were asked whether they "had refractive correction" and whether they had "seen an eyecare professional (optometrist or ophthalmologist) within the last two years."

Self-reported data, and how that data may fit within a conceptual framework[27] for access, is presented in Figure 1.

Because the early childhood questions about seeking eyecare were not asked directly, we considered a response to be complete if the parent had filled in the relevant section; that is, if a parent did not select "eye problems" to any of the questions about health specialist visits, their response defaulted to a "no." For all other self-reported data, missing data or selection of "unknown" were considered incomplete.

Figure 1: Conceptual framework for access to healthcare.



Levesque et al's framework[27] separates provider and patient factors related to access. The self-reported data that shed light on a patient's ability to access eyecare systems are mapped to the lower part of the figure. Note that discrete questions cannot address the complexity of access; patient abilities are cumulative (someone who has refractive correction would need to have perceived a need, sought and reached eyecare, as well as had an avenue to pay for assessment services and treatment); and barriers and facilitating factors exist on the provider and patient sides. Adapted from Levesque et al (2013)[27].

Assessment of VA

At 9-years, children were invited to complete near and distance VA assessments. At 18-years, teens were invited to complete a distance VA assessment only. In each case, the left and right eyes were tested independently. If participants brought glasses or wore contact lenses, this refractive correction was used during the VA assessment. At 9-years, it was specifically noted whether each participant was using their correction, whereas at 18-years, assessors left a comment if a participant with refractive correction was not wearing it.

For distance VA at 9-years, children were asked to identify letters on a standardised physical chart viewed from four metres (ETDRS design, Sloan font, logarithmic size progression with five letters per line, testable range -0.32 to 1.1logMAR, scored letter by letter). At 18-years, distance VA was measured using an automated electronic VA (EVA[28]) system viewed from three metres (custom algorithm,[28] Sloan font, logarithmic size progression presented one single crowded letter at a time, testable range -0.32 to 1.6logMAR, scored letter by letter). For near VA at 9-years, children viewed a reduced size (1/10th) physical chart from 0.4 meters (ETDRS design, Sloan font, logarithmic size progression with five letters per line, testable range was -0.12 to 1.18logMAR, scored letter by letter).

We use logMAR notation to report VA, where smaller numbers indicate better vision and 0.0logMAR or more negative (Snellen notation 6/6 or better) is considered ostensibly normal. We report visual impairment based on definitions from ICD11 with cut-offs at 0.3logMAR (6/12), 0.5logMAR (6/18) and 1.0logMAR (6/60) for mild, moderate and severe impairment respectively, similar to related studies.[5,24] We use the same cut-offs for visual impairment when reporting near and distance VA.

For all VA assessments, we use the term "attempted" when participants had a recorded score, and "completed" when the recorded score fell within the testable range (defined above for each VA test). If a participant had a complete test result for one eye and did not attempt testing with the other eye, results were considered complete (to not exclude the possibility of monocular enucleation) and recorded as the "better eye."

Data analysis

Only complete data, as defined above, were used for analysis (summarised in Table 1). Data used for cross-sectional and longitudinal analysis were limited to the subset of participants with complete data for each variable in question, so some analyses have a lower "n" than the corresponding cells in Table 1. Data analysis was primarily descriptive and included scatter and Bland–Altman plots. Odds ratios (ORs) and the 95% confidence intervals (95% CI) were used to understand categorical data across time. Chi-squared tests were used to assess whether categorical information varied between groups. Wilcoxon rank-sum tests were used to examine differences in continuous data (neither dataset tested met normality assumptions). When we make comparisons about visual impairment across time, we consider only distance VA and group all visual impairment categories together. Data cleaning and analysis was completed in R studio on R versions 3.6.1 and 3.6.3.

Results

An overview of results, and the number of participants with complete data at each relevant time-point, is summarised in Table 1.

Between birth and 9-years, participation in the project reduced from 1,398 to 1,019 (73% retention). The vision component of the study at 9-years included fewer children than the wider data collection at that time-point; of the 1,016 eligible participants, only 887 answered the question about having refractive correction, 866 completed the distance VA test and 867 completed the near VA test.

At 18-years, 467 teens agreed to the invitation for additional follow-up. The subset of 9-year-olds who went on to participate at 18-years did not differ in terms of ethnic breakdown (χ^2=2.66, df=5, p=0.75) from those who did not participate as teens, but males were less likely to return for this extra follow-up than females (χ^2=5.00, df=1, p=0.03). Importantly, in terms of their 9-year-old distance VA, the subset of participants who returned at 18-years did not differ from the subset who did not return at this age (better eye: W=93081, p=0.87, n=383 vs n=483, worse eye: W=91559, p=0.92, n=383 vs n=480).

Self-reported data

Only 0.5% of parents (6/1,241) reported suspecting a vision problem for their 1-year-old, but this measure increased to about 3% by ages 4- and 6-years (32 and 30/1,064 respectively) as children's behaviour better reflects visual abilities. At 1- and 2-years, about 7% reported seeking some form of eyecare (which could include care for eye and vision concerns, as well as eye or vision check-ups where there were no concerns). This dropped to less than 1% as the questions focused on specialist, hospital and emergency clinic visits. About 15% of parents (111/729, 15.2%) reported seeking eyecare at least once from 1- to 9-years. At 18-years, 18.8% of participants (86/457) reported having seen an eyecare provider in the last two years. Ownership of refractive correction increased from 3.6% (32/887) to 14.3% (66/463) from 9- to 18-years.

Parents who reported suspecting a vision problem at some point between 1- and 6-years (n=30) were more likely to seek care for an eye issue (OR=4.8, 95% CI=2.2–10.2) and to have a child who usually wears refractive correction at 9-years (OR=10.6, 95% CI=4.0–28.1) than parents who did not report suspecting their child had problems with their vision. At 18-years, those who reported seeking eyecare in the last two years (n=86) were more likely to report having refractive correction (OR=16.6, 95% CI=9.1–30.4) than those who had not sought eyecare.

Those who reported seeking eyecare at least once between 1- and 9-years (n=97) were not significantly more likely to have refractive correction at 9-years (OR=1.9, 95% CI=0.7–5.0) than those who did not report seeking eyecare. Since there is an elevated odds ratio, it is possible that there were too few children with refractive correction at 9-years (n=24) to show a statistically significant association. Nonetheless, because an eye exam is a prerequisite to acquisition of refractive correction, this counter-intuitive finding suggests children had eye exams not captured by the study questions, possibly because an eye exam between 1- and 9-years was not considered a "specialist visit" by the parent, because eye exams occurred between queried time-points, or because parents reporting seeking eyecare for eye health rather than vision problems.

Assessment of VA

Among those who reported ownership of refractive correction and completed VA tests, only five of 29 children (17.2%) were confirmed to be wearing it at 9-years, compared to just over half at 18-years (36/65, 55.4%).

The VA test results are summarised in Table 2. The percentage of participants with visual impairment in one eye was 1.9% for distance and 2.4% for near at 9-years, and 7.9% for distance at 18-years. Percentage of visual impairment in both eyes was 0.9% for distance and 1.5% for near at 9-years, and 4.2% for distance at 18-years.

The change in distance VA between 9- and 18-years, by eye, is shown in Figure 2.

Overall, there was not a statistically or clinically significant change in mean distance VA from 9- to 18-years (0.02logMAR for each eye, one letter, for each eye). The limits of agreement (±0.42 and ±0.45logMAR for right and left eyes, respectively) are wide because of the variation associated with the deterioration of vision for many participants between 9- and 18-years (red dots above the mean line).

Integration of self-reported data and assessed distance VA

Avoidable visual impairment

Most children with visual impairment in at least one eye at 9-years had neither parental report of seeking eyecare (18/24, 75.0%) nor received refractive correction (15/24, 66.2%), which suggests that opportunities for intervention that could have mitigated or reversed visual impairment were missed. Indeed, of the four children with visual impairment and no refractive correction at 9-years who returned and completed the 18-year VA assessment, three had been prescribed correction by 18-years, and the two who were wearing it had substantial improvements in VA (≥0.20logMAR) compared to their uncorrected VA results at 9-years.

Most 18-year-olds with visual impairment had not seen an eyecare provider in the past two years (31/55, 56.4%) and did not own refractive correction (32/55, 58.2%). Thirty-nine 18-year-olds acquired their visual

Table 1: Overview of results across the longitudinal study.

	Suspected vision problem (same question each year)	**Sought eyecare in last year (different wording across years*)**	**Sought eyecare in last two years (only asked once)**	**Has refractive correction (different wording across years)**	**Distance VA (different protocol across years)**	**Near VA (only assessed once)**
	Self-reported data				**Assessed vision data**	
	General component		**Vision Specific component**			
Baseline **1,398 general participants**						
1-year **1,241 general participants**	C=1241 Yes=6 (0.5%)	C=1240 Yes=87 (7.0%)				
2-years **1,162 general participants**	C=1161 Yes=12 (1.0%)	C=1161 Yes=82 (7.1%)				
4-years **1,066 general participants**	C=1064 Yes=32 (3.0%)	C=1066 Yes=3 (0.3%)				
6-years **1,019 general participants**	C=1018 Yes=30 (2.9%)	C=1019 Yes=2 (0.2%)				
9-years **1,016 general participants** **891 vision participants**		C=1012 Yes=10 (1.0%)		C=887 Yes=32 (3.6%)	A=873 C=866 (3OE) VI=24 (2.8%)	A=877 C=867 (1OE) VI=34 (3.9%)
18-years **467 vision participants (only a subset invited to participate)**			C=457 Yes=86 (18.8%)	C=463 Yes=66 (14.3%)	A = 460 C=457 (1OE) VI=55 (12.0%)	
Completed all relevant time points **(Yes=at least once)**	C=847 Yes=45 (5.3%)	C=729 Yes=111 (15.2%)		C=402 Yes=62 (15.5%)	A=389 C=383 (1 OE) VI=50 (13.1%)	

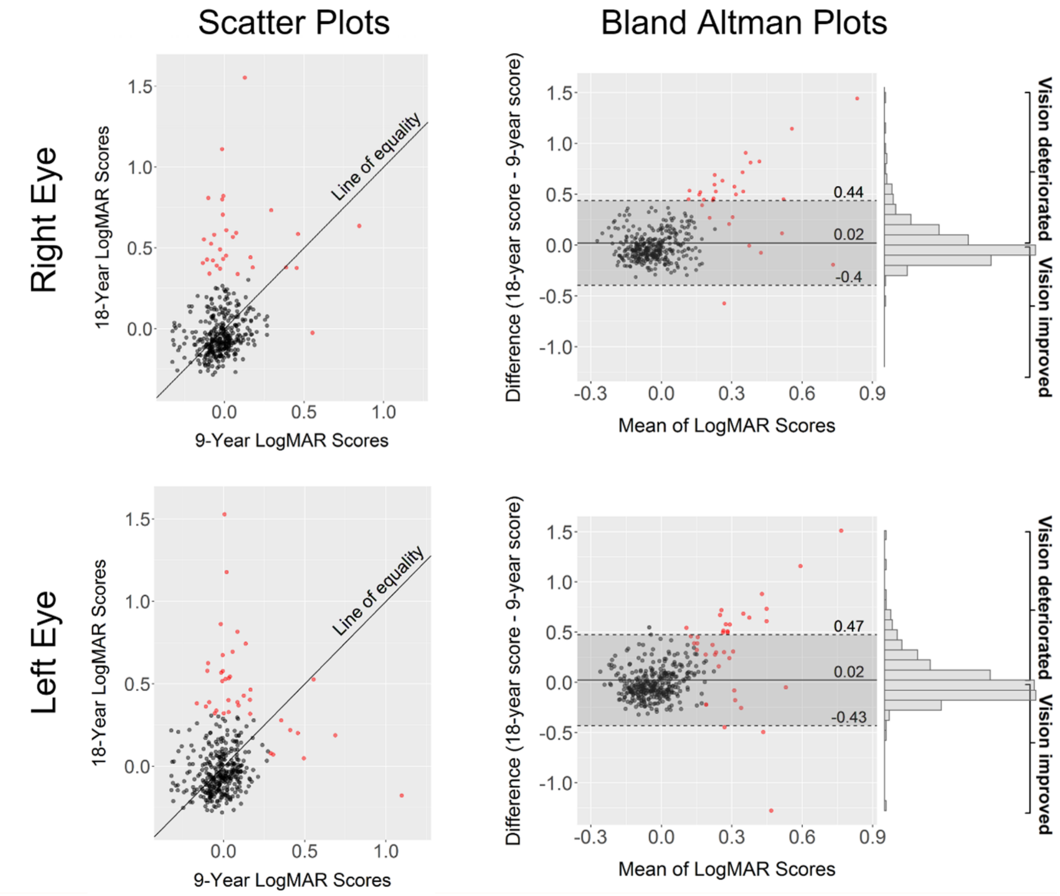
VI = visual impairment, using a cut-off of 0.3logMAR (6/12), including impairment in either one eye or both eyes. *For the questions about seeking eyecare at 1- and 2-years healthcare options included healers, general practitioners and hospital/specialist/emergency clinic, whereas at 4-, 6- and 9-years, reasons for seeking healthcare were only queried for hospital/specialist/emergency clinic. A = assessed, C = complete data, OE = one eye only.

Table 2: Prevalence of visual impairment

	9-year distance VA		**9-year near VA**		**18-year distance VA**	
	Count	Percent	Count	Percent	Count	Percent
No visual impairment either eye	839	97.2%	832	96.1%	401	87.9%
Visual impairment in one eye	16	1.9%	21	2.4%	36	7.9%
Visual impairment in both eyes	8	0.9%	13	1.5%	19	4.2%
Visual impairment in both eyes by level						
Mild visual impairment	4	0.5%	9	1.0%	11	2.4%
Moderate visual impairment	4	0.5%	3	0.3%	8	1.8%
Severe visual impairment	0	0.0%	1	0.1%	0	0.0%

Cut-off for visual impairment is >0.3logMAR (6/12), “mild” includes 0.31 to 0.50logMAR (poorer than 6/12 to 6/20), “moderate” includes 0.51 to 1.0logMAR (poorer than 6/18 to 6/60) and “severe” includes 1.1logMAR or greater (poorer than 6/60). This table counts only participants for whom there are completed data for both eyes.

Figure 2: Longitudinal changes in distance VA.



The upper panel shows data from the right eye (n=383) and the lower panel shows data from the left eye (n=382). Participants with vision impairment (VA>0.3logMAR) in either test are shown in red. To better visualise data points, each point is shifted by a randomly generated offset of up to 0.01logMAR (less than one letter on an eye chart), and a small level of transparency was added.

impairment after 9-years (at which age they had good VA and did not report having refractive correction). Most of this likely treatable subgroup had not seen an eyecare provider in the past two years (24/39, 61.5%) and did not own refractive correction (25/39, 64.1%), despite the fact that, for eight of these teens, the level of visual impairment would preclude acquisition of a driver licence.

Ability to access eyecare

Participants whose parents suspected a vision problem had clinically (more than 0.10logMAR, or 1 line) and statistically poorer VA at 9-years (better eye: 0.12logMAR, W=14839, p<0.0001, n=34 vs n=604 worse eye: 0.15logMAR, W=14786, p<0.0001, n=33 vs n=601) and 18-years (better eye: 0.13logMAR, W=6337, p<0.0001, n=28 vs n=320, worse eye: 0.23logMAR, W=6491, p<0.0001, n=28 vs n=319) than participants whose parents had never suspected a vision problem. Parents' ability to perceive a need for eyecare increased the likelihood that their children obtained refractive correction, but barriers remained; only nine of the 38 children whose parents noted concern went on to receive treatment by 9-years (23.7%).

At 18-years, although few teens (86/457, 18.8%) reported seeking eyecare services, most who did obtained refractive correction (51.2% overall, and 70.8% of those with visual impairment). This suggests Pacific teens were able to engage with treatment options when prescribed; however, barriers existed to reaching eyecare services in a timely matter. When participants reported having but not wearing refractive correction (at 9- and 18-years), lost or broken glasses was often noted as the reason, suggesting replacement was a further barrier (although this was not measured directly).

Discussion

Prevalence of visual impairment

The prevalence of distance-vision impairment at the 9-year assessment (1.9% in one eye only, and 0.9% in both eyes) is similar to the few published reports of visual impairment focused on primary-school aged Pacific children. Available reports include two 1980s publications about 5–19-year-olds in Vanuatu,[3,6] a 2020 report of 5–15-year-olds living in Tonga,[23] as well as recent reports about 5–12-year-olds[24] and 6–7-year-olds[5] in Auckland, all reporting less than 1% of children had visual impairment in both eyes. The higher prevalence of visual impairment at 18-years (7.9% in one eye only, and 4.2% in both eyes) is expected, primarily due to increased rates of myopia (the most common cause of poorer distance VA globally).[29] For example, in Vanuatu, myopia was found in 0.6% of primary school children and in 7.8% of secondary school students.[6] These prevalence rates are low compared to other groups of children. For example, vision impairment in both eyes is estimated to impact 3.7% of 6–7-year-old children in Ireland,[30] 10% of 5–15-year-old children in Southern China[31] and 13% of 6–19-year-olds in Western China.[32]

The prevalence of near-vision impairment at 9-years reported here (2.4% in one eye, and 1.5% in both) is lower than that of a recent study[5] of near vision in 6–7-year-old (predominantly Pacific) children in Auckland (9.7% in one eye, and 12.3% in both). This apparent discrepancy could be related to cognitive development from 6- to 9-years, and the observation that 6-year-olds can find near tests particularly challenging.

Functionally, at least 0.9% of the participants at 9-years would have struggled to see detailed information presented at the front of a classroom, and at least 1.5% would have struggled with their schoolwork at near. By 18-years, not only could untreated visual issues have potentially caused amblyopia[22] and impacted educational[19] and social development,[20] but they may also have begun to impact on teens' transition to independence; 4.2% of the 18-year-old cohort would not have met the vision standards for a driver licence.

Avoidable visual impairment and access to care

Although the prevalence of visual impairment is relatively low, much of it appeared avoidable; most participants with visual impairment had not reported seeking eyecare and did not own refractive correction. These issues reflect available published literature related to access. Pacific families are less likely to participate in the B4 School Check programme;[33] Pacific children are more likely to enter school with uncorrected refractive errors;[5] Pacific and Māori teens are less likely to have refractive correction than their European peers (Owens et al report 10% and 21% ownership, respectively[17]); and Pacific and Māori teens with low VA are reported to have little history of, or plan for, seeking eyecare.[17] Although this analysis of visual impairment and its correction aligns with available literature, the generalisability of these results beyond South Auckland is difficult to ascertain,[26] especially given the paucity of vision data from Aotearoa New Zealand.

This analysis does not address the reasons for these inequities or critique the provider side of access. It highlights patients' abilities (to perceive the need for eyecare, and to engage with treatment options when prescribed) and suggests how Pacific families could be better supported (to reach and pay for services). It is critical to consider the responsibility of the provider to change these negative trends in access. Eyecare is not free in Aotearoa New Zealand, and although subsidies are available, they can be hard to navigate.[5] Re-imagining an eyecare system that is more approachable, acceptable, available, affordable and appropriate[27] could help reduce the impact of avoidable visual impairment for Pacific youth, and should be the focus of further research and policy initiatives.

Strategies for improvement may include incorporating eyecare within primary healthcare; family-centric rather than service-centric models;[34] building trust, perhaps by increasing the number of culturally concordant eyecare providers; extending subsidies for eye-exams and treatment to older teens; and offering affordable and appropriate screening, assessment and treatment options co-located in convenient locations.[2,34,35] Although these broad strategies (and more specific strategies from other contexts[36,37]) may be useful, collaboration with Pacific communities in Aotearoa New Zealand is pivotal to understanding barriers and to developing and implementing appropriate strategies to overcome them.

Support for change in patterns of access is particularly important because Pacific teens are likely to go on to experience disproportionately greater issues associated with keratoconus,[13,14,17] cataracts[11,12] and diabetic retinopathy[7,9,10] later in life, and patterns of access to eyecare from early life may influence future eyecare seeking behaviours.

Limitations

Participant retention reduced between birth and 9-years and only a subset of participants could be invited for the 18-year assessment. These factors together potentially biased the sample towards families with better access to care. Furthermore, without full eye exams, we do not know the cause of visual impairment, and VA alone underestimates significant refractive error[5] and other forms of visual impairment. Thus, the problem of avoidable visual impairment among Pacific youth may well be larger than this analysis suggests.

This analysis does not include barriers to access, and we are limited in our interpretation of eyecare-seeking abilities because questions did not capture eyecare sought between data collection points. Additionally, from 1- to 9-years the question was subject to parent interpretation, and, specifically in years 4, 6 and 9, if a parent did not consider an eyecare provider a "specialist," our reports would underestimate eyecare seeking activity. Further, the wording of questions about having and wearing refractive correction differed slightly across years, which may potentially have affected the longitudinal observations.

Although the differences between the 9-year and 18-year VA protocols may have impacted reported thresholds, the effect is likely small. A recent study[38] found that results from the electronic format were only slightly improved compared to physical charts (range of 1–3 letters or 0.02–0.06logMAR[38]).

Conclusion

Although the prevalence of visual impairment was relatively low, most participants who had visual impairment did not report having refractive correction, and few reported regular eye exams. These findings suggest that much of the visual impairment would be avoidable with improved access to eyecare services. Because untreated childhood visual impairment may have life-long impact, establishing equitable access to eyecare could substantially improve outcomes for Pacific communities throughout the lifespan.

Competing interests:

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The inequity of access to health: a case study of patients with gout in one general practice

Leanne Te Karu, Matire Harwood, Bruce Arroll, Linda Bryant, Tim Kenealy

ABSTRACT

AIM: Gout is a health equity issue for Māori and Pacific peoples because disparities in quality of care exist. This study aims to describe domains of access that may contribute to the optimisation of gout care and, therefore, address health inequity.

METHODS: The practice management system at one general practice in Auckland was used to identify enrolled patients with gout, using disease codes and medication lists. Barriers to access for the cohort were investigated using staff knowledge and the practice management system. The general practice is uniquely situated within an urban marae (traditional meeting house) complex serving a predominantly Māori community. This enables a focus on domains of access other than cultural safety.

RESULTS: Of 3,095 people enrolled at the practice, 268 were identified as having gout. Of these, 94% had at least one other long-term health condition. The majority of people with gout enrolled at the practice have employment roles incongruent with the clinic's opening hours.

CONCLUSIONS: Social circumstances, such as employment and availability of transport, should be actively discussed with all patients and recorded in the practice management system. Reorientation of health services, including hours of access, is evidentially required to ensure optimal management of gout and possibly other health conditions.

Achieving health equity in Aotearoa New Zealand is a stated aim of the Government and those responsible for managing and developing its health and disability system.[1] This is against a background of a long history of inequitable health outcomes and life expectancy for Indigenous Māori compared to non-Māori.[2,3] A recent review of New Zealand's health and disability system sought to identify barriers within the system, with a "goal of achieving equity of outcomes and contributing to wellness for all, particularly Māori and Pacific peoples."[4] Additionally, the Waitangi Tribunal (the Tribunal) is currently hearing national claims relating to health services and health outcomes for Māori.[5] The Tribunal is alarmed that pro-equity action is still not embedded within the system, despite the Crown stating 14 years ago that Māori health inequities were unacceptable.[6]

Gout has been described in Māori since the thirteenth century,[7] and although its prevalence has increased for over 50 years,[8–10] it is significantly less likely to be optimally managed to prevent painful attacks and long-term sequelae than in non-Māori.[11] A large body of evidence confirms that uncontrolled serum urate levels, together with gout flares, lead to unnecessary joint and organ damage and premature mortality.[12–16] This is despite that gout can be diagnosed with certainty, and inexpensive pharmacotherapy to lower serum urate and prevent gout is readily available.[17] Inequity in gout prevention also exists for Pasifika peoples.[11] Given non-Māori, non-Pasifika peoples enjoy better health outcomes and longer life expectancy than Māori and Pasifika peoples, the gap in the quality of healthcare for gout is disturbing and in line with longstanding observations such as the "inverse care law."[18] Gold standard treatment of gout in

New Zealand has the potential not only to eradicate the disease but to contribute to a substantial reduction in this nation's health inequity.

Penchansky and Thomas[19] and others[20] define "access" as a general concept that summarises a set of more specific domains, which encompass approachability, acceptability (which includes cultural safety), availability and accommodation (which includes service opening hours), affordability and appropriateness (which provides for quality of care). New Zealand's Pharmaceutical Management Agency (PHARMAC) has provided another layer to the taxonomy of access to health by including the availability of medicines or those subsidised so that people pay a minimum fee (NZ$5 per medication at the time of this study).[21]

The complexity and multifaceted nature of access to health services for Indigenous peoples has been further described.[22,23] Davy et al advocated that previous models needed to be less linear and more inclusive of the healthcare system to understand and address access for Indigenous people. They stressed the importance of access to culturally safe healthcare services to meet the needs of communities. [23]

This paper aims to describe domains of access to gout services at one specific general practice in New Zealand. This practice is Māori-led and oriented to its community (79% Māori), with formal links to the marae (traditional meeting house) and its social services, including housing, food banks and Kaumātua (elder) support. There is ethnic congruence between clinic staff and the community. These factors explicitly address cultural safety (acceptability) to the community and allow for considering other health system factors that may impact other domains of access for Māori and Pasifika patients.

Methods

The study site is a general practice situated in a marae complex. It is a "very low-cost access" practice, meaning that fees to patients are relatively low (maximum NZ$18 per adult consultation at the time of this study). Some clinic staff speak te reo Māori and Samoan languages. Transport is available to help people attend appointments. Community health workers are integrated into the practice and run programmes co-created with the community to address long-term health conditions, including diabetes and cardiovascular disease, with routine conversations around gout.

The practice's enrolled gout population was determined on 1 June 2017 from the electronic medical records in the practice management system (PMS). Descriptive statistics are reported in this paper. The PMS only records data collected at the practice. For health services provided outside the practice, data are dependent on the outside service returning a record to the practice in which the patient is enrolled. As per previous definitions,[24,25] people were classified as having gout if the PMS recorded a classification of gout or a prescription for allopurinol or colchicine. People who had been prescribed allopurinol and had a diagnosis of myeloproliferative disease were excluded. Author LTK reviewed the PMS records of each person with gout for evidence of employment status, health status and difficulties with access. This review was supplemented by a discussion of patients with practice staff.

Ethnicity was classified according to that recorded in the PMS, and if more than one ethnicity was recorded, priority was assigned to Māori followed by Pacific.

Ethics approval was not sought for this study as it was based on routinely collected records. All enquires were undertaken by staff with clinical responsibilities to care for these patients, and all results are anonymised.

Results

Of 3,095 people (all ages) registered at the site practice, 268 people were identified as having gout (Table 1).

Māori made up 72% of the gout cohort and 79% of the practice population; Pasifika peoples made up 20% and 12%, respectively; 69% were male across all ethnicities. Non-Māori, non-Pasifika males tended to be older, although numbers were small. Mean age was lowest for Pasifika peoples.

Nearly every person with gout (94%) had one or more long-term conditions in addition to their gout; only 15 people had gout alone. The four most common comorbidities are listed in Table 2. The average number of long-term medicines per person prescribed to this cohort was 4.5 (range 0–16). Thirteen people had been prescribed ten or more medicines concurrently, and 128 had five or more. Polypharmacy is commonly defined as five or more medications.[26]

Employment status

In total, 144 people (55%) worked in labouring/manual jobs. This included 40 people working in construction (concrete, roofing, roading), 38 people driving machinery (cranes, buses, trucks, stock trucks, refrigerator trucks) and 37 people working in factories or as shift workers. A further 29 were listed as “labourer” without detail.

Of the remaining 124 people, 41 people were receiving invalid benefits for an array of health conditions; some had significant levels of disability, including being wheelchair users. Retired people, homemakers or solo parents numbered 49. Nine people had educative roles (teacher aides, te reo (Māori language) teachers, youth workers). For 25, either the information was insufficient or they were homeless people who did not request medical certificates for invalid benefits.

Individual lookup within the PMS also revealed specific commentary for 18 people (Table 3) detailing how employment affected their ability to access health services.

Discussion

PMS records of diagnostic codes, clinician notes and staff knowledge provided background on a cohort of people with gout enrolled in a predominantly Māori general practice in South Auckland, New Zealand. More than half of patients (55%) had limited or no ability to access the general practice during clinic opening hours, and the practice has little flexibility to respond to these barriers, which constitutes a shortfall in the access domain of availability and accommodation. We believe the nature and extent of this issue has received insufficient attention and is therefore not fully appreciated.

The concept of barriers to accessing the New Zealand health system is not new. For example, costs can be an issue for the patients, even though the fees can be low

Table 1: Ethnicity, gender, age of enrolled patients with gout (N=268).

	Gender N	Age, years Mean (range)	% of 268 patients with gout
Māori			
Female	61	60 (23–83)	72
Male	131	53 (23–84)	
Pasifika peoples			
Female	21	57 (40–89)	20
Male	33	47 (23–81)	
NZ European			
Female	2	59 (47–70)	6
Male	14	63 (45–79)	
Other*			
Female	0		2
Male	6	54 (39-71)	
Total			
Female	84 (31%)	58 (23–89)	100
Male	184 (69%)	54 (23–84)	

*Other included Asian (n=2), Indian (n=2), South African (n=1) and American (n=1). NZ = New Zealand.

Table 2: The four most common comorbidities .

Comorbidity	Patients (n)
Cardiovascular disease*	194
Type 2 diabetes mellitus	92
Pre-diabetes	19
Asthma	27

*Cardiovascular disease included hypertension, familial hyperlipidaemia, ischaemic heart disease, congestive heart failure, atrial fibrillation or chronic kidney disease in the absence of diabetes.

Table 3: Examples of notes recording access issues within the clinical record.

- Works on cranes at wharf; struggles to get in
- Works on road construction; usually gone 13 hours/day
- Works in a dry-cleaning factory; 13-hour days; struggles to get in
- Labourer; works long hours and shifts; has eight kids, and 11 moko live with him and wife; always stretched
- Plastic laminator sometimes both night shifts and day shifts
- Labourer; on road construction, now struggles to get employment; was in jail in 20s for drink driving; job security an issue
- Works days in fish processing and on the trains at nights; diabetic; HbA1c 98 mmol/mol
- Plasterer; out on construction sites
- Linesman; works out of town
- Roofer; just changed to cleaner because of multiple OA (osteoarthritis) issues; can’t finish work until after 5 pm
- Truck driver; can be out of town for weeks
- Caretaker cleaner; struggles to get in
- Machine operator; can’t get in
- Gout at 30 years; now gets every 2/52; roofer; can’t be off work
- Works until 7 pm each day; hard to get in; mother rings in for scripts
- Labourer; gets gout flares 3×/year; difficult to get in
- Labourer; works in the city; starts at 5 am
- Truck driver; hard to get in

for New Zealand. The 2016/17 New Zealand Health Survey reported affordability as a domain with “unmet need due to general practitioner costs” in 22% of adult Māori respondents compared with 18% for Pacific, 10% for Asian and 14% for European/other.[27] Equally, racism—a failure in the domain of acceptability—has been shown to impact on access to general practice and contribute to unmet need.[28]

In addition to this, the people who experienced challenges accessing services had comorbidities that should elevate care and prioritise them for health services. Although the co-prevalence of other health conditions alongside gout is not new, the extent is not yet fully understood. Winnard et al found that diabetes and/or ischaemic heart disease affected 40% of people with gout.[29] They further identified that a person with diabetes and gout had an age-standardised mortality rate ratio of 2.0 compared with a person with diabetes without gout ($p<0.001$). Likewise, a person with cardiovascular disease (CVD) and gout had an age-standardised mortality rate ratio of 1.4 compared with a person with CVD who did not have gout. This reinforces the double impact, and the implications of even worse access, for those who are most needing treatment. Our study found a co-prevalence of 72% with CVD and 94% with any long-term health condition.

These barriers to accessibility were further compounded for people with a disability. The assumption that standard clinical health service hours are sufficient to meet the needs of those who most require support must be challenged. We were not able to determine the numbers of people in this cohort who were unable to “pop-in” to see their doctor or healthcare professional. This study indicates that accessibility issues may be wider than envisaged.

Collecting and storing data on social determinants and barriers to access in electronic medical records is gaining momentum internationally,[30,31] but it is not seen routinely in New Zealand. Therefore, we propose that employment status should be recorded within the PMS, and enablers to access must be discussed with patients. This should include disability information, the ability to pay for services and possibly developing a practice template on which any staff member may record issues consistently. Services could include evening/weekend clinics, more mobile practitioners, virtual engagement using information technology and targeted funding support for fees. The challenge of providing health services timed to meet patient needs is one that many countries have grappled with.[32] Despite heterogeneity in study design and reporting, there has been consistent evidence that those accessing services outside routine hours are from lower socioeconomic populations and with chronic illnesses.[33] One study from rural general practice in New Zealand noted Māori were three times more likely than non-Māori to access out-of-hours health services when provided.[34] How these services can be supported and funded in New Zealand is also keenly debated. Resourcing general practice to respond has previously been met with claims that adequate and appropriate out of hours services are not fiscally supported at a national level, at least not for rural services.[35] Implementation of the current health system review and commissioning should consider authentic engagement with communities to understand and meet their needs in a sustainable and attainable manner for those delivering primary care services—both from a human and fiscal resourcing perspective.

The Waitangi Tribunal reported that “a-one-size-fits-all” model tends to suit the needs of the majority, not those most in need, and recommended a principle of “options.”[6] This point talks explicitly to advocating for the availability of health services premised on Māori models of health and engagement. Correspondingly, this would align with the proposed Indigenous access framework in considering a non-linear health system configuration. Regardless, the status quo of continuing to provide existing services in existing hours of operation fails to deliver excellent health outcomes for those most in need and creates further inequity. The current model of traditional hours of operation (eg, 8.30 am to 4.30 pm or similar) is not compatible with the lives or priorities of patients.

Many factors contribute to poor management of gout. A qualitative investigation examined this practice’s response to preventing the burden of gout from the perspective of patients.[36] Interviews with 23 community participants articulated that the key features pertaining to barriers are shortfalls in physical, financial and cultural access. Participants highlighted challenges with employment security and place of work as well as financial co-payments for general practitioner visits and medicines. This study provides quantification of some of these challenges.

A nurse-led gout initiative in the United Kingdom achieved best-practice management in more than 90% of patients with gout, compared with 30% under usual general practitioner-led care.[37] However, this was largely a cohort of older, white British men. Only 16 out of 512 participants were believed to be non-white (Indian or Pakistani ethnicity) (personal communication with the lead author). The service was offered in traditional working hours, and therefore, even with appropriate resourcing, it may not be the model to emulate for the Indigenous people in this study with significant life pressures.

Strengths

This study represents a view of the life challenges of accessing primary healthcare for people enrolled in a low cost general practice servicing a predominantly Indigenous cohort of people with gout in New Zealand. We are unaware of similar published data and believe it is unusual for primary care to include records of employment and social circumstance. This is a marker of a particular model of practice. Additionally, it provides a practice level view of the co-prevalence of long term conditions alongside gout in this cohort.

Weaknesses

Given this study was undertaken in a suburban community of low socioeconomic status and predominantly in a population enduring the legacy of colonisation, it may not be generalisable to all populations. Further, much of the data reported are informed by the PMS and its inherent limitations.

Conclusion

Māori people with gout are disproportionately limited in access to health services because of their employment and social circumstance. Accessibility is a significant issue for those in paid employment, due to the opening hours of primary care. Those not working represent a level of social disadvantage where costs and travel to services are challenging. All components of access must be considered. In this general practice, where staff strive to deliver approachable, acceptable (culturally safe) and affordable healthcare, availability and accommodation of access was a significant limiting factor.

Further, it is very uncommon for Māori and Pasifika peoples not to have comorbidity of long-term health conditions. These people represent the demographic that every effort should be made to assure ease of access to comprehensive holistic services. The system does not have the patient at the centre in terms of access and co-creation of engagement. No matter how you consider the rhetoric for greater access for those most in need, this research highlights the reality as being the opposite for most people in this cohort. Effort must be made to ascertain and document the availability of services to people, as is the case with clinical variables. Services should be appropriately supported to reconfigure to suit all people's lives. The Crown has a duty to ensure the resourcing, the expectation and accountability that health services are responsive and accessible to those most in need.

"A right delayed is a right denied"
– Martin Luther King

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Selection of Māori students into medicine: re-imagining merit. Exploring some of the sociological reasons that might explain the exclusion of Māori from the medical workforce

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ABSTRACT

This paper aims to describe a number of sociological and theoretical foundations that underpin selection into tertiary health education in New Zealand and that have historically served to limit the participation of Māori students in restricted-entry health professional programmes. It further describes practical steps that can be taken to promote pro-equity changes within tertiary institutions. First, we discuss the sociological concept of meritocracy as a dominant approach to student selection and pedagogy in universities, and we describe the consequences of this approach for Māori students. Second, we discuss the concepts of white supremacy and privilege as two organising sets of values that interplay with each other and shape the tertiary environment. Third, we discuss possible alternative theoretical and ethical approaches based on Rawls' theory of justice, mana motuhake and strengths-based assumptions. Finally, we illustrate these alternative approaches, which are fundamentally committed to Te Tiriti o Waitangi, with an example of their successful application.

Māori have been severely under-represented in New Zealand's medical workforce for the entirety of the country's colonial history.[1–4] Under-representation of Māori in the health workforce continues today, and while many factors likely drive this under-representation, inequitable and poor outcomes for Māori in the education sector are a major contributing factor.[5] It has long been recognised that selection processes into restricted-entry tertiary programmes such as medicine have a critical role to play in ensuring that inequities in health workforce participation are eliminated.[6–8]

The benefits to medical education and to the health workforce of diversity and representation are well described,[9] yet there has been a failure to support educational pathways that would result in an equitable health workforce. The aim of this paper is to describe a number of sociological and theoretical foundations that underpin selection into tertiary education in New Zealand and that have historically served to limit the participation of Māori students in restricted-entry health professional programmes. The paper further aims to describe practical steps that can be taken to promote pro-equity changes within tertiary institutions.

In order to understand the institutional context and help shape a more inclusive future for the health professions, we explore why and how institutions limit access to higher education for some groups in society while privileging access for others. We challenge some of the fundamental assumptions that underpin the behaviour and policies of tertiary institutions and discuss how tertiary institutions can re-define the concept of merit. We suggest some approaches to helping institutions break free from the written and unwritten rules that limit the extent to which the full benefits of tertiary education are shared by all groups in society.

Policies in tertiary institutions vary, and the analyses in this paper may not apply entirely, or at all, to any particular institution. Nevertheless, we believe it is instructive to understand the dominant ideologies that shape the tertiary environment and enable or obstruct the entry of Māori students into medicine.

The paper has four parts. First, we discuss the sociological concept of meritocracy as a dominant approach to student selection and pedagogy in universities, and we describe the consequences of this approach for Māori students. Second, we discuss the concepts of white supremacy and privilege as two organising sets of values that interplay with each other and shape the tertiary environment. Third, in order to imagine a society that is more explicitly based on egalitarian principles, we discuss possible alternative theoretical and ethical approaches based on Rawls' theory of justice, mana motuhake (a concept of self-determination) and strengths-based assumptions. In the fourth and final part, we illustrate these alternative approaches, which are fundamentally committed to Te Tiriti o Waitangi, with an example of their successful application.

Meritocracy

This paper is concerned with how the concept of meritocracy has been taken up, used and is now normalised within the sphere of higher education and by the social elites who derive their status and privilege from this usage. In this context, the term focuses on "cultivating the excellent and the talented."[10]

Meritocracy is a multifaceted sociological concept. The concept is old, dating back at least to ancient China, where the idea was introduced in order to address the problem of the nepotistic appointment of incompetent people to senior administrative roles. The concept of meritocracy was introduced to ensure that people were appointed on the basis of their training, skills and aptitudes, rather than family connections.[11,12]

The word "meritocracy" is itself a neologism—a combination of Latin and Greek—coined in the late 1950s.[13] The term is usually credited to English sociologist Michael Young, in particular his book *The Rise of the Meritocracy* published in 1958.[13] "Mereo" is Latin for "earn," and "—cracy" is Greek for "power," as in "plutocracy," that is, "government by the wealthy." Meritocracy refers to the idea that power and authority should be vested in individuals on the basis of talent, effort and achievement.

In the context of tertiary education, this achievement ideology defines and frames educational success as a product of individual talent and effort, and academic failure as a lack of talent and hard work; it takes no account of the structures and systems of opportunity and is absent of power analysis. Furthermore, it takes no account of the design and delivery of education that is framed to align with the hidden goals of preferentially meeting the needs of those with relative privilege. Individuals who are perceived to lack skills and intelligence are often relegated to the bottom of the meritocratic heap from a very early age. In this way arbitrary class distinctions are (re-)established, albeit camouflaged by the rhetoric of equal opportunity: "anyone can succeed if they try hard enough." The concept of merit as used in higher education is frequently essentialised, individualised and inherently eugenicist.[14]

Meritocratic approaches in higher education thus define worthiness at the point of entry. In this frame, worthiness at entry is defined largely in terms of the credentials that are the reward for those who make a "choice" to get a "good" education—for those who have come through privileged educational pathways. In many universities, especially those that aspire to be regarded as elite, the idea that higher education should be reasonably accessible for all who have suitable aptitudes has long gone. Higher education, in many universities, is now the preserve of those students who are already established on privileged educational pathways and insufficient account is taken of the known educational and social conditions of students from less privileged backgrounds.[15,16] This is accentuated further within tertiary education in programmes, such as medicine, where entry is in part the result of intense competition between students.

The definition of merit is social and, therefore, political and not an inherently personal trait.[10] Mijs emphasises the point that there is no neutral definition of merit and documents various definitions of merit that have been used through history—from manliness, aggression, asceticism and bisexuality in Sparta in 400BC, through to white race, male and intelligence in American Ivy League universities between 1900 and 1920 and athleticism, life experience and intelligence in American Ivy League universities between 1950 and onwards.[11] Any definition of merit "is a construction that must serve some groups of people, while disadvantaging others."[11] Karabel (quoted in Mijs), talking about the admissions systems at Harvard and Yale, says: "Those who are able to define 'merit' will almost invariably possess more of it, and those with greater resources—cultural, economic, and social—will generally be able to ensure that the educational system will deem their children more meritorious."

Young wrote his book *The Rise of the Meritocracy* as a dystopian novel set in the year 2034. His novel was an ironic critique of the idea of meritocracy.[13] Mijs argues that educational institutions and politicians embrace the notion because it allows them to define an exclusionary elite and provides legitimation of social inequality.[11] Young felt compelled to write to *The Guardian* newspaper and point out to Prime Minister Tony Blair that his novel was about a dystopian future, not an idealised utopia. Littler notes: "For Young, the unironic way 'meritocracy' was now deployed, which worked by 'sieving people according to education's narrow band of values [using] an amazing battery of certificates and degrees' meant that social stratifications had hardened, those demoted to the bottom of the social pile were deemed unworthy and demoralised. 'No underclass', he wrote, 'has ever been left as morally naked [as this one].'"[12]

Littler quotes French economist Piketty who uses the term "meritocratic extremism" and talks of "the apparent need of modern society, and especially US society, to designate certain individuals as 'winners', and to reward them all the more generously if they seem to have been selected on the basis of their intrinsic merits rather than birth or background."[12] Littler argues that "the idea of meritocracy has become a key means through which plutocracy—or government by a wealthy elite—perpetuates, reproduces and extends itself," and that meritocracy is a device that can only be used individually—it is inherently atomistic and competitive—by promising opportunity while producing social division.[12] It ensures that certain people are left behind.

Reay argues that it is the myth of meritocracy that keeps the neoliberal dream alive—that is, the belief that if you work hard, "all can rise to the top."[17] It is a cruel dream with many working-class casualties, with the few relatively high achieving white working class and ethnic-minority students who gain admission to elite universities being at risk of the psychological trauma of marginalisation, as well as more brutal overt and covert forms of racism.[17]

Counter-narratives to the concept of meritocracy tend to place emphasis on education as an entitlement of citizenship and acknowledge that contextual factors play a significant role in the likelihood of a student gaining access to higher education and going on to gain access to a place in medical school. With regards to medical education internationally, many medical schools are grappling with how to use a range of approaches to account for contextual factors (eg, access to appropriate science education) and to recognise and mitigate these (eg, the UK Office for Students[18]). Carefully considered and strategic tailoring of selection processes to support entry of diverse students, in addition to responsive and effective programmes that support tertiary success among students who have less privileged educational backgrounds, are two of these approaches.

White supremacy and privilege

Brittney Cooper, in Littler, writes: "The merit card is the white equivalent of a race card—it is the highest trump card… [it is] the supposedly race neutral rubric that everyone should naturally agree is the best way to judge candidates, all questions of race aside. The myth of meritocracy is one of the foundational erroneous ideals of white supremacy. Whether we are speaking about increasing racial access to education or jobs, the term merit is thrown around as though it exists in opposition to diversity."[12]

We are not referring solely to the ideology that leads to, for example, openly racist attacks, although that ideology is one important expression of white supremacy. Rather, we are referring to the insidious layering of values that result in the systematic devaluing of Indigenous ways of being and the exclusion and alienation of Indigenous people from social institutions through the insistence that they conform to cultural norms that are not their own, and inaction in the face of need.[19–22]

White supremacy is an important foundational values system of settler-colonial societies. It permeates the cultural fabric and institutions, including education,[22,23] in deep and often unseen ways. Patel discusses the challenges and conflicts for higher education in making commitments to diversity that are meaningful within the reality that "contemporary initiatives for diversity… reflect a desire for the appearance of diversity without unseating structural inequity."[24] Just as in contemporary society, where white people subject themselves and others to moral contortions in order to ethically justify their unearned privilege,[25] so too did colonialists in Australia, New Zealand, Canada and the United States—many of whom were from disadvantaged backgrounds themselves—need a moral justification for land theft, killing and barbarity. White supremacy—the explicit ordering of humans into a hierarchy with white people at the top—along with religious doctrines (eg, the Doctrine of Discovery, which continues to have legal relevance[26]), were tailored to this purpose of moral justification. It is alright, according to this narrative, to kill people and rob their land if they are inherently inferior, and if the settlers are pursuing a higher moral purpose.

This ideology aligns with eugenicist arguments. The eugenics movement contributed much to US and wider education policy in the twentieth century, including the racial segregation of US schools, arguing that black pupils were indeed inferior and it was preferable for all students, including black students, to keep schools segregated.[14] The legacy of the eugenics movement is reflected, to some extent, in research findings in New Zealand on political attitudes towards the ideology of equality,[27] ideological legitimation of the status quo[28] and essentialist explanations for mental illness.[29] The link with meritocracy is one that suggests academic achievement is about not only deservingness, but also inherent capability.

Central to the functioning of tertiary education systems is the concept of privilege, specifically *unearned* privilege. Diangelo refers to this unearned privilege as the "tail wind" that assists those with white skin in America through the trials and tribulations of everyday life.[25] The converse is the head wind (the hurdles) that African American, Latino and Indigenous people experience in everyday life— including education particularly. Categories of unearned privilege that commonly apply include gender, sexuality, skin colour, ethnicity and social class. They generate the tail wind that eases a person's passage through life in a neo-liberal, colonial nation such as New Zealand.

Those with unearned privilege are often reluctant to acknowledge it, preferring instead to attribute their relative advantages to hard work and diligence, and are often very reluctant to relinquish it. Diangelo uses the word "fragility" to describe the reactions of white people when confronted with evidence of their unearned privilege.[25] Fragility often expresses itself as anger, denial, rejection, and sometimes with tears and emotional diversion.

An alternative theoretical position: egalitarianism, mana motuhake and strength-based assumptions

The point of departure for this section is the concept of egalitarianism, the idea that everyone is enabled to participate in and belong to the wider society while recognising their individual and group differences. For example, students from adverse socioeconomic backgrounds have skills, strengths, knowledge, experiences and attributes that mean we cannot treat them the same as students from privileged educational backgrounds, but they should be able to benefit from and contribute to higher education, as an entitlement of citizenship.

The twentieth century American philosopher John Rawls, in his book *A Theory of Justice*, expressed the view that social institutions should not confer morally arbitrary lifelong advantages on some persons at the expense of others.[30] He argued that society should be judged by the way it treats the least well-off in society.

Rawls conducted a thought experiment, whereby members of society choose the sort of society in which they live. His one stipulation was that no one can know in advance their status in that society—rich, poor, white, black, male, female, gay, lesbian, Indigenous and so on. Given this "veil of ignorance," people would be unlikely to choose a society that favours one set of arbitrary characteristics, such as skin colour or gender, and are more likely to choose a society that maximises the benefit of everyone, so that wherever they end up in that society they would do as well as possible.

Rawls' vision is significant because it provides a framework for imagining a society that values egalitarianism and that is not based on values that centre the accumulation of wealth and rule by the wealthy. In practical terms, we can model our tertiary education selection policies and actions on an imagined world the way we wish it to be, noting that some Indigenous scholars have argued that justice is impossible within the context of settler colonialism.[31]

The Māori concept mana motuhake aligns with Indigenous self-determination and sovereignty.[32] Within tertiary education, it conveys the sense that Māori have a right to be in control of their own pedagogies and the application of those pedagogies, including in ways that engage with and value Māori world views and provide benefits for Māori students. Māori approaches based on mana motuhake reject the gatekeeping (or, more concerningly, gate-locking) notion of merit—including meritocracy's failure to engage with inequity in opportunity and differences in experiences, attributes and world views—and apply different criteria and measures to the selection of students. It is possible to imagine various ways that mana motuhake could be exercised in tertiary education. For example, mana motuhake could be exercised within the current system, or outside the system as part of an alternative Māori education system. Examples of the former approach can be found in the publicly funded wānanga: Te Wānanga o Raukawa, Te Wānanga o Aotearoa and Te Whare Wānanga o Awanuiārangi. The case study below provides an example of the exercise of greater Māori authority within an existing tertiary education institution, and highlights some of the opportunities for and constraints on exercising mana motuhake within universities.

Strengths-based approaches place emphasis on the enormous richness, experience and expertise people from diverse backgrounds bring into tertiary institutions. Strengths-based approaches do not stigmatise or marginalise students from Indigenous or low socioeconomic backgrounds, but rather value these students for the understandings, approaches and world views they bring.

Implementing pro-equity selection and educational-support policies: a case study

The authors of this paper all work for the University of Otago, which provides the institutional context for this case study. The university, in common with all of New Zealand's eight universities, is yet to engage fully and meaningfully with mana motuhake and Māori rights in education and in health. This neglect of basic rights and egregious inaction in the face of need is evident in the barriers of access to and pathways through tertiary training of the health workforce. The university has historically resisted the proactive implementation of effective strategies to expand the training of Māori doctors, dentists, physiotherapists, pharmacists and so on. This resistance has tended to reflect typical meritocratic approaches:[12,22] "We select 'the best.'"

One hundred and eighty years after the signing of New Zealand's foundational constitutional document, Te Tiriti o Waitangi, the participation of Māori students in all tertiary health professional programmes remains persistently well below population parity, with few exceptions.[15,16] In association with this, Māori and Pacific people are greatly under-represented across New Zealand's registered health professional workforce.[33]

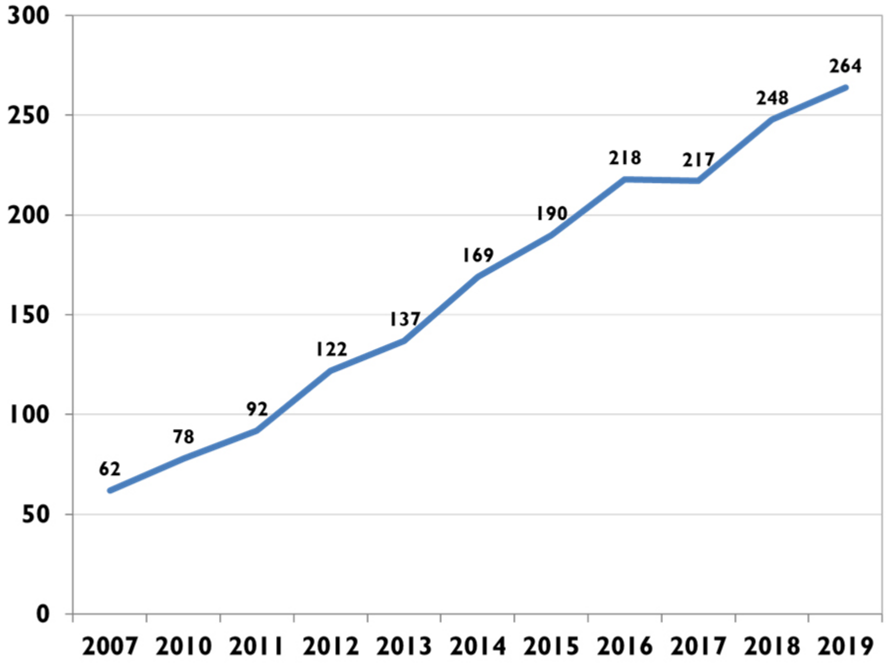
For the entire history of New Zealand's health and educational systems, universities and other higher education institutions have been largely inactive in the face of health workforce need. These institutions have not sought to actively address the under-representation of Māori working within the health system. Generally, at most, there have been piecemeal and tokenistic responses to this under-representation.[2–4]

We illustrate here the adoption of alternative approaches that focus on pro-equity selection and educational-support policies that, over a ten-year period, have resulted in radical changes in the entry of Māori students into the medical programme at the University of Otago and a growing number of Māori medical graduates. The proportion of Māori students entering the programme increased from 4–5% to over 20%, illustrating that, even when the structures of opportunity are hostile to Māori, it is indeed possible to achieve change in institutional behaviour over a relatively short period of time (Figure 1).

We have identified four overarching factors that facilitated these changes in institutional behaviour. Each of these factors has been necessary, but no factor is sufficient on its own. It is a combination of conditions that has prompted change, and the right combination will most probably vary from context to context, institution to institution. Other critical factors are undoubtedly necessary for successful change to occur in different contexts.

Theory is the first necessary condition. Educational institutions are doomed to carry on swimming around in a soup of conceptual muddle and prevailing meritocratic ideologies as long as they lack knowledge and understanding of Māori histories, concepts of Indigeneity, strong

Figure 1: Number of Māori students across all years of the medical programme 2007–2019.



anti-racism theory and analysis, kaupapa Māori theory and sociological understanding and critique of the prevailing ideologies. Specifically, in the pursuit of workforce equity, we re-framed concepts of meritocracy, understood critical race theory[34–36] and gave expression to mana motuhake.

Leadership is the second necessary condition. Māori leadership must be fully empowered. In this context, the role of the institution's senior leadership is to create a safe place for Māori leadership to be fully exercised. Leadership grounded in a Māori world view, drawing heavily on mātauranga Māori (Māori knowledge systems), is inherently strengths-based. The leadership approach taken from the inception of the process had a strong focus on responsiveness, innovation, evaluation, accountability and adaptation.

Effective policy, strategy, planning and implementation is third. At the level of policy and strategy, the University of Otago has a positive and enabling Māori strategy.[37] Underneath that strategy, health educators developed and implemented the Mirror on Society policy. This policy aims to select cohorts of students for all the university's nine health professional programmes that reflect, as much as possible, the ethnic and socioeconomic realities of the communities which graduates would go on to serve.[15,16] In addition, Māori leaders developed clear and ambitious plans to radically alter the status quo. They adopted an ongoing process of planning, implementation, evaluation and modification of programmes and further implementation. Programme development has been informed by evidence and culturally centred, with continual quality improvement, evaluation and monitoring.

The final condition is tailored investment. One of the tasks of leadership is to secure the resources necessary for transformative change. In practice, this meant that resources for the support of Māori staff and students were a key area of focus. The programme of support for Māori students was contributed to significantly by Ministry of Health funding, in recognition of the value placed on the outcome of a greatly increased Māori health workforce.

Conclusion

Current health policies prioritise much greater Māori participation in the health workforce. However, the vision for a health workforce where the entry door is open and where Māori participate fully is a very long way from being realised. The key to this door is critically held in the hands of the education sector.

We have used the example of a specific medical programme to illustrate the wider phenomenon of the adherence by tertiary institutions to traditional meritocratic approaches of student selection. In adopting these approaches, tertiary institutions ignore the structures of opportunity in wider society—and the distribution of privilege and disadvantage that determines the level and opportunity for access and participation of prospective students—thereby perpetuating the long-standing and marked under-representation of Māori doctors in the medical workforce.

We have argued that one of the key tasks in tertiary education is to resist and reverse the dual contemporary political and social tendencies towards increasing socioeconomic divisions in society and the increasing entrenchment of privilege. In particular, the application of the principles of meritocracy and the ideology of white supremacy have ensured that barriers to higher education remain in place, albeit well camouflaged behind pseudo-egalitarian language. These barriers have had the effect of ensuring ongoing privileged status for some while denying it to others. We have demonstrated that an alternative approach, based on egalitarianism, Māori approaches and strengths-based assumptions, can be effective in markedly increasing Māori participation in medical education and the medical workforce of the future.

Universities can better serve the needs of society by redefining merit to be a concept that places positive value on Indigeneity and a lived understanding of socioeconomic adversity. By defining these attributes and experiences as meritorious, as opposed to unfortunate liabilities, we welcome into our institutions students who can offer much to our universities and to society, and in turn to whom universities can offer so much.

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Which demographic factors influence Pacific women's attendance at colposcopy clinics in New Zealand?

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ABSTRACT

AIM: The aim of this study was to examine the demographic factors associated with attendance at colposcopy clinics among Pacific women following a high-grade cytology in New Zealand.

METHODS: A retrospective cohort study was undertaken of Pacific women following high-grade cytology between January 2010 and December 2015. Univariate and multivariate binary logistic regression was undertaken to assess whether socioeconomic deprivation, age and Pacific ethnicity were associated with colposcopy attendance.

RESULTS: Colposcopy attendance for Pacific women was 84.9% at 90 days and 93.5% at 180 days following referral. Pacific women residing in the most deprived areas were less likely to attend at both 90 days (OR=0.37 95% CI: 0.21–0.67) and 180 days (OR=0.19 95% CI: 0.60–0.63). Older women were more likely to attend their colposcopy appointment at 90 days when compared to the reference group aged <24-years-old. There was no association between Pacific ethnicity and attendance when adjusting for deprivation and age.

CONCLUSIONS: The overall attendance rates for Pacific women were higher than expected. Despite Pacific women engaging with cervical screening, Pacific women living in the most deprived areas were less likely to be seen by colposcopy services following a high-grade cytology. Targeted interventions are required to improve service utilisation and reduce health inequities.

Since New Zealand introduced organised cervical screening in the 1990s, both the incidence and mortality of cervical cancer has reduced significantly.[1] Although high levels of cervical screening coverage are key to reducing the incidence and mortality of cervical cancer, colposcopy follow-up is another essential component of the cervical screening pathway.[2,3] Cancelled or missed colposcopy appointments contribute to the inefficient use of health resources, increased financial costs and longer waiting times.[4] Delayed colposcopic assessment following a high-grade cytology should be minimised to reduce patient anxiety and the risk of adverse outcomes.[2,5] Immediate referral to colposcopy is indicated following a high-grade cytology, and the current National Cervical Screening Programme (NCSP) guidelines recommend that women are seen within 20 working days of receipt of referral.[6]

Pacific women experience considerable disparity accessing colposcopy services in New Zealand: following a high-grade cytology, 25% of Pacific women are not seen by colposcopy clinics within 90 days compared to 8.2% of European/other women. Non-attendance improves at 180 days to 13.3%, but it still remains higher than European/other women, whose non-attendance rate at 180 days is 5.6%.[7] There is no research examining which demographic factors are associated with Pacific women's attendance at colposcopy services,[8] and a better understanding of these factors is required to improve access to colposcopy care and reduce health inequities for Pacific women.

A number of international studies have been undertaken to identify the demographic factors associated with colposcopy non-attendance. Socioeconomic deprivation has been shown to be associated with non-attendance at colposcopy clinics. A large retrospective cohort study by Douglas et al in the United Kingdom reported that women residing in the most deprived areas and younger women were less likely to attend their colposcopy appointment.[9] A Canadian study reported similar results in regard to socioeconomic deprivation, although they reported that older women aged 60–69 were less likely to attend their colposcopy appointment.[10] These studies offer useful insight, but both used area level income alone to determine deprivation, which has some limitations because a number of factors can influence socioeconomic deprivation. Using income alone can limit the findings.[11] It is unknown whether individual Pacific ethnicity is associated with colposcopy attendance, which raises the question of whether patient information and education programmes need to be tailored to specific groups of Pacific women. Culturally tailored and language-specific cervical screening education programmes have already been successful in engaging Pacific women to participate in cervical screening.[12–14]

The aim of this exploratory study was to evaluate the colposcopy attendance rate of Pacific women following a high-grade cytology, and to examine whether socioeconomic deprivation, age and Pacific ethnicity were associated with attendance at colposcopy clinics. Understanding these factors is important for developing health policy and improving service provision for Pacific women, given the disparity they experience accessing colposcopy services.

Methods

The data were sourced from the NCSP register (NCSP-R). The NCSP-R is a national computer-based database that collects demographic data, cervical screening laboratory information and colposcopy referral and visit data. These data are confidential. All women are placed on the register at the time of cervical screening, but women may choose to opt off the register. Data on all Pacific women with an index high-grade cytology during the period 1 January 2010 and 31 December 2015 were extracted from the NCSP-R. High-grade cytology included atypical squamous cells suspicious for high-grade (ASC-H), high-grade squamous intraepithelial lesion (HSIL), atypical glandular or endocervical cells (AGUS) and adenocarcinoma in situ (AIS).[15] Women with evidence or suspicion of cancer or endometrial abnormalities on cytology were excluded from this study.

Two subsets of data were provided for this study, as it was part of a larger study: (1) women with a histology sample taken at colposcopy and (2) women with no histology taken within 90 days following high-grade cytology. Because this study was examining colposcopy attendance, a review of NCSP-R online screening histories of the women with no histology at 90 days was undertaken to identify women who had been seen by colposcopy clinics within 90 days with no histology sample taken. The retrospective review (described in Figure 1) identified two datasets: (1) women seen within 90 days and (2) women not seen within 90 days.

The index cytology date was defined as the date the high-grade cytology sample was taken. Women were classified according to whether they attended a colposcopy at 90 days and at 180 days after their index cytology report. The 90-day and 180-day time intervals were selected because they are currently used by the NCSP as quality indicators to assess timeliness to assessment.[16]

Age was recorded at the time of the high-grade cytology. Categorical age groups were defined as ≤24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years and >65 years. The reference age category was selected to take into account the changes in NCSP screening recommendations in New Zealand (eg, cervical screening now commences at aged 25).[17]

Socioeconomic status was based upon domicile at the time of the data extract. The New Zealand Index of Deprivation (NZDep) quintiles relate to the level of deprivation of the neighbourhood in which a woman resides and is a measure of nine factors collected in the national census. These include transport access, home ownership, living space, education, single-parent family, communication, income, employment and benefits. Quintile 1 represents the least deprived 20% of areas, and quintile 5 represents 20% of the most deprived areas.[18]

Women who did not have a deprivation quintile documented were excluded from the deprivation analysis.

Prioritisation level two coded ethnicity data is self-identified and up to three ethnic groups are provided. Prioritisation level two coded ethnicity data was provided so women who identified as both Māori and Pacific could be included. This also allowed for the different Pacific ethnicities, as defined by the Ministry of Health coding, to be identified, so any differences between New Zealand's diverse Pacific communities could be assessed.[19]

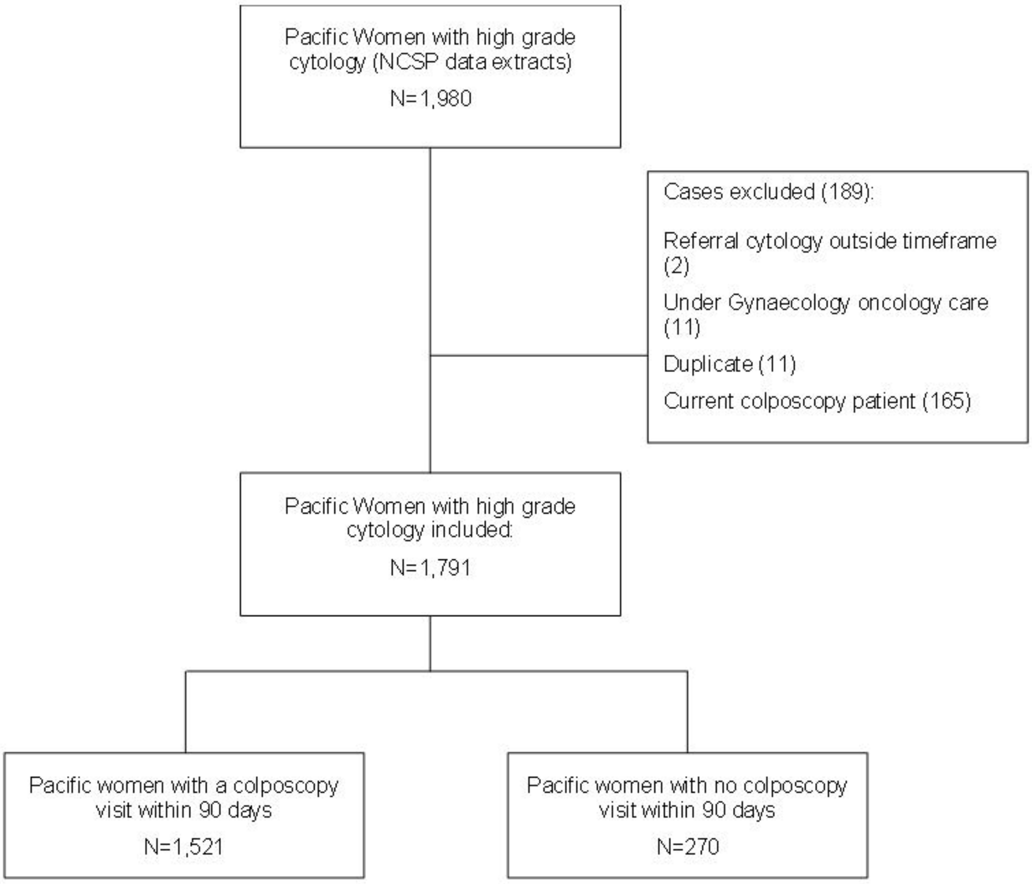
Data was analysed using SPSS (IBM Corporation, New York, USA) version 25 for Mac. Logistic regression was undertaken to regress colposcopy attendance status at 90 day and 180 days against age, NZDep and Pacific ethnicity, prior to and after adjusting each variable. Statistical significance was defined as $p<0.05$ and results were expressed as odds rations (OR) with 95% confidence intervals.

Results

During 2010 and 2015, there were 1,791 Pacific women with a high-grade index cytology recorded on the NCSP-R. Women had a mean age of 34 (standard deviation=12.0) and they typically resided within the two most deprived quintiles (Table 1). At 90 days, 84.9% of Pacific women attended their colposcopy appointment (Table 1). In unadjusted analyses, women in the most deprived quintile had lower odds of attendance at 90 days compared with women in the least deprived quintile (77.0% compared to 90.3%, odds ratio (OR)=0.35, 95% CI: 0.20–0.63). When adjusted for age and Pacific ethnicity in the multivariate model similar results were reported (OR=0.36 95% CI: 0.20–0.66).

Women in the age categories 25–34 years (OR=1.47 95% CI: 1.07–2.01), 35–44 years (OR=2.17 95% CI: 1.43–3.28) and 55–64 years (OR=3.96 95% CI: 1.68-9.33) were more likely to attend within 90 days in the unadjusted

Figure 1: Retrospective cohort dataset assessing Pacific women's colposcopy attendance within 90 days.



model compared to women in the reference category, aged <24 years. When adjusted for Pacific ethnicity and NZDep, the analysis reported similar results, with women in the age categories 25–34 years (OR=1.48 95% CI: 1.07–2.06), 35–44 years (OR=2.05 95% CI: 1.32–3.17) and 55–64 years (OR=4.34 95% CI: 1.70–11.1) being more likely to attend than the reference group.

Fijian women were more likely to attend their colposcopy appointment at 90 days when compared to the reference group in the unadjusted model (OR=1.92 95% CI: 1.12–3.30). However, the multivariate model showed there was no association with Pacific ethnicity and attendance when adjusting for age and deprivation.

At 180 days, 93.5% of Pacific women attended their colposcopy appointment. In the unadjusted analysis, there was an association between attendance and deprivation. Women in the most deprived quintile had lower odds of attendance compared with women in the least deprived quintile (89.1% compared to 97.2%, (OR=0.19, 95% CI: 0.59–0.69)). When adjusted for age and Pacific ethnicity, similar results were reported (OR=0.24 95% CI: 0.08–0.67).

Women in the age category 35–44 years (OR=2.05 95% CI: 1.11–3.80) were more likely to attend within 180 days in the unadjusted model compared to that of the women in the reference category, aged <24 years. When adjusting for Pacific ethnicity and NZDep, the analysis produced similar results, with women in the age category 35–44 years (OR=1.99 95% CI: 1.03–3.85) more likely to attend within 180 days. There was no association between attendance and Pacific ethnicity in both the unadjusted and multivariate models at 180 days.

Discussion

This is the first study to examine the demographic factors associated with Pacific women's attendance at colposcopy clinics in New Zealand following a high-grade cytology. The rates of attendance at 90 days and 180 days were higher than expected: 84.9% and 93.5% respectively. Attendance improved at 180 days, and this was seen across deprivation quintiles, which is similar to the rates reported in the literature.[9,10] This likely reflects the processes put in place by colposcopy clinics, primary care providers and NCSP-R to minimise the loss to follow-up and engage women. These include utilising cultural support to services funded by the NCSP or district health boards, sending reminder letters, informing the primary care provider of the non-attendance and NCSP-R follow-up of non-attenders with primary care providers.[6]

Although in this study overall attendance was higher than expected, 15% of Pacific women still experienced delayed colposcopy assessment following their high-grade cytology. The importance of timely colposcopy assessment is crucial for reducing the impact of cervical cancer among Pacific women. A retrospective review of cervical cancer occurrences in New Zealand identified that 34% of women diagnosed with cervical cancer had an abnormal smear in the preceding 6–84 months, which represent missed opportunities to diagnosis and prevent cancer.. Among this group, Pacific women were over-represented, particularly when the cytology was high grade: Pacific women accounted for 53% of cases compared to 16% for European women.[20] For cervical screening programmes to be effective it is essential that timely follow-up and treatment of cervical abnormalities are achieved.[2,3]

Pacific women's rates of attendance in this study were higher than those reported in NCSP Independent Monitoring Report (IMR), which reported that 74.6% of Pacific women had been seen at 90 days, compared to 84.9% reported in our study. At 180 days the NCSP IMR reported 86.7% compared to our 93.5%.[7] A possible explanation for these differences could be that the study excluded cases with a suspicion or evidence of cancer and endometrial abnormalities. The results from this study more accurately reflect current access to colposcopy care for Pacific women with high-grade cytology, because some women with cervical cancer or endometrial abnormalities may be referred directly to gynaecology or gynaecology oncology services and therefore would not have a colposcopy visit recorded on the NCSP-R. Although this study measures attendance for Pacific women, one limitation is that comparisons cannot be made with other ethnic groups. Given the attendance rates

Table 1: Analysis of colposcopy attendance within 90 days and associated variables.

	Sample column % (n)	90-day attenders row % (n)	Unadjusted model		Multivariate model*	
			OR (95% CI)	P-value	OR (95% CI)	P-value
	100 (1,791)	84.9 (1,521)				
NZDep quintile						
Q1 (least deprived)	8.1 (145)	90.3 (131)	1.00		1.00	
Q2	9.0 (161)	90.6 (146)	1.04 (0.48–2.23)	0.920	1.00 (0.46–2.16)	0.997
Q3	15.8 (283)	91.5 (259)	1.15 (0.57–2.30)	0.686	1.14 (0.57–2.30)	0.700
Q4	24.5 (439)	89.0 (391)	0.87 (0.46–1.63)	0.665	0.88 (0.47–1.66)	0.704
Q5 (most deprived)	37.6 (674)	77.0 (519)	0.35 (0.20–0.63)	0.001	0.36 (0.20–0.66)	0.001
Missing data	4.9 (89)	4.9 (75)				
Age						
<24	25.2 (452)	79.6 (360)	1.00		1.00	
25–34	36.2 (649)	85.2 (553)	1.47 (1.07–2.01)	0.016	1.48 (1.07–2.06)	0.018
35– 44	19.0 (342)	89.4 (306)	2.17 (1.43–3.28)	0.001	2.05 (1.32–3.17)	0.001
45– 54	11.6 (209)	83.2 (174)	1.27 (0.82–1.95)	0.274	1.29 (0.82–2.03)	0.265
55– 64	5.5 (99)	93.9 (93)	3.96 (1.68–9.33)	0.002	4.34 (1.70–11.1)	0.002
65+	2.2 (40)	87.5 (35)	1.79 (0.68–4.69)	0.237	2.28 (0.77–6.72)	0.132
Ethnicity						
Samoan	37.6 (674)	85.1 (574)	1.00		1.00	
Fijian	11.4 (205)	91.7 (188)	1.92 (1.12–3.30)	0.017	1.43 (0.81–2.54)	0.212
Cook Island Māori	20.3 (364)	83.5 (304)	0.88 (0.62–1.25)	0.483	0.82 (0.57–1.20)	0.320
Tongan	16.3 (293)	83.9 (246)	0.91 (0.62–1.33)	0.632	0.85 (0.57–1.26)	0.428
Niuean	7.7 (138)	79.7 (110)	0.68 (0.42–1.09)	0.111	0.68 (0.41–1.10)	0.121
Other Pacific	6.5 (117)	84.6 (99)	0.95 (0.55–1.65)	0.878	0.91 (0.50–1.67)	0.776

*Multivariate model: Adjusted for age, ethnicity and deprivation.

Table 2: Analysis of colposcopy attendance within 180 days and associated variables.

	Sample column % (n)	180-day attenders row % (n)	Unadjusted model		Multivariate model*	
			OR (95% CI)	P-value	OR (95% CI)	P-value
	100 (1,791)	93.5 (1,675)				
Deprivation index						
Q1 (least deprived)	8.0 (145)	97.2 (141)	1.00		1.00	
Q2	8.9 (161)	98.1 (158)	1.65 (0.27–10.3)	0.586	1.46 (0.32–6.66)	0.624
Q3	16.5 (283)	97.1 (275)	0.71 (0.18–2.73)	0.621	0.96 (0.28–3.28)	0.960
Q4	24.5 (439)	95.8 (421)	0.58 (0.16–2.06)	0.405	0.67 (0.22–2.03)	0.483
Q5 (most deprived)	37.6 (674)	89.1 (601)	0.19 (0.59–0.69)	0.006	0.24 (0.08–0.67)	0.007
Missing data	4.9 (89)	4.7 (79)				
Age						
≤24	25.2 (452)	91.3 (413)	1.00		1.00	
25–34	36.2 (649)	94.1 (611)	1.51 (0.95–2.41)	0.078	1.48 (0.91–2.41)	0.106
35–44	19.0 (342)	95.6 (327)	2.05 (1.11–3.80)	0.021	1.99 (1.03–3.85)	0.039
45–54	11.6 (209)	92.8 (194)	1.22 (0.65–2.26)	0.527	1.40 (0.71–2.77)	0.327
55–64	5.5 (99)	94.9 (94)	1.77 (0.68–4.62)	0.240	1.91 (6.59–5.56)	0.233
65+	2.2 (40)	90.0 (36)	0.85 (0.28–2.51)	0.769	1.11 (0.32–3.90)	0.861
Ethnicity						
Samoan	37.6 (674)	93.4 (630)	1.00		1.00	
Fijian	11.4 (205)	96.0 (197)	1.72 (0.79–3.71)	0.168	1.29 (0.56–2.99)	0.538
Cook Island Māori	20.3 (364)	92.3 (336)	0.83 (0.51–1.37)	0.482	0.78 (0.46–1.32)	0.369
Tongan	16.3 (293)	94.1 (276)	1.13 (0.63–2.02)	0.670	1.05 (0.57–1.94)	0.854
Niuean	7.7 (138)	92.0 (127)	0.80 (0.40–1.60)	0.540	0.77 (0.38–1.57)	0.477
Other Pacific	6.5 (117)	93.1 (109)	0.95 (0.43–2.07)	0.901	1.29 (0.56–2.99)	0.538

*Multivariate model: Adjusted for age, Pacific ethnicity and deprivation.

were higher than expected, a disparity still exists when compared to the IMR data for European/other women, whose attendance rate was 92.8% at 90 days.[7]

Pacific women residing in the most deprived areas in New Zealand were less likely to attend at both the 90-day and 180-day time-periods, even when adjusting for ethnicity and age. Our findings are consistent with international studies that have reported socioeconomic deprivation is associated with non-attendance at colposcopy clinics.[9,10,21] Since previous studies have utilised income quintiles alone, one strength of our study was that NZDep area level deprivation quintiles are based on a number of factors, including transport access, home ownership, living space, education, single-parent family, communication, income, employment and benefits.[9]

Although access to secondary healthcare services such as colposcopy is free, there are still barriers to attending colposcopy services for Pacific women living the most deprived areas. This research contributes to the growing body of evidence that identifies the socioeconomic determinants of health result in inequities for Pacific people accessing healthcare in New Zealand. Pacific people are more likely to have higher unemployment rates and lower median household incomes, and to live in “high deprivation” areas.[22] Although colposcopy services are free, the costs associated with attendance, such as time off work, transport and parking, are likely to be barriers to accessing healthcare.[23–27]

This study does not explore Pacific women’s experiences or examine other possible causes for delays or non-attendance. There are many factors that influence non-attendance at colposcopy clinics, including knowledge and education, language, psychological aspects, the health system and financial, practical and cultural barriers.[4,23–27] Cervical screening literature has highlighted the importance of cultural beliefs and cultural competence in regard to Pacific women engaging with cervical screening services. However, there is no research into the topic for Pacific women accessing colposcopy services.[8,13] Further research into Pacific women’s experiences is required to better understand the interplay between socioeconomic deprivation and other factors and to identify why Pacific women do not engage with colposcopy services.

Older women were more likely to be seen at both the 90-day and 180-day time-periods when compared the reference group of women aged ≤24 years. As has been reported by previously published research, there was non-linear association between attendance and age.[9,10] Women >24 years of age were less likely to attend and represented a quarter of the study sample. This is consistent with other studies that have reported older women being more likely than younger women to attend their colposcopy appointment. [4,9,21,23–28] Conversely, other studies have shown older women are less likely to attend their colposcopy appointment.[10,29] These studies do not explain why younger women are less likely to attend their colposcopy appointment. Primeau et al identified that younger women were more likely to experience more social service barriers, such financial problems, unemployment, housing issues and childcare issues. These barriers resulted in delayed assessment and were less likely to be resolved when compared other barriers like transportation issues, location of the health facility and fear.[30] With the recent change for cervical screening to commence at age 25, colposcopy attendance among Pacific women will likely improve in the future.

Pacific ethnicity was included as a variable in this study because of the culturally diverse nature of the Pacific community. When adjusting for deprivation and age, the type of Pacific ethnicity is not associated with attendance at 90 days or 180 days. The results suggest targeted interventions based on Pacific ethnicity alone are not required and that the impact of socioeconomic deprivation has a stronger association in regard to non-attendance.

There are some limitations with this NCSP-R dataset. The register does not hold information for women who have opted off the register, and thus their data are not present in the dataset. However, it is reassuring that Pacific women’s rate of withdrawal from the NCSP-R is very low (0.002%).[7] One more limitation is that the NZDep data provided were the domiciles of women at the time of the data extract and not at the time of the high-grade cytology.

A strength of this study is that, because the data has come from the NCSP-R, which is a national dataset, the dataset of Pacific women is close to complete. This allowed all colposcopy visit follow-up data to be held in one place.

Conclusion

It is encouraging to see higher rates of attendance at colposcopy clinics for Pacific women following a high-grade cytology. However, despite their engagement with cervical screening, Pacific women living in the most deprived areas are less likely to be seen by colposcopy services following a high-grade cytology. It is important that consideration is given to how we engage with Pacific women from the most deprived areas in New Zealand to improve access to colposcopy care and reduce cervical cancer risk. Further research is required to understand the relationship between deprivation and other potential barriers to attending colposcopy services for Pacific women and, ultimately, to enable health policy development and to find solutions to improve access to colposcopy services particularly with the implementation of primary HPV screening.

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Māori and Pacific peoples' experiences of a Māori-led diabetes programme

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ABSTRACT

AIM: Type 2 diabetes mellitus (T2DM) disproportionately affects Māori and Pacific peoples in Aotearoa (New Zealand). Despite this, the lived experiences of T2DM and its management by Māori and Pacific peoples are scarcely acknowledged in health literature. The present study examines the lived experiences of T2DM by Māori and Pacific participants in the Mana Tū diabetes programme. Mana Tū is a Māori-led diabetes support programme co-designed by the National Hauora Coalition (NHC) alongside patients with diabetes, clinicians, health service planners and whānau ora providers.

METHOD: The study used qualitative methods underpinned by Kaupapa Māori (Māori approaches) approaches. Twenty-two semi-structured interviews were conducted with participants of the Mana Tū diabetes programme and their whānau (thirteen Māori, 9 Pacific) from Tāmaki Makaurau (Auckland) and Te Tai Tokerau (Northland).

RESULTS: The study identified barriers, facilitators and motivators for participants to live well with T2DM. Four key themes were constituted: (1) whānau experience of T2DM, (2) cultural safety in healthcare interactions, (3) whānau ora (collective family wellbeing) and (4) Kaupapa Māori approaches to health interventions. Themes were consistent across Māori and Pacific participants.

CONCLUSION: Findings suggest that Māori-led health interventions can better support Māori and Pacific people living with T2DM and are needed to ensure these communities receive appropriate, responsive and equitable healthcare.

Type 2 diabetes mellitus (T2DM) disproportionately affects Māori and Pacific peoples in Aotearoa.[1,2] Māori, Pacific and people living in high socioeconomic deprivation experience significant inequities in the incidence of this condition and the associated complications, hospitalisations and mortality.[2,3] Māori and Pacific peoples are also diagnosed at a younger age, which leads to an earlier onset of diabetes-related complications, and diabetes contributes to the shorter life expectancy of Māori and Pacific peoples compared with non-Māori, non-Pacific.[4] Current health service approaches to reduce these inequities focus on early detection and the medical management of diabetes.[5] These approaches largely take place within primary healthcare settings, with the intention of reducing the burden on secondary care services.[6] Despite these attempts, there is a lack of evidence that healthcare interventions within primary care settings are effective at enhancing equity for Māori and Pacific peoples living with T2DM.[5]

Internationally, culturally responsive health interventions have shown promising results in the prevention and management of T2DM.[7–9] In Aotearoa, culturally responsive health interventions for Māori with diabetes and their treatment need to acknowledge a complex set of factors, including the social determinants of health, the cultural incompetence of many health practitioners and institutional racism in health (and other) service settings.[10,11] For Māori, as for other Indigenous peoples, these factors are all by-products of colonisation and intergenerational/historical trauma.[10,11] Effective interventions purposefully deploy decolonising Kaupapa Māori attributes such as tikanga Māori (traditional Māori customs), mātauranga Māori (traditional Māori knowledge), kaupapa Māori (Māori values of traditional knowledge), whānau ora (whānau wellbeing in relation to individual wellbeing) and traditional methods of healing based on interconnected relationships, spirituality and psychological, physical and social factors.[10,12,13] Similarly, health interventions that centre holistic wellbeing, collective responsibilities, identity and cultural values have been shown to be responsive in Pacific communities too.[35]

Mana Tū, a whānau ora approach to long-term conditions, is a Māori-led, Kaupapa Māori approach to supporting people living with poorly controlled T2DM and their wider whānau (family members).[14] Mana Tū (which means "to stand with authority") uses a decolonised approach that positions whānau to stand with authority while living with a long-term condition. Kai Manaaki (skilled case managers who are embedded within primary care) are a core feature of Mana Tū. Kai Manaaki provide a "walk alongside" approach to case management to support diabetes self-management in Māori and Pacific peoples living with poorly controlled T2DM (defined as HbA1c>64mmol/mol).[15]

Little is understood about the experiences of Māori and Pacific peoples living with T2DM or their experience of health interventions.[6] This gap in knowledge situates a qualitative exploration of their lived experiences nicely. This study aims to explore how participants in the Mana Tū programme construct and give meaning to their experiences navigating health and social services in Aotearoa, as well as their experiences living with T2DM and their journey in the Mana Tū programme.

Methods

This study used a qualitative Kaupapa Māori approach to undertake and analyse data from semi-structured interviews with participants of the Mana Tū diabetes programme in Auckland and Northland and their wider whānau.

Methodology

This study applied Kaupapa Māori approaches, foregrounding Māori ways of being and understanding, recognising the impact of colonisation on hauora Māori (Māori wellbeing), legitimising mātauranga Māori and situating participants as experts of their own past, present and future hauora.[16,18,19] Utilising Kaupapa Māori approaches was fundamental to the direction of this study, as it appropriately aligned with the wider conduct of the Mana Tū programme (Kaupapa Māori, Māori-led and whanau-ora-based). Steps were taken to ensure that the Kaupapa Māori research approach taken here was "safe" for both Māori and Pacific participants. First, the inclusion of Pacific expertise occurred at each step of research, including consultation, data collection and analysis.[37] Second, we created a "negotiated space" where the relationships between distinctive worldviews were expanded.[36] Finally, the "give way rule"[19] was established at the outset for any cultural interpretations needed that involved our Pacific participants, although it was not required. Deploying the give way rule from the outset allowed for a pathway by which the research team could call upon a Pacific research advisor to appropriately decide on the cultural interpretation of an event, incident or story. [19]

Participants

Actively enrolled participants of the Mana Tū programme and their wider whānau members were invited to participate in semi-structured qualitative interviews with the author (TT). Fluency in English was required for participants to take part in the interviews, but a language interpreter option was offered to participants whose first language was not English. Interviews were conducted and transcribed in English and te reo Māori (where used). Participants were recruited through Mana Tū Kai Manaaki caseloads, and interviews took place across the Northland and Auckland regions. Participants were offered to invite their Kai Manaaki to attend the research interview as an additional support person, if desired.

Data collection

Semi-structured, qualitative interviews were carried out by the author (TT) and focussed on three areas in the construction of lived experience:

- experiences of navigating health and social services in Aotearoa
- experiences of disease burden
- experiences of the Mana Tū programme.

Interviews were conducted at a location chosen by participants, predominantly their homes or in a private room at their local general practice clinic. Kaupapa Māori approaches, which emphasised whakawhanaungatanga (building connections and relationships), whanaungatanga (strengthening relationships and connections), karakia (prayer) and koha (acknowledgments), were utilised during engagement with participants. Interviews lasted an average of 30 minutes (ranging from 20 minutes to 90 minutes) and were conducted until data saturation was reached.

Data analysis

Interviews were audio recorded by the author with the permission of the participant and any whānau members present. Recordings were first transcribed by TT in an orthographic style. Transcripts were regularly reviewed by members of the research team at the time and discussed with TT in research hui (meetings). During these hui, initial coding, themes and positionality of TT were explored from the perspectives of the wider research team and were used to guide subsequent interviews and analysis. Transcripts were sent to participants, who were invited to contact the research team to discuss or request any changes to their interview transcripts.

Thematic analyses were used to explore participants' lived experiences of T2DM and taking part in Mana Tū. Initial coding was generated by TT using both inductive and deductive approaches.[20] Following the initial coding, broader themes were then produced and discussed with the wider research team. NVivo12 software was used to assist with coding and storage of the transcripts.

All identifying information, such as names and locations, were removed to maintain anonymity. Only generic demographics, such as gender, ethnicity and rurality of their location within their district health board (DHB), are included in Table 1 to provide context to responses.

Research team

The immediate research team at the time of data collection and analysis was comprised of the lead investigator (MH), research manager and programme manager (TT) of the wider Mana Tū study. The lead investigator identifies as a wāhine (female) Māori (Ngāpuhi) and is a prominent Māori health researcher in Aotearoa. The lead investigator provided overall guidance and oversight to the study and data analysis. TT, also a wāhine Māori (Te Roroa, Ngāpuhi) was responsible for conducting the qualitative interviews and led the interpretation of findings. TT took part in reflexive journaling throughout the research process, which assisted her in contextualising how she situated herself within the research and interpreted the lived experience of participants.

Ethics approval and registration

Ethics approval was obtained from the New Zealand Health & Disability Committee (reference: 17/NTB/249/AM02). The wider Mana Tū study was registered with the Australian and New Zealand Clinical Trials Register (reference: ACTRN12617001276347).

Results

Participants

A total of 32 participants were interviewed, including twenty-two actively enrolled participants of the Mana Tū programme and 10 of their whānau members.

Demographics were collected on actively enrolled Mana Tū programme participants only. All Mana Tū participants who were interviewed self-identified as Māori and/or Pacific, and 13 out of the 22 Mana Tū participants identified as female (see Table 1 for participant demographics). The mean age of participants was 58 years. The whānau members described themselves as carers, siblings, children, grandchildren, or spouses to the Mana Tū programme participants.

Themes

Narratives were largely centred around their lived experience of T2DM within the Aotearoa healthcare system, the importance of cultural safety in healthcare interactions, whānau ora (collective family wellbeing) and Kaupapa Māori approaches. These narratives were grouped into the following key themes:

- Whānau experience of T2DM
- Feeling culturally safe
- Whānau ora
- A Kaupapa Māori approach

Table 1: Mana Tū participant demographics.

ID	Participant gender	Participant DHB	Ethnicity
1	F	Semi-urban	NZ Māori
2	F	Semi-urban	Cook Island Māori
3	F	Rural	NZ Māori
4	F	Rural	NZ Māori
5	M	Rural	NZ Māori
6	F	Rural	NZ Māori
7	M	Urban	Samoan
8	F	Urban	Samoan
9	F	Urban	Samoan
10	F	Semi-urban	NZ Māori
11	F	Urban	NZ Māori
12	M	Semi-urban	Samoan
13	F	Semi-urban	Niuean
14	F	Urban	NZ Māori
15	M	Semi-urban	Tongan
16	M	Urban	NZ Māori
17	M	Urban	NZ Māori
18	M	Urban	NZ Māori
19	F	Semi-urban	NZ Māori
20	F	Semi-urban	NZ Māori
21	M	Urban	Fijian
22	M	Urban	Tongan

M: Male. F: Female. NZ: New Zealand. DHB: District health board.

Key elements of each of these themes are described below.

Whānau experience of T2DM

The presence and impact of T2DM in conjunction with other illnesses was significant and experienced across multiple generations. Participants described the intergenerational burden of T2DM and felt overwhelmed by the enormity of disease in their whānau, to the point where T2DM was somewhat normalised. Participants also acknowledged the presence of T2DM within their whānau as a key motivator for them to participate in Mana Tū. Mana Tū Kai Manaaki were viewed as facilitators who supported participants through grief and challenges associated with T2DM.

> *"We lost four of our young ones. Not through suicide but being obese. Uncontrolled diabetes. Yeah, so I had a bit of a sad patch, which I suppose this programme Mana Tū came in handy, you know? [Kai Manaaki] was here for the first couple of weeks going, 'oh, come on. You can do this!'" – Female, urban New Zealand Māori*

The presence of T2DM in whānau often motivated participants to learn about the condition, engage in condition-related knowledge sharing with their wider whānau and become role models for good self-management. Motivators were spoken about as both positive (seeking life longevity) and negative (fearing complications of T2DM and death).

> *"They're still well and kicking you know, driving around, walking around in their mid-80s, turning 90s. So, they must be doing something right. I just sort of use them as examples. If they can live a long life by doing all the right things, you know, then I'm sure I can." – Male, urban Samoan*

Feeling culturally safe

Participants experienced both positive and negative interactions with healthcare professionals when seeking healthcare support related to T2DM. Negative interactions were often experienced when engaging with health professionals who had different cultural backgrounds, particularly Pākehā (New Zealander of European descent) doctors. Negative experiences often made participants and their wider whānau members feel judged, misunderstood and inferior, which led to distrust and disconnection from healthcare services. Culturally safe engagement within healthcare settings was highly valued by participants and their wider whānau members because it provided a pathway for meaningful connection and mutual understanding of their native language, cultural worldview and sociocultural lived experience.

> *"The only thing different they [health professionals] can do is more like this lady here [Kai Manaaki]. Get the right approach. Get someone who can connect. They [whānau] want to speak with someone who speaks their [the patient's] language for starters, who knows their [the patient's] culture. And I think that if they want to start getting a bit more targeted in their [the health services] treatment of diabetes, that's what they need to look at." – Male, urban New Zealand Māori*

Kai Manaaki were often described as drivers of culturally safe engagement in Mana Tū visits and during consultations between participants and their healthcare providers. Kai Manaaki attending healthcare appointments alongside participants meant that cultural needs and aspirations could be communicated more effectively. Kai Manaaki could advocate for participants entitlements and disrupt any unequal power relations that would normally exist in these environments.

> *"I respond a lot to Māori because they know how Māori people, especially old, and the ways that we sit." – Female, rural New Zealand Māori*

The intersections between health, culture and social contexts were noted by some participants who spoke about feeling that the wider social contexts influencing health events were not considered by some Pākehā health professionals. Participants valued the understanding of these contexts and support offered by Kai Manaaki, which extended to the wider whānau.

> *"She [Kai Manaaki] helped me without being pushy or you know. Because some people, Pākehā get pushy. Sorry for saying that. But you*

> *know, they get pushy and then they just dump you when they can't make you do something. They just dump you. Whereas [Kai Manaaki 1] and [Kai Manaaki 2] don't. Even with my sister. [Kai Manaaki 2] will say, 'oh, next time we will come out and visit her.' And she's always better after [Kai Manaaki 2] calls in." – Female, urban New Zealand Māori*

Whānau ora

Whānau ora (collective family wellbeing) was viewed by most participants as a critical success factor of the Mana Tū programme, as it allowed participants and their wider whānau to navigate health and wellbeing goals as a collective group. This collective navigation strengthened participant support systems, allowed for small and achievable changes over time and improved holistic wellbeing for the collective whānau.

> *"I think it was perfect timing because when [Kai Manaaki] came on my aunty was staying with me during that time and I think it was the way in which [Kai Manaaki] approached it. Instead of excluding my aunty, she actually included her. So that, and my aunty found it really beneficial for herself. So, it has had that rippling effect for her as well because she even appreciated those visits." – Female, urban New Zealand Māori*

Participants also spoke of the collective responsibility their whānau members had in supporting and caring for them. This responsibility was seen as an unconditional and natural obligation in the collective whānau journey to live well and often meant that younger whānau members would step into carer roles for their elders.

> *"I don't know if there was some kind of way that whānaus like ours, like our whānau, who have had to at the end of the day come together and take responsibility and put all these things in place to help support mum's health, you know, to support her health from here on. I don't quite know what that might look like because I've had to give up full-time work to move back home you know, to come home." – Whānau member of female rural New Zealand Māori*

A Kaupapa Māori approach

Many Māori and Pacific participants valued the ability to explore and focus on domains of wellbeing beyond physical health in the Mana Tū programme through its Kaupapa Māori approach. This often included a focus on taha wairua (spiritual health), taha hinengaro (mental health) and taha whānau (family health).

> *"Also having a Māori is important for me. Coz' they kind of understand the cultural element of things as well, and also the spiritual aspect of health. Both cultural and religious has been good. So, she understands me with that. So, you know, having those common beliefs, those common things definitely helps. It's very supportive." – Male, urban New Zealand Māori*

This extension beyond the physical health domain applied to goal-setting activities carried out during Mana Tū visits, where participants and their wider whānau often focussed on goals associated with social connection and spiritual and mental wellbeing.

> *"Nah, it's been great, the goals I've been setting. I've achieved most of them. Not only health but socially and personally." – Female, semi-urban New Zealand Māori*

Both health and social outcomes were viewed by participants as interwoven into their holistic wellbeing. For some participants, seeing their Kai Manaaki actively address social outcomes was important to maintaining their wellbeing. Additionally, participants and wider whānau members commented on the various barriers that impede navigation of the social care system.

> *"[Kai Manaaki] would go and do things for him at social welfare that was a lot lifted off his shoulders you know. He didn't have to go but [Kai Manaaki] did it for him and it was so helpful. We couldn't believe it when she went to social welfare, and she'd come back straight away. We'd be like, 'how did she do it so fast?' If I was to go there I'd be sitting in the queue and waiting for hours and hours, which I have experienced." – Whānau member of male semi-urban Tongan*

Discussion

These findings highlight the challenges still faced by Māori and Pacific peoples living with T2DM in Aotearoa and provide a lens for system-reflection on how Māori-led approaches can tackle inequities and better support Māori and Pacific peoples to live well with long-term conditions.

T2DM had a significant impact, was widespread and had an intergenerational presence in whānau of the participants, to the point where the experience of T2DM was inevitable and normalised. The presence of T2DM often motivated participants to learn about the condition and model good self-management behaviours. The challenges faced by participants and their whānau in relation to disease burden was clearly evident across interviews and replicate the challenges experienced by Māori and Pacific peoples in other long-term conditions.[21] The mana-enhancing support provided by Kai Manaaki was highly valued by participants in their journey to live well. This finding is consistent with similar models of care delivered in primary and community care levels.[34]

Low levels of cultural safety in interactions with health professionals were a deterrent from the healthcare system. Mana Tū was seen as a model example of a culturally responsive programme that enhanced connections between Māori and Pacific peoples and the healthcare system. The cultural responsiveness of Kai Manaaki in their practice was seen as critical to establishing a trusted connection with participants. These findings are consistent with evidence that reinforces the importance of language and cultural identity in the healthcare setting.[22–23] Participants also acknowledged cultural barriers with Pākehā health professionals, which may allude to segmentation of biomedical models and socially insular Western medical paradigms.[24]

The concept of "whānau ora" in this analysis is seen as an approach that focusses on improving the wellbeing of whānau as a collective group, rather than solely working with an individual alone.[25] The focus on whānau ora in Mana Tū enhanced social support structures and drove positive ripple effects in wider whānau outcomes. Mana Tū provided a pathway for participants to navigate their journey towards living well, as a collective. Wider whānau care and support in managing T2DM was seen as an unconditional responsibility of the collective whanau group and fundamental to participants living well. Children often stepped into informal carer roles when supporting their elders living with T2DM, reinforcing traditional Māori care customs and values.[26] The intergenerational duty of care between younger whānau members and their elders was seen as natural. It revitalised pre-colonial Māori social support structures that help the collective thrive.[27–28]

Kaupapa Māori approaches are designed to address social injustices and achieve equity, revitalise Māori cultural values and practices and transform peoples' lives in positive ways.[29–30] Kaupapa Māori approaches require Māori leadership not only to deconstruct colonising systems and processes, but also to reconstruct these systems in a decolonising manner. Kaupapa Māori approaches used in Mana Tū supported participants and their whānau to explore aspects of their wellbeing external to physical health. This holistic approach saw taha wairua (spiritual wellbeing) as a prominent narrative and central to whānau healing. The Kaupapa Māori approaches used also appeared to have benefits for both Māori and Pacific participants, which demonstrates the multi-cultural responsiveness of the programme.

For both Māori and Pacific participants, actively addressing social issues in Mana Tū helped to reduce social stressor barriers that may have impeded their health while simultaneously highlighting discrimination faced by some who navigate health and social services in Aotearoa. This recognition of wider social contexts allowed a better understanding of the impact wider social contexts have on physical health.[31] Understanding sociocultural contexts that can impact health is particularly important for Māori, who have been significantly marred by the impacts of colonisation and are still suffering from social injury.[32]

The concepts revealed in this research highlight the benefits of a Kaupapa Māori approach for both Māori and Pacific people living with T2DM and reinforce the need for more culturally tailored and targeted health interventions in Aotearoa. To adequately address these inequities, interventions need to respond to the complex needs and issues experienced by Māori and Pacific peoples. Achieving equitable outcomes in Aotearoa is critical to ensuring that the future is one where all Māori and Pacific whānau thrive, live well and live long. Lastly, the perspectives of Māori and Pacific communities where health interventions are delivered should be actively and consistently incorporated in all service delivery designs and analyses in Aotearoa, to ensure programmes are culturally safe and fit for purpose.

This analysis is timely, given the lack of prior research privileging the qualitative accounts of Māori and Pacific participants' experiences within a Māori-led diabetes programme and the recent announcements regarding the initiation of the New Zealand Māori Health Authority and Iwi-Māori Partnerships Boards as health service commissioners.[33]

Competing interests:

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Cigarette smoking and e-cigarette use among university students in New Zealand before and after nicotine-containing e-cigarettes became widely available: results from repeat cross-sectional surveys

Ben Wamamili, Pat Coope, Randolph C Grace

ABSTRACT

AIM: To estimate the prevalence and patterns of smoking and vaping, and associations between smoking and vaping, among university students in New Zealand when access to nicotine-containing e-cigarettes was restricted (ie, time point 1 or T1) and 12-months after restrictions were relaxed (ie, time point 2 or T2).

METHOD: Cross-sectional surveys of university students across all eight universities: T1, March 2018 (n=1,932), and T2, March 2019 (n=2,004). Chi-squared tests compared responses between T1 and T2 and logistic regression examined associations between smoking and vaping with student characteristics.

RESULTS: The patterns of smoking (T1 vs T2): current (10.6% vs 12.1%, p=0.716), daily (5.0% vs 4.6%, p=0.121), and cigarettes/day, time to first cigarette, and avoidance of smoking in smoke-free spaces were not significantly different. In contrast, vaping: current (6.8% vs 13.5%, p<0.001), daily (2.7% vs 5.4%, p<0.001), and possibly vaping in smoke-free spaces, were significantly higher at T2. At both periods, males had higher odds of smoking, vaping and dual use; students aged 25–34 and long-term New Zealand residents had higher odds of vaping. Asian and Other students had lower odds of smoking at T1, and Other students had higher odds of vaping at T2.

CONCLUSION: Vaping was significantly more prevalent at T2 than T1, without there being a corresponding decrease in smoking. Age, sex, student type and ethnicity predicted smoking and vaping.

Cigarette smoking is a leading cause of preventable illness and death in New Zealand[1] and globally[2] and a major contributor to inequalities in health and social wellbeing between Māori and non-Māori New Zealanders.[3] New Zealand aims to be smoke-free by 2025 (the Smokefree 2025 goal)[4] and electronic cigarette/e-cigarette use (vaping) is thought to be a promising alternative for people who smoke cigarettes.

Recent data from the New Zealand Health Survey show a general decline in the prevalence of smoking and an increase in vaping in the population.[5] Overall, 14.2% of people aged 15 years or older smoked at least once a month (ie, currently smoked) in 2018/19 vs 13.4% in 2019/20, and 12.5% smoked at least daily in 2018/19 vs 11.6% in 2019/20. By age, current smoking in 2018/19 vs 2019/20 was 14.4% vs 12.4% in 15–24-year-olds and

18.3% vs 19.8% in 25–34-year-olds, and daily smoking was 11.2% vs 10.1% and 15.5% vs 16.7%, respectively. In contrast, 4.7% vaped at least once a month (ie, currently vaped) in 2018/19 vs 5.2% in 2019/20, and 3.2% vaped at least daily in 2018/19 vs 3.5% in 2019/20. By age, current vaping was 7.1% vs 9.2% in 15–24-year-olds and 7.0% vs 7.7% in 25–34-year-olds, and daily vaping was 3.6% vs 4.2% and 5.1% vs 6.0%, respectively.

Before 12 March 2018, it was illegal to sell nicotine-containing e-cigarettes in New Zealand, but individuals could import small amounts for personal use. However, following a District Court ruling (Ministry of Health v Philip Morris),[6] New Zealand effectively had an unregulated environment for vaping products (including nicotine-containing e-cigarettes). As a result, vaping products and retail outlets grew rapidly alongside blatant marketing of vaping to young people as a lifestyle product, until vaping legislation (Smokefree Environments and Regulated Products (Vaping) Amendment Act 2020) was passed in August 2020.[7]

There is limited information about the prevalence and patterns of smoking and vaping among tertiary students in New Zealand. Two studies of university students aged 18–24 years (2018 data) reported that 49.8% ever smoked, 11.1% currently smoked and 5.9% smoked daily,[8] whereas 40.5% ever vaped, 6.1% currently vaped and 1.7% vaped daily.[9]

No previous study has compared the prevalence and patterns of smoking and vaping before (ie, time point 2 or T1) and after (ie, time point 2 or T2) nicotine-containing e-cigarettes became widely accessible in New Zealand. The current study sought to fill this gap. This information is important to help (1) identify potential trends in patterns of smoking and vaping among young people, (2) assess likely implications of any trends in smoking and (3) guide policy considerations to advance the Government's Smokefree 2025 goal.

Method

Data from two cross-sectional surveys of university students from across New Zealand, conducted in March 2018 (T1) and March 2019 (T2), were analysed. Using previously validated questions, the questionnaire (Appendix 1) collected data on smoking, vaping, the Smokefree 2025 goal and participants' health. The ethnicity question was based on the New Zealand census;[10] tobacco use questions were based on the New Zealand Tobacco Use Survey (NZTUS)[11] and the Fagerstrom Test for Nicotine Dependence Questionnaire (FTNQ);[12] and the questions on e-cigarette use were based on Pearson et al.[13] Questions on smoking and vaping in smoke-free spaces were developed in-house. The T2 questionnaire also asked whether respondents participated in the T1 survey (those who did were excluded from the current analysis). The questionnaire and survey tools (online and in-person) were piloted on 22 students at the University of Canterbury in October 2017.[8]

Both surveys aimed to recruit a minimum of 1,062 students with representation from all eight universities in New Zealand (7–9% Māori, 5–7% Pasifika, 84–88% NZ European/Other). The estimated sample assumed random sampling and was calculated based on available data at the time (ie, the 2016 Universities New Zealand data)[14] that showed the total student population of 172,000, a confidence interval (CI) of 95%, estimated ever-vaping and ever-smoking proportion of 0.5 (conservative estimate) and a margin of error of 3%.[8,9]

We used a convenience sample because complete enrolment lists of students were not available from the universities to allow for random sampling. Information about the research was distributed widely online on students' association Facebook pages and through direct contact with research assistants from all universities. Research assistants approached students on campus and provided a short description of the research, handed the questionnaires and pens to participants, collected completed questionnaires and posted them in secure, registered packages to the principal researcher. All research assistants received training and supervision.[9]

Participation was voluntary and participants were required to provide consent before completing the questionnaire (online or on paper). In both survey cycles, participants could enter into a draw to win one of ten NZ$100 cash prizes after completing the survey as a token of appreciation.[9,15] Internet protocol addresses (IP addresses) were used to identify and remove duplicate entries entered online.

All data were de-identified before analysis, and each response was weighted to improve representation of the New Zealand university student population. The calculation of weights required knowledge of the distribution of the relevant variables over the eight universities.[16] At T1, weighting could be accomplished using sex and university size, with data from the Ministry of Education.[17] Each person was assigned a weight so that the adjusted joint sample distribution of sex and university matched that of the published population for all universities in 2018.[16] At T2 (2019 data), data on the distribution of the relevant variables over the eight universities were not available—each person was assigned a weight so that the adjusted sample distributions of sex and university size matched those of the published population for all universities in 2018.[16]

Participants

A total of 2,180 participants took part in T1 and 1,932 were included in the current analysis (46 were not studying and 202 did not choose a valid university). At T2, 2,257 participants took part, of whom 2,004 were included in the current analysis. Of those excluded from T2, 74 did not provide a valid university, 179 participated in T1 or had missing data on participation in T1 (excluded to obtain two independent samples). However, the demographic characteristics of participants and patterns of smoking and vaping were similar at T2, with or without the excluded T1 participants. Valid universities included: Auckland, Canterbury, Lincoln, Massey, Otago, Waikato, Auckland University of Technology and Victoria University of Wellington.

Ethics approval

The University of Canterbury Human Ethics Committee approved both surveys together (research ethics ID: HEC 2017/42/LR-PS) and we undertook Māori consultation through the Ngāi Tahu Consultation and Engagement Group.

Survey measures

Demographic information

Age: For the purpose of analysis, age was categorised into three groups (<25 years, 25–34 years and ≥35 years). This allowed for comparisons with population estimates that use similar age groups[5] as well as ensuring adequate numbers in subgroups.

Gender: We categorised gender into male, female and other (includes respondents who reported gender as “other” and “prefer not to say”). However, only male and female were used in analysis because of small numbers of other (n=24), and thus the variable was labelled “sex.”

Ethnicity: Ethnicity was categorised into New Zealand European (NZ European), Māori, Pasifika (included Samoan, Cook Island Māori, Tongan and Niuean), Asian (included Indian and Chinese) and Other. We recorded each ethnicity and thus allowed “n” to increase in the presentation of data.

Student type: Neither survey asked information about the nationality or residency status of participants. For this analysis, participants who had lived in New Zealand for ≤5 years were categorised as short-term New Zealand residents, and those who had lived in New Zealand for ≥6 years were categorised as long-term New Zealand residents.

Cigarette smoking: Respondents who answered “Yes” to the question, “Have you smoked cigarettes or tobacco at all, even just a few puffs?” were categorised as “ever smoked”; respondents who smoked at least once a month as “currently smoked”; and those who smoked at least once a day as “smoked daily,” consistent with previous research.[8,9,15,18]

The number of cigarettes per day was categorised as: 1–5, 6–10 and more than 10. The time to smoking the first cigarette after waking up was categorised as: within 30 minutes, 31–60 minutes and more than 60 minutes. Smoking in smoke-free places was categorised as: never/almost never and other. Intentions to quit smoking were categorised as: yes, within 30 days; yes, after 30 days but within 3 months; yes, but not within the next 3 months; and not planning on giving up smoking. Attempts to quit smoking in the last 12 months was categorised as: yes or no. The number of serious attempts to quit in the last 12 months were categorised as: 1–3, 4–5 and more than 5.

E-cigarette use: Respondents who answered “Yes” to the question, “Have you ever tried an e-cigarette or vaping device?” were categorised as “ever vaped”; those who vaped at least once a month as “currently vaped”; and respondents who vaped at least once a day as “vaped daily,” consistent with previous research.[9,15,18]

Further, respondents were asked whether they had “used an e-cigarette or vaping device daily for a month or more,” and those who had were asked whether the e-cigarette that they used most often contained nicotine. Other variables include: vaping in smoke-free spaces (never/almost never and other); reasons for vaping (quit smoking, enjoyment and curiosity); and perceptions of the harmfulness of e-cigarettes compared with cigarettes (coded on Likert scale: 1 = much less harmful than cigarettes; 2 = somewhat less harmful than cigarettes; 3 = about the same as cigarettes; 4 = somewhat more harmful than cigarettes; and 5 = much more harmful than cigarettes).

Data analysis

Chi-squared tests were used to compare the overall prevalence of smoking and vaping, and Mann–Whitney U tests were used to compare the differences in the perceptions of harmfulness of e-cigarettes compared with cigarettes, between T1 and T2. Further, logistic regression assessed the associations between smoking and vaping with student characteristics (age, sex, student type and ethnicity). Four new variables were created and used in logistic regressions: (1) exclusive smoking (smoking currently[8,19] and not vaping currently); (2) exclusive vaping (vaping currently[20,21] and not smoking currently); (3) dual use (smoking and vaping currently); and (4) non-use (neither smoking nor vaping currently).

The variables were coded as age (1 = ≥35 years, 2 = 25–34 years, 3 = <25 years), sex (1 = male, 2 = female), student type (1 = long-term New Zealand resident, 2 = short-term New Zealand resident) and smoking and vaping (1 = dual use, 2 = exclusive smoking, 3 = exclusive vaping, 4 = non-use). The last category was used as reference category. All statistical analyses were performed using IBM SPSS Statistics V.27 and two-sided p<0.05 was considered statistically significant; confidence intervals (95% CI) were reported.

Results

Participants

The demographic characteristics of participants are displayed in Table 1. The age and sex of participants at T1 and T2 were similar; there were more New Zealand European participants (56.4% vs 51.2%) and fewer Pasifika (4.6% vs 6.1%) and Asian participants (15.8% vs 21.5%) at T2; Māori participants were similar at both surveys.

Smoking

Patterns of ever (51.5% vs 50.9%, p=0.716), current (10.6% vs 12.1%, p=0.121) and daily smoking (5.0% vs 4.6%, p=0.528), number of cigarettes per day, time to smoking the first cigarette after waking up, avoiding smoke-free spaces (indoors 88.3% vs 90.1%, p=0.506; outdoors 67.8% vs 67.2%, p=0.874), intentions to quit smoking and the number of serious quit attempts in the last 12 months were not significantly different between the two surveys (Table 2).

E-cigarette use

The prevalence of ever (37.3% vs 47.4%, p<0.001), current (6.8% vs 13.5%, p<0.001) and daily vaping (2.7% vs 5.4%, p<0.001) was significantly higher at T2, whereas non-use in smoke-free spaces (indoors 77.5% vs 68.0%, p=0.003; outdoors 71.3% vs 60.8%, p=0.002) was significantly lower at T2 compared with T1 (Table 3). At T2 there was a significant shift in the perception of harmfulness of e-cigarettes on a 5-point Likert scale (Mann–Whitney test, p=0.010), but over both time periods the majority of students (T1:75.5%, T2: 72.4%) still perceived e-cigarettes as less harmful than cigarettes.

Table 4 displays the reasons for vaping among students at T1 and T2, by age, sex, ethnicity and student type. Overall, curiosity was the leading reason for vaping (except for students ≥35 years at T1 where the majority vaped to quit smoking).

The association between smoking and vaping with student characteristics

A set of multinomial logistic models predicted smoking and vaping status with age, sex, student type and ethnicity as predictors. The T1 model was significant: χ^2 (27, N=1,847) = 93.059, p<0.001 and age, sex, student type and ethnicity made a significant contribution to the model (Table 5). Compared with females, males had higher odds of dual use (OR=3.13, 95% CI: 1.49 to 6.56), exclusive smoking (OR=2.56, 95% CI: 1.82 to 3.61) and exclusive vaping (OR=1.99, 95% CI: 1.29 to 3.06). Asian students had lower odds of exclusive smoking than non-Asian students (OR=0.32, 95% CI:

Table 1: Demographic characteristics of participants at T1 and T2 surveys.

	T1 survey (n = 1,932)		T2 survey (n = 2,004)	
	n	%	n	%
Age (years)				
<25	1,595	82.6	1,631	81.4
25–34	270	14.0	284	14.2
≥35	66	3.4	85	4.2
Missing data	1	0.1	4	0.2
Gender				
Male	740	38.3	828	41.3
Female	1,114	57.7	1,094	54.6
Other*	24	1.2	37	1.8
Missing data	54	2.8	45	2.2
Ethnicity†				
NZ European	989	51.2	1,130	56.4
Māori	156	8.1	161	8.0
Pasifika	117	6.1	92	4.6
Asian	415	21.5	316	15.8
Other	494	25.6	504	25.1
Years lived in New Zealand				
≤5 years	491	25.4	469	23.4
≥6 years	1,434	74.2	1,532	76.4
Missing data	7	0.4	3	0.1

*Includes those who said “other” (13) and “prefer not to say” (11). †Multiple responses were allowed, hence percentages add up to more than 100%.

Table 2: The patterns of smocking at T1 and T2 (overall).

	T1 survey		T2 survey		p-value
	%	95% CI	%	95% CI	
Ever smoked	51.5	49.1–53.7	50.9	48.9–53.1	0.716
Currently smoked	10.6	9.2–12.0	12.1	10.7–13.6	0.121
Smoked daily	5.0	4.1–6.1	4.6	3.7–5.6	0.528
Number of cigarettes/day					
1–5	68.0	61.1–74.3	69.5	63.5–75.1	0.926
6–10	17.5	12.6–23.4	16.2	11.9–21.3	
More than 10	14.6	10.1–20.1	14.3	10.3–19.2	
Time to smoking the first cigarette					
Within 30 minutes	17.2	12.5–22.8	18.2	13.8–23.4	0.740
31–60 minutes	11.8	7.8–16.8	13.8	9.9–18.5	
>60 minutes	71.0	64.6–76.9	68.0	62.1–73.6	
Did not smoke in smoke-free spaces					
Indoors	88.3	83.5–92.2	90.1	86.0–93.4	0.506
Outdoors	67.8	61.4–73.8	67.2	61.2–72.7	0.874
Intentions to quit smoking					
Yes, within 30 days	19.3	14.4–25.0	21.3	16.6–26.7	0.265
Yes, after 30 days but within 3 months	14.5	10.2–19.7	12.5	8.8–17.0	
Yes, but not within the next 3 months	34.7	28.5–41.2	27.9	22.7–33.7	
Not planning on giving up smoking	31.6	25.6–38.0	38.2	32.4–44.3	
Attempts to quit smoking					
Tried to quit in the last 12 months	36.1	29.9–42.7	40.9	35.0–47.0	0.272
Made 1–3 serious quit attempts	69.6	58.3–79.5	70.0	60.5–78.4	0.367
Made 4–5 serious quit attempts	17.7	10.0–27.9	11.8	6.5–19.4	
More than 5 serious quit attempts	12.7	6.2–22.1	18.2	11.5–26.7	

Table 3: The patterns of e-cigarette use at T1 and T2 (overall).

	T1 survey		T2 survey		p-value
	%	95% CI	%	95% CI	
Ever vaped	37.3	35.2–39.5	47.4	45.2–49.6	<0.001
Currently vaped	6.8	5.7–8.0	13.5	12.0–15.1	<0.001
Vaped daily	2.7	2.0–3.5	5.4	4.4–6.5	<0.001
Vaped daily for a month or more	15.4	12.5–18.7	17.8	15.4–20.4	0.247
Used nicotine-containing e-liquids	78.5	67.8–86.9	83.8	77.1–89.1	0.318
Did not vape in smoke-free spaces					
Indoors	77.5	72.7–81.8	68.0	63.8–72.1	0.003
Outdoors	71.3	66.1–76.0	60.8	56.4–65.1	0.002
Reasons for vaping					
To quit smoking	6.2	4.3–8.6	5.7	4.3–7.4	0.689
Enjoyment	13.7	10.9–16.9	16.5	14.2–19.1	0.156
Curiosity/just wanted to try	63.9	59.7–68.0	63.0	59.8–66.2	0.735

Table 4: The reasons for vaping at T1 and T2 by age, sex, ethnicity and student type.

	T1 survey			T2 survey		
	To quit (%)	Enjoyment (%)	Curiosity (%)	To quit (%)	Enjoyment (%)	Curiosity (%)
<25 years	2.4	14.6	68.3	3.9	17.6	64.3
25–34 years	27.9	6.6	41.0	18.9	9.5	55.8
≥35 years	41.7	8.3	16.7	16.7	5.6	44.4
Male	7.1	14.3	60.9	6.0	21.1	54.8
Female	5.6	12.1	67.3	5.4	12.3	71.8
NZ European	6.6	11.9	67.6	5.4	17.6	63.7
Māori	8.3	20.0	61.7	7.0	10.5	60.5
Pasifika	8.1	18.9	62.2	5.9	11.8	58.8
Asian	3.0	19.7	56.1	6.6	11.3	67.0
Other	5.4	13.0	57.6	6.1	15.7	62.1
Long-term NZ resident	6.6	13.3	65.6	5.0	17.0	63.7
Short-term NZ resident	4.1	16.4	52.1	10.0	13.1	59.2

0.14 to 0.71) and students whose ethnicity was Other had lower odds of exclusive smoking than students whose ethnicity was non-Other (OR=0.45, 95% CI: 0.22 to 0.93). Compared with students aged <25 years, students aged 25–34 years (OR=1.90, 95% CI: 1.07 to 3.39) and students aged ≥35 years (OR=2.74, 95% CI: 1.09 to 6.90) had higher odds of exclusive vaping. Long-term residents had higher odds of exclusive vaping (OR=2.94, 95% CI: 1.34 to 6.44) than short-term residents.

Likewise, the T2 model was significant: χ^2 (27, N=1,916) = 167.821, p<0.001 and age, sex, student type and ethnicity made a significant contribution to the model (Table 5). Compared with females, males had higher odds of dual use (OR=4.89, 95% CI: 3.08 to 7.77), exclusive smoking (OR=1.45, 95% CI: 1.01 to 2.09) and exclusive vaping (OR=2.36, 95% CI: 1.68 to 3.33). NZ European students had higher odds of exclusive vaping than non-NZ European students (OR=3.62, 95% CI: 1.90 to 6.90) and students whose ethnicity was Other had higher odds of exclusive vaping than students whose ethnicity was non-Other (OR=2.56, 95% CI: 1.40 to 4.70). Students aged 25–34 years had lower odds of exclusive vaping (OR=0.47, 95% CI: 0.23 to 0.98) compared with students aged <25 years, whereas long-term New Zealand residents had higher odds of exclusive vaping than short-term New Zealand residents (OR=2.24, 95% CI: 1.08 to 4.65).

Discussion

To the best of our knowledge, this is the first study in New Zealand to assess and compare (1) the prevalence and patterns of smoking and vaping, and (2) the associations between smoking and vaping with university student characteristics before (T1) and after (T2) restrictions on access of nicotine-containing e-cigarettes were relaxed in New Zealand.

Overall, we found similar prevalence of smoking (ever, current and daily), cigarettes per day, time to smoking the first cigarette and avoidance of smoking in smoke-free spaces at T1 and T2. In contrast, we found significantly higher prevalence of vaping (ever, current and daily), and significantly lower prevalence of non-use in smoke-free spaces, at T2 compared with T1. At both surveys, males were more likely to exclusively smoke, exclusively vape or dual use than females; students aged 25–34 were more likely to exclusively vape than students <25 or ≥35, and long-term New Zealand residents were more likely to exclusively vape than short-term New Zealand residents. Students who identified as Asian or Other were less likely to exclusively smoke at T1 than non-Asian and non-Other students, respectively. Further, students who identified as Other were more likely to exclusively vape at T2 than non-Other students.

The observed decline in students who reported non-use of e-cigarettes in indoor (from T1 77.5% to T2 68.0%, p=0.003) or outdoor smoke-free spaces (from T1 71.3% to T2 60.8%, p=0.002) is of great concern. If vaping in smoke-free spaces became widespread and led to increased smoking in these spaces, this would be a source of considerable harm to public health. We also found a non-significant increase in the use of nicotine-containing e-liquids (78.5% vs 83.8%, p=0.318). Consistent with previous research,[20–24] our results showed strong associations between smoking and vaping, particularly in male participants.

These findings suggest that university students (and possibly other tertiary students) may be vaping for reasons other than to quit smoking. Indeed, the majority of those who vaped reported curiosity (T1: 63.9%, T2: 63.0%) as the most common primary reason for vaping, followed by enjoyment (T1: 13.7%, T2: 16.5%) and to quit smoking (T1: 6.2%, T2: 5.7%), consistent with previous research.[9] Students aged <25 years were less likely to vape to quit (T1: 2.4%, T2: 3.9%) compared with students aged 25–34 years (T1: 27.9%, T2: 18.9%) or ≥35 years (T1: 41.7%, T2: 16.7%), which might suggest younger students had lower nicotine addiction than older students.

A key finding of this analysis was the significant shift in perceptions of harmfulness of e-cigarettes (moving from “much less/somewhat less harmful” at T1 towards “somewhat more/much more harmful” at T2), but overall more students perceived e-cigarettes as less harmful than cigarettes at both time points. Similar shifts have been reported in adults in the United States, where more people perceived e-cigarettes to be equally or more harmful than cigarettes in 2015 compared with 2012.[25]

Table 5: Multinomial logistic models predicting the likelihood of dual use, exclusive smoking and exclusive vaping in university students in New Zealand at T1 and T2.

		T1 survey			**T2 survey**		
		OR	**95% CI**	**p-value**	**OR**	**95% CI**	**p-value**
Dual use vs non-use	<25 years	Ref			Ref		
	25–34 years	1.49	0.57–3.91	0.415	0.62	0.30–1.25	0.182
	≥35 years	2.14	0.46–9.94	0.330	0.41	0.10–1.78	0.234
	Female	Ref			Ref		
	Male	3.13	1.49–6.56	0.003	4.89	3.08–7.77	<0.001
	Short-term resident	Ref			Ref		
	Long-term resident	0.68	0.22–2.11	0.506	1.13	0.56–2.29	0.726
	NZ European	3.24	0.82–12.79	0.094	1.94	0.92–4.10	0.082
	Māori	1.37	0.40–4.75	0.619	2.43	1.29–4.57	0.006
	Pasifika	0.92	0.11–7.58	0.935	0.61	0.14–2.68	0.510
	Asian	1.23	0.31–4.85	0.770	0.96	0.40–2.30	0.928
	Other	1.49	0.46–4.87	0.508	1.65	0.76–3.59	0.210
Exclusive smoking vs non-use	<25 years	Ref			Ref		
	25–34 years	0.68	0.39–1.19	0.176	1.49	0.89–2.47	0.127
	≥35 years	0.63	0.22–1.82	0.395	0.85	0.33–2.21	0.744
	Female	Ref			Ref		
	Male	2.56	1.82–3.61	<0.001	1.45	1.01–2.09	0.045
	Short-term resident	Ref			Ref		
	Long-term resident	0.89	0.54–1.46	0.634	0.95	0.54–1.66	0.847
	NZ European	0.55	0.28–1.09	0.087	1.14	0.56–2.32	0.716
	Māori	1.15	0.62–2.15	0.656	1.58	0.82–3.01	0.169
	Pasifika	0.75	0.33–1.72	0.500	0.74	0.24–2.27	0.598
	Asian	0.32	0.14–0.71	0.005	0.78	0.35–1.75	0.552
	Other	0.45	0.22–0.93	0.031	1.01	0.48–2.13	0.976

Table 5: Multinomial logistic models predicting the likelihood of dual use, exclusive smoking and exclusive vaping in university students in New Zealand at T1 and T2 (continued).

		T1 survey			T2 survey		
		OR	**95% CI**	**p-value**	**OR**	**95% CI**	**p-value**
Exclusive vaping vs non-use	<25 years	Ref			Ref		
	25-34 years	1.90	1.07–3.39	0.029	0.47	0.23–0.98	0.044
	≥35 years*	2.74	1.09–6.90	0.032	-	-	-
	Female	Ref			Ref		
	Male	1.99	1.29–3.06	0.002	2.36	1.68–3.33	<0.001
	Short-term resident	Ref			Ref		
	Long-term resident	2.94	1.34–6.44	0.007	2.24	1.08–4.65	0.030
	NZ European	0.94	0.42–2.12	0.882	3.62	1.90–6.90	<0.001
	Māori	1.28	0.62–2.62	0.509	1.00	0.51–1.94	0.999
	Pasifika	0.35	0.08–1.59	0.172	1.17	0.44–3.14	0.751
	Asian	0.58	0.22–1.48	0.251	0.91	0.41–1.99	0.805
	Other	0.76	0.34–1.74	0.519	2.56	1.40–4.70	0.002

*Maximum likelihood estimates for ≥35-year-olds were unable to be calculated for T2 survey because of quasi-complete separation in the data. This was because no ≥35-year-old responded that they exclusively vaped.

Policy implications

Our findings suggest e-cigarette use among university students and possibly use in smoke-free spaces might be increasing. Ongoing data collection is required to better understand how trends in e-cigarette use impact on smoking and the Government's aspirations for New Zealand to become smoke-free by 2025.[16]

Limitations

This study has a number of limitations. Firstly, it used convenience samples, which are susceptible to volunteer bias. However, data were weighted to partly address this bias. Secondly, data were self-reported. Self-reported data are susceptible to under- or over-reporting, which can result in overestimation or underestimation of the reported estimates. Thirdly, although age, sex and the proportion of Māori participants were similar at T1 and T2, there was a greater proportion of NZ European and fewer Pasifika and Asian participants at T2, which might have affected the results. Further, cross-sectional studies cannot assess cause and effect, so the results should be interpreted in that light.

Conclusion

The results suggest a significant increase in the prevalence of vaping between March 2018 and March 2019, a period that was characterised by rapid growth in the vaping industry (products and retail outlets) in New Zealand. However, the increase in vaping was not accompanied by a decrease in the prevalence of cigarette smoking. Ongoing data are required to monitor trends in smoking and vaping, particularly in smoke-free spaces.

Competing interests:

Nil.

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Shear wave elastography to predict oesophageal varices, morbidity and mortality in chronic liver disease

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ABSTRACT

INTRODUCTION: In chronic liver disease (CLD), Fibroscan® (transient elastography) can be a useful “rule-out” test for oesophageal varices, but it is limited by body habitus. Shear wave elastography (SWE) is another non-invasive fibrosis test that is better suited for overweight subjects. We determined SWE’s ability to predict oesophageal varices, morbidity and mortality in a predominantly overweight population.

METHODS: Subjects (n=1,120) with CLD who underwent SWE at Middlemore Hospital between 1 July 2015 and 30 June 2018 were identified. The diagnostic accuracy of SWE to rule out oesophageal varices in advanced hepatic fibrosis was assessed, as well as associations with morbidity and mortality.

RESULTS: Of 304 subjects with advanced fibrosis, 89 had endoscopic data and 18 had varices. Median body mass index was 28.2kg/m^2. Area under the receiver operating characteristic curve value for liver stiffness to predict varices was 0.74 and 0.80 when combined with serum albumin. Liver stiffness ≤12.4kPa and albumin ≥37g/L had a negative predictive value of 95%. There were 135 hospital admissions and 19 deaths. Liver stiffness correlated with hospital admissions (p=0.007) and independently predicted mortality.

CONCLUSIONS: Shear wave elastography could be a useful rule-out test for screening endoscopy in overweight populations with CLD.

Chronic liver disease (CLD) is a growing problem affecting approximately fifty million people worldwide.[1] Advanced fibrosis in CLD is associated with the development of oesophageal varices (OV).[1,2] Variceal bleeding is a life-threatening event associated with a mortality of 25% to 50% and occurs in up to 30% of cirrhotic patients within the first two years.[3] Routine endoscopic screening for OV in all cirrhotic patients is the widely accepted gold standard, but it is invasive and resource-intensive.[4] It is also not available outside specialised centres.

Elastography, which is based on the liver stiffness measurement (LSM), is an excellent tool for predicting liver fibrosis.[5] There are two main methods: transient elastography (TE, Fibroscan®) and shear wave elastography (SWE). Recently, FibroScan-based LSM has been shown to be useful in ruling out the presence of OV and has been incorporated into international guidelines for this purpose.[2,6–12] However, the reliability of FibroScan is significantly impaired in subjects with a high body mass index (BMI).[12] New Zealand has the third highest rate of adult obesity in the OECD, with 30.9% of adults being classified as obese.[13] Two-dimensional (2D) SWE is an ultrasound-based tool with the advantage of direct anatomical visualisation of the region of evaluation.[14,15] It is also more reliable in subjects with a higher BMI.[14] However, there is a paucity of data on the utility of SWE-derived LSM (SWE-LSM) for predicting the presence of OV, morbidity and mortality. There is also little data in Asia–Pacific populations with a high prevalence of Māori, Pasifika and Asian subjects.

The primary aim of this study was to determine the diagnostic accuracy of SWE-LSM to “rule out” the presence of OV in the real-world setting of a large tertiary centre with a predominantly overweight CLD population and a high prevalence of Māori, Pasifika and Asian subjects. Secondary aims included determining the association of SWE-LSM with morbidity (hospital admissions) and mortality.

Methods

Study population

This retrospective cohort study analysed data from adult subjects who had a SWE scan performed at a tertiary hospital (Middlemore Hospital, Auckland, New Zealand) between 1 July 2015 and 30 June 2018. Inclusion criteria were: (a) a SWE scan performed for the indication of chronic liver disease, (b) a valid SWE-LSM result and (c) advanced fibrosis (LSM of ≥8.1kPa, ≥10.2 kPa for alcohol-related liver disease (ALD) and ≥9.2kPa for all other aetiologies).[16,17] All scans were performed by experienced operators (hepatology nurse specialists and gastroenterologists) using the Aixplorer® 2D SWE imaging system (SuperSonic Imagine, France).

Data collection

Ethics approval was received from the Health and Disability Ethics Committee (Reference: 18/NTB/2). Subjects meeting the inclusion criteria were identified from an existing clinical database. Data collected included: (a) population characteristics (age, sex, ethnicity, body mass index, aetiology of liver disease and beta blocker use); (b) serum markers (serum biochemistry (alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma glutamyl transferase (GGT), alkaline phosphatase (ALP), bilirubin, serum albumin, sodium and creatinine), complete blood count (haemoglobin, platelet count) and prothrombin ratio; and (c) endoscopic findings (the presence and size of oesophageal varices (absent, small (<5mm) or large (>5mm))). Biochemical data were used to derive model for end-stage liver disease (MELD) scores. The maximum interval permitted between SWE and other findings was three months for biochemical parameters and 12 months for endoscopy. Subjects were followed for up to three years for number of all-cause hospital admissions, liver disease-related hospital admissions, infection-related hospital admissions and mortality.

Analysis

Data were analysed in two subgroups: (a) subjects with endoscopic data and (b) all subjects meeting the inclusion criteria over the study period. Statistical analyses were performed using IBM Statistical Package for Social Sciences (SPSS) version 25. The Shapiro–Wilk test was utilised to test for normality. Non-normally distributed variables were presented as medians with inter-quartile ranges and analysed using Spearman's rho, Mann–Whitney U, Kruskal–Wallis and Fisher's Exact tests. The utility of SWE to rule out the presence of OV was assessed using receiver operating characteristic (ROC) curves. The utility of SWE to predict morbidity and mortality was assessed using logistic and cox regression analyses. Statistical significance was defined by $p<0.05$.

Results

Population characteristics

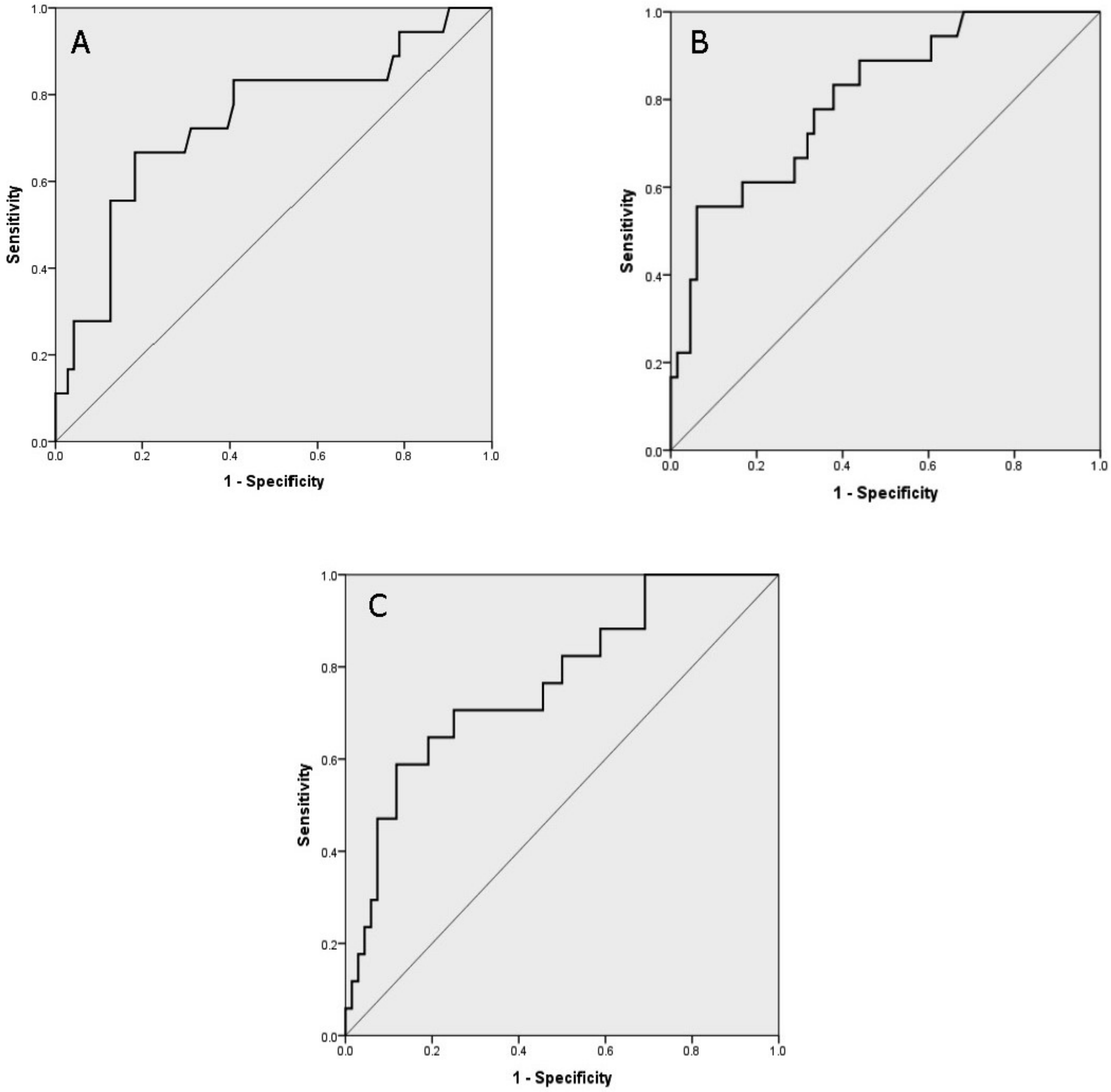
Of 1,120 subjects who underwent SWE scans within the study period, 304 subjects had advanced hepatic fibrosis and were included for analysis. Baseline characteristics of the total population are listed in Table 1. Overall, the most common aetiology was chronic hepatitis B (31.3%), followed by non-alcoholic fatty liver disease (24%) and chronic hepatitis C (23.7%). The median LSM score was 11.7kPa. The majority of subjects were overweight with 69.8% having a BMI >25. The median BMI was 28.2kg/m^2. Māori and Pasifika comprised 30.9% of the population, and Asian subjects accounted for 30.6%. Biochemical parameters indicated that the subjects had largely compensated liver disease.

SWE to predict the presence of OV

Eighty-nine subjects had endoscopies within the defined time-period. Of these, 18 had OV. Out of the 18 subjects with OV, 14 had grade 1 varices, two had grade 2 varices and two had grade 3 varices. Baseline demographics of the endoscopy population are listed in Table 2. The subjects with OV were older and had a higher prevalence of alcohol-related liver disease. Other baseline, clinical and biochemical characteristics were similar. No subjects had a bleeding event following a SWE-LSM.

Subjects with OV had a significantly higher median SWE scores when compared to subjects without OV (21.5kPa vs 13.5kPa, p=0.002, Table 2). This finding was not affected by interval between SWE and endoscopy (p=0.10) and differences in beta-

Figure 1: Diagnostic performance of SWE-LSM for prediction of OV. (A) SWE-LSM (AUROC 0.74, p=0.02), (B) SWE-LSM and serum albumin (AUROC 0.80, p<0.001) and (C) SWE-LSM and platelet count (AUROC 0.77, p=0.01).



Abbreviations: SWE-LSM (shear wave elastography-derived liver stiffness measurement), OV (oesophageal varices), AUROC (area under the receiver operating characteristic curve).

Table 1: Population characteristics of the total population (n=304).

Descriptor	Value
Population characteristics	
Median age [years (IQR)]	58 (50–66)
Sex [n (%)]	
Male	214 (70.4)
Female	90 (29.6)
Ethnicity [n (%)]	
European	107 (35.2)
Māori	41 (13.5)
Pacific	53 (17.4)
Asian	93 (30.6)
Other	10 (3.3)
Aetiology [n (%)]	
Hepatitis B virus	95 (31.3)
Hepatitis C virus	72 (23.7)
Non-alcoholic fatty liver disease	73 (24.0)
Alcohol	30 (9.9)
Other	34 (11.2)
Median BMI [(IQR)]	28.2 (24.3–32.3)
BMI<25 [n (%)]	91 (31.2)
BMI 25-30 [n (%)]	86 (29.5)
BMI>30 [n (%)]	115 (39.4)
Beta-blocker use [n (%)]	43 (14.1)
SWE	
Median SWE-LSM [kPa (IQR)]	11.7 (10–15)
Fibrosis stage [n (%)]*	
F3 equivalent	189 (62.2)
F4 equivalent	115 (37.8)
Biochemistry [median (IQR)]	
ALT (U/L)	52 (34–103)
AST (U/L)	46 (36–87)
ALP (U/L)	92 (68–152)
GGT (U/L)	86 (38–171)
Total bilirubin (µmol/L)	10 (8–15)
Albumin (g/L)	36 (32–39)
Prothrombin ratio	1.0 (0.95–1.1)
Platelet count (x10^9/L)	199 (151–246)
Haemoglobin (g/L)	133 (116–152)
Sodium (mmol/L)	139 (137–141)
Creatinine (µmol l/L)	85 (73–99)
MELD Score	7 (6–9)

Abbreviations: IQR (interquartile range), n (number), BMI (body mass index), SWE (shear wave elastography), LSM (liver stiffness measurement), kPa (kilopascal). *Fibrosis stage is based on Metavir equivalent; advanced fibrosis is ≥F3. ALT (alanine aminotransferase), AST (aspartate aminotransferase), ALP (alkaline phosphatase), GGT (gamma glutamyl transferase), MELD (model of end-stage liver disease).

Table 2: Population characteristics of the endoscopy population (n=89).

Characteristic	Endoscopy population (n=89)	OV absent (n=71)	OV present (n=18)	p
Population characteristics				
Median age [years (IQR)]	61 (53–70)	57 (51–67)	67 (57–71)	0.04*
Sex [n (%)]				
Male	55 (61.8)	47 (66.2)	8 (44.4)	0.11
Female	34 (38.2)	24 (33.8)	10 (55.6)	0.11
Ethnicity [n (%)]				
European	39 (43.8)	30 (42.3)	9 (50.0)	0.43
Māori	13 (14.6)	10 (14.1)	3 (16.7)	1.00
Pacific	12 (13.5)	10 (14.1)	2 (11.1)	1.00
Asian	21 (23.6)	19 (26.8)	2 (11.1)	0.12
Other	4 (4.5)	2 (2.8)	2 (11.1)	1.00
Aetiology [n (%)]				
Hepatitis B virus	18 (20.2)	16 (22.5)	2 (11.1)	0.35
Hepatitis C virus	11 (12.4)	10 (14.1)	1 (5.6)	0.45
Alcohol	19 (21.3)	10 (14.1)	9 (50.0)	0.002**
Non-alcoholic fatty liver disease	27 (30.3)	24 (33.8)	3 (16.7)	0.25
Other	14 (15.7)	11 (15.5)	3 (16.7)	1.00
Median BMI [(IQR)]	28.7 (24.5–33.5)	28.2 (24.3–33.4)	30.3 (26.0–35.0)	0.37
Beta-blocker use [n (%)]	19 (21.3)	14 (19.7)	5 (27.8)	0.52
SWE				
Median SWE score [kPa (IQR)]	14.3 (11.1–18.4)	13.5 (11.0–16.6)	21.5 (14.8–33.7)	0.002**
Fibrosis stage [n (%)]				
F3 equivalent	37 (41.6)	34 (47.9)	3 (16.7)	0.80
F4 equivalent	52 (58.4)	37 (52.1)	15 (83.3)	0.80
Median interval between SWE and endoscopy [days (IQR)]	105 (29–200)	110 (39–191)	54 (7–220)	0.10
Biochemistry [median (IQR)]				
ALT (U/L)	34 (24–53)	34 (21–82)	63 (22–141)	0.85
AST (U/L)	41 (26–59)	43 (30–56)	59 (34–160)	0.17
ALP (U/L)	111 (79–167)	99 (74–165)	110 (78–265)	0.21
GGT (U/L)	108 (53–204)	82 (35–223)	151 (27–865)	0.32
Total bilirubin (micromol/L)	12 (8–21)	9 (7–25)	14 (10–36)	0.09
Albumin (g/L)	36 (31–39)	34 (32–40)	25 (21–32)	0.001**
Prothrombin ratio	1 (1–1.1)	1.0 (1–1.2)	1.1 (1.10–1.2)	0.11
Platelet count ($x10^9$/L)	185 (128–254)	206 (128–264)	146 (73–192)	0.01*
Haemoglobin (g/L)	130 (112–146)	119 (102–138)	122 (105–142)	0.08
Sodium (millimol/L)	139 (137–141)	140 (137–142)	137(136–139)	0.27
Creatinine (micromol/L)	84 (67–98)	89 (71–106)	80 (62 –93)	0.43
MELD Score	7.5 (6–10)	8.0 (6.0–9.5)	8.0 (6.8–11.5)	0.55

Abbreviations: OV (oesophageal varices), p (probability value), IQR (interquartile range), n (number), BMI (body mass index), SWE (shear wave elastography), LSM (liver stiffness measurement), kPa (kilopascal), F3 (fibrosis stage 3), F4 (fibrosis stage 4), ALT (alanine aminotransferase), AST (aspartate aminotransferase), ALP (alkaline phosphatase), GGT (gamma glutamyl transferase), MELD (model of end-stage liver disease). *p<0.05, **p< 0.0.

blocker use between the two subgroups (p=0.52). Only two of 18 subjects had variceal banding.

The area under the receiver operating characteristic curve (AUROC) for SWE-LSM to predict OV was 0.74 (p=0.02, Figure 1A). Using LSM alone, a cut-off of ≤10.7kPa had a sensitivity of 89% and ruled out OV with a negative predictive value of 97% (Figure 1A). Serum albumin, platelet count and age were also significantly different between subjects with and without OV (Table 2). Therefore, they were individually incorporated with LSM to improve the diagnostic performance of the model. Combining LSM with serum albumin improved the diagnostic accuracy (AUROC 0.80, p<0.001, Figure 1B). On logistic regression, a SWE score of ≤12.4kPa combined with an albumin level ≥37g/L had a sensitivity of 88% and a negative predictive value of 95% for OV. The addition of platelet count (a common biochemical surrogate for portal hypertension) and age did not improve diagnostic performance over that of LSM (Figure 1C).

SWE-LSM and morbidity and mortality

Three hundred and four subjects were followed-up over a period of up to three years (median 695 days). There were 137 all-cause admissions, 35 liver-disease related admissions and 48 infection-related admissions (Table 3). The SWE-LSM weakly correlated with the number of all-cause hospital admissions (Spearman's rho, r=0.2, p=0.007) but more strongly correlated with hospital admissions related to liver disease (r=0.5, p<0.001) and infection (r=0.6, p=0.008). SWE-LSM also correlated with serum biochemical markers of liver disease severity (prothrombin ratio, bilirubin, low albumin) as well as low platelet count and low haemoglobin (p<0.001).

The cumulative three-year survival for the 384 subjects was 0.8. There were 19 deaths. On multivariate cox regression, SWE-LSM (p=0.04) and age (p=0.03) were both independent predictors of mortality (Figure 2).

Discussion

Non-invasive predictors of significant portal hypertension are needed to rationalise which patients with advanced liver disease should be selected for endoscopic assessment. Current standard practice is that all patients with cirrhosis, and probably advanced fibrosis, should have a screening endoscopy. Elastography (both transient elastography (Fibroscan) and more recently SWE) has an established role in staging hepatic fibrosis.[15,18] Our findings add to the emerging data showing that SWE can also be used to confidently exclude the need for invasive endoscopy in these high-risk patients.

The AUROC for SWE as a diagnostic test to predict varices was 74%, which is considered "good performance" for a diagnostic test. For a rule-out test, the negative predictive value is important. An excellent negative predictive value could be achieved using a 10.7kPa cut-off. The diagnostic performance of the model was improved by the addition of serum albumin. If the serum albumin was ≥37g/L, the SWE cut off could be increased to ≤12.4 kPa while retaining a high sensitivity and an excellent negative predictive value of 95%. This would confidently exclude the need for endoscopy in a greater proportion of patients. Platelet count, which is often considered a biochemical surrogate for portal hypertension, did not improve the accuracy of the model.

On logistic regression analysis, SWE-LSM was an independent predictor of survival over a three-year period. This finding is also supported by a recent study by Trebicka et al, who showed that SWE-LSM combined with MELD scores predicted mortality.[21] The SWE-LSM had a weak but significant association between the number of all-cause hospital admissions and a stronger association for liver-related and infection-related admissions in particular. To our knowledge, this is the first study to demonstrate longitudinal correlation between SWE-derived LSM, morbidity and mortality in subjects with advanced liver disease.

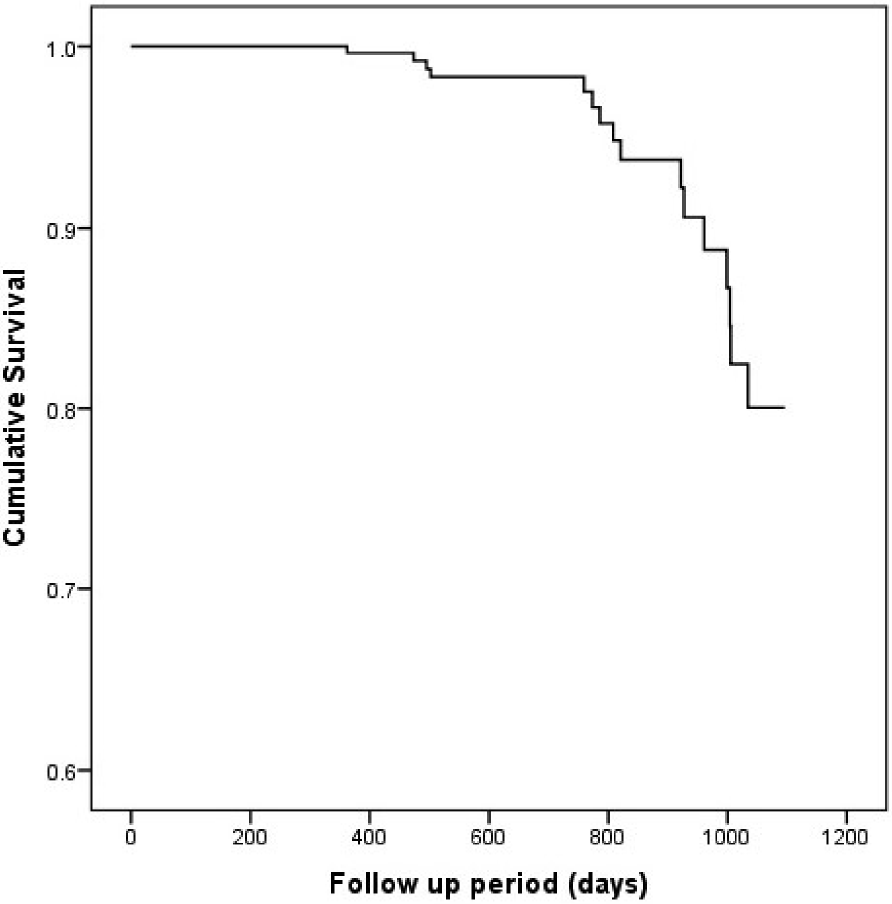
Although there are more data for the role of Fibroscan in predicting OV, the technical success rate of Fibroscan is limited by an increased BMI.[19–22] In comparison, the reproducibility of SWE is not affected by BMI. Our study population's high BMI reflects the rising obesity epidemic, and in that real-world context, SWE may be a more suitable tool. Therefore, although we had a relatively small sample size (89 with endoscopic

Table 3: Correlation of SWE-LSM with morbidity.

Hospital admissions	n	Spearman's rho	p
All-cause	137	0.2	0.007**
Liver disease-related	35	0.5	<0.001**
Infection-related	48	0.6	0.008**

Abbreviations: n (number), p (probability value). * p<0.05, ** p< 0.01.

Figure 2: Kaplan–Meier survival curve for the entire cohort and multivariate cox regression model showing the significant predictors of mortality.



Predictors	Exp (B)	p
SWE score (kPa)	1.02	0.04*
Age (years)	1.06	0.03*

Abbreviations: SWE (shear wave elastography), kPa (kilopascals).

data from 304 subjects) and it was a single centre study, these first New Zealand data for the use of 2D SWE as a diagnostic tool for predicting varices is still relevant. Studies in other populations are scarce. Most are retrospective with similar sample size. An Italian study suggested a cut-off of 13.2kPa (sensitivity 95%, but a poor AUROC 0.58), and an Asian study suggested a cut-off of 13.9kPa (AUROC 0.88).[22,23]

The 20% prevalence of OV limited our ability to assess SWE-derived LSM's clinical utility by restricting the number of parameters that could be incorporated into our model, which may explain why the addition of platelet count did not offer a significant benefit. Sample sizes for individual aetiologies and grades of OV were also not large enough to facilitate specific analyses or to be incorporated into our model. However, it was noted that ALD had a significantly higher proportion of OV compared to other aetiologies. Although data for active drinking were not specifically recorded, it was noted that those with OV had a trend towards a higher AST and GGT, raising the possibility that active hepatitis could have contributed to the risk. Nonetheless, clinical, endoscopic and biochemical data were collected using stringent criteria, and time-dependant confounders were accounted for, despite the study's limitations and retrospective nature.

In conclusion, SWE-LSM could be a useful test to identify patients with CLD and advanced fibrosis who do not need to undergo endoscopy to screen for varices. This could be particularly relevant to populations with a high prevalence of overweight subjects. In addition, SWE-LSM is predictive of morbidity and mortality. These findings warrant validation in larger prospective studies.

Competing interests:

Nil.

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Review of the Accident Compensation Corporation's radiation therapy injury claims, 1 July 2009–30 June 2019

Aubrey L Stones, Patries M Herst

ABSTRACT

AIM: The aim of this study was to review and report on radiation therapy injury claims lodged with the Accident Compensation Corporation (ACC) in New Zealand in the last decade.

METHODS: ACC's treatment injury database was used to identify injury claims decided between 1 July 2009 and 30 June 2019. The associated structured and unstructured data, including claim lodgement information and medical records, were reviewed.

RESULTS: Of 121,168 treatment injuries, only 975 (0.8%) were radiation therapy injury claims, with 519 claims accepted for cover. Most declined claims were considered "ordinary consequences of treatment" rather than treatment injuries. Of the 519 accepted claims, ACC classified 21 as fatal and eight as serious, which indicates a need for lifelong ACC support. Injuries correlated with the age and gender of the most common cancers treated with radiation therapy in New Zealand. More treatment injury claims were submitted and accepted for New Zealand European patients compared with Māori and Pasifika patients.

CONCLUSION: Radiation therapy injury claims make up a very small proportion of the total number of ACC treatment injury claims. A better understanding of the claim process may assist injured individuals better by improving appropriate claim lodgement and claim acceptance rates.

The Accident Compensation Corporation (ACC) was established by the New Zealand Government in 1974 following the passing of the Accident Compensation Act in 1972.[1] The Accident Compensation Act 2001 sets out ACC's current purpose, putting increased focus on injury prevention and rehabilitation. The Accident Compensation Amendment Act passed in 2005 replaced "medical misadventure" with "treatment injury," expanding the rather narrow grounds for cover.[1] Currently, ACC provides financial and rehabilitative support to all New Zealand citizens, residents and visitors who have been injured in an accident or from medical treatment in New Zealand.[2]

Treatment injury claims must be lodged by a registered health professional with consent of the patient. The lodgement process involves the registered health professional submitting a specific treatment injury lodgement form, ACC2152, and an ACC45 lodgement form.[2] Successful claims cover injuries caused by treatment that are *not* ordinary consequences, or necessary parts, of treatment. Acceptance of a claim depends on the clinical knowledge at the time of treatment and the underlying health condition of the patient. Once a claim is accepted, ACC can provide payments towards treatment, rehabilitation and compensation, so that clients can get back to their daily lives or a "new normal."

Radiation therapy, as part of a multidisciplinary approach, makes up a substantial component of cancer treatment, with more than half of all cancer patients receiving radiation therapy as part of their cancer treatment.[3,4] In the 2019 calendar year, 11,319 courses of radiation therapy were delivered in New Zealand (Radiation Oncology Online Tool[5]). The National Radiation Oncology Plan 2017 to 2021[6] reported that the radiation therapy rates were 64% for breast cancer, 24% for prostate cancer and 50% for rectal cancer. During radiation therapy, exposure of normal healthy tissue to a certain dose of radiation is unavoidable and can result in acute and chronic side effects.[7] Many of these side effects would not be considered ACC treatment injuries but common side effects of radiation treatment. Side effects such as osteoradionecrosis or secondary cancers may be covered by ACC as treatment injuries. Injuries resulting from incorrect radiation treatment or site, incorrect positioning or patient transfer and equipment breakages may also be covered by ACC as treatment injuries.[2]

This study explored the incidence, type and costs of radiation therapy injury claims from the last decade, with the aim of increasing health professionals' understanding of the ACC treatment injury claim process and legislated criteria to better assist injured individuals.

Methodology

This retrospective analysis reviewed ACC's treatment injury claims database for radiation therapy injury claims decided between 1 July 2009 and 30 June 2019. An ACC Privacy and Ethics Threshold Analysis (PETA) document detailing the specific data fields and the reasons for using the radiation therapy injury data was signed off by ACC's Privacy Officer on 15 November 2019.

The analysis used code-based methods to select an inclusive cohort of patients with injuries from radiation therapy. For the inclusive claim cohort, the associated demographic, treatment, injury and patient journey information was analysed using both structured data fields, which gave injury, cost and demographic information, and unstructured data fields, which contained additional clinical information about the radiation treatment and the injury. Review of the individual claim details in the inclusive cohort was conducted to extract additional data fields that allowed further detail of the type and extent of injury and enhanced the quality of the data.

The timeframe of 10 years captured a sufficient number of claims for analysis and allowed a lag period for recently assessed claims data to be as accurate as possible. Treatment injury claims have a legislated timeframe of nine months for the initial cover decision. These claims can be reassessed within five months of the initial cover decision.

Data sources

Data included in this paper were sourced from ACC's EOS claims management system, the primary source of claims information for ACC. ACC payment, review and risk of harm databases were also accessed. The Ministry of Health's New Zealand Cancer Registry and radiation treatment volumes were accessed from the Radiation Oncology Online Tool,[5] and New Zealand population data were sourced from Statistics New Zealand.[8] The "deep dive" into the unstructured data for the accepted claims was carried out to create additional structured data fields. Once the data quality and deep dive processes were completed, the final data extraction was conducted on 17 August 2020.

Data quality review

When a treatment injury claim is lodged, information is put into the structured and unstructured data fields in EOS, which are updated as more information is gathered during the cover assessment process. Data quality issues arise when fields are not completed or not updated appropriately. Although ACC has processes in place to review known data issues, data quality reports do not consider every possible issue. Issues may only become evident when individual claim details are reviewed. When the radiation therapy claims were reviewed for this study, various data issues were identified, including: (1) wrong treatment facility where data were recorded for the facility where the injury was identified instead of where the radiation therapy was delivered, (2) wrong injury or lack of injury detail, (3) wrong treatment event where radio-ablation or chemotherapy was recorded as radiation therapy and (4) missing fields. For this study, data issues were rectified by an ACC treatment injury cover specialist.

Data analysis

SAS Enterprise Guide 7.1 was used to extract EOS data from the relevant ACC databases, using structured data fields. Excel 365 ProPlus was used to collate the extracted data into tables and figures. Data analysis was purely descriptive, with averages and ranges provided where useful.

Results

Incidence of radiation therapy injuries

Between 1 July 2009 and 30 June 2019, a total of 121,168 treatment injuries were received and decided by ACC, with 75,966 claims (63%) accepted for cover. Only 975 claims (0.8%) were for injuries specifically related to radiation therapy, with 519 claims (53%) accepted for cover (Table 1). The acceptance rate over the decade was 53% (range 43.1% to 62.2%).

On average, 47% of radiation therapy claims were declined each year. The vast majority (399, 88%) of declined claims did not meet the cover criteria: (1) identification of a specific injury, (2) a clear causal link to the radiation therapy and (3) the injury must not be an ordinary consequence of radiation therapy (Table 2).

The effect of demographics on injury claims

The demographic data for the radiation therapy injury cohort are presented in Table 3. The age groups consider the age of the client at the date of injury, which is the date the client first sought treatment for the covered injury. The date of injury can correspond to the date of radiation therapy (skin infections) or can be many years apart (secondary cancers). Claims associated with prostate cancer were most common in the 65–74-year age group (45% of prostate cancer registrations in 2017). Breast cancer claims were most common in the 45–64-year age group (50% of breast cancer registrations in 2017). For claims associated with colon, rectum and rectosigmoid cancer, the most common age group was the 75+ age group (41% of registrations). Overall, the accepted radiation therapy injury claims were highest in 50–69-year age group for females (51% of accepted claims) and the 60–79-years age group for males (55% of accepted claims).

ACC ethnicity data are based on a system of prioritisation that reduces multiple ethnic responses to a single response: for example, all Māori are classified as Māori regardless of additional ethnicities.

In the ten financial years 2009/10 to 2018/19, New Zealand Europeans made

Table 1: Radiation therapy (RT) injury claims with ACC cover decision.

Cover decision financial year	Radiation therapy claims				RT claims % of all TI* accepted	RT claims as % of all TI
	Accept	Decline	Total	% Accept		
2009/10	34	43	77	44%	0.7%	0.9%
2010/11	30	32	62	48%	0.6%	0.7%
2011/12	31	41	72	43%	0.6%	0.8%
2012/13	42	31	73	58%	0.7%	0.7%
2013/14	51	31	82	62%	0.7%	0.8%
2014/15	48	38	86	56%	0.6%	0.7%
2015/16	55	49	104	53%	0.6%	0.7%
2016/17	68	53	121	56%	0.7%	0.8%
2017/18	83	74	157	53%	0.8%	1.0%
2018/19	77	64	141	55%	0.7%	0.9%
Total	519	456	975	53%	0.7%	0.8%

* TI: Treatment injury.

Table 2: Reasons for declining radiation therapy injury claims in the period from 1 July 2009 to 30 June 2019.

Decline reason	Decline claim count	% decline
Ordinary consequence of treatment	246	54%
No causal link to radiation	93	20%
No injury	60	13%
Lack of information	20	4%
Withdrawn	18	4%
Underlying health condition	11	2%
Necessary part of treatment	4	1%
Other	4	1%

Table 3: Radiation therapy injury claim decisions by age group and gender in the period from 1 July 2009 to 30 June 2019.

Age group	Accept		Decline		Total	
	Female	Male	Female	Male	Female	Male
0–19	5	7	7	8	**12**	**15**
20–29	9	6	7	8	**16**	**14**
30–39	27	9	15	8	**42**	**17**
40–49	42	21	49	20	**91**	**41**
50–59	75	48	51	52	**126**	**100**
60–69	58	84	54	59	**112**	**143**
70–79	33	58	41	51	**74**	**109**
80+	11	26	10	16	**21**	**42**
Total	**260**	**259**	**234**	**222**	**494**	**481**

up 75% of treatment injury claims (76% of accepted claims); Māori made up 10% of total and accepted claims, Asian 5% and Pasifika 4%. These proportions differ for radiation therapy specific injuries: New Zealand Europeans make up 80% (81% of accepted claims), Māori make up 9% (8% of accepted claims), Asian 2% and Pasifika 3% (2% of accepted claims) (Table 4).

The effect of the district health board regions on injury claims

Radiation therapy is currently available in seven district health board (DHB) regions at ten public and private facilities. For ACC purposes, the DHB region is where the radiation therapy that resulted in the injury was delivered. The number of claims resulting from treatment within different regions will relate to the population in that region, the technology and expertise available and clinicians' awareness of treatment injury claims. The Auckland DHB region had the highest number of treatment injuries but one of the lower acceptance rates. The Bay of Plenty DHB region had the highest acceptance rate followed by the Southern DHB region, despite the former having the smallest claim numbers (Table 6).

The effect of different registered health professionals on injury claims

The majority (53.1%, n=518) of radiation therapy claims decided in the last ten financial years were lodged by general practitioners, followed by claims lodged by DHBs (29.2%, 285 claims) and private clinics or hospitals (13.5%, 132 claims). The remaining 40 claims were lodged by other providers. Excluding the latter, claims lodged by private providers were most likely to be accepted (68%) (Table 6).

Costs of radiation therapy treatment injuries

Radiation therapy injuries can range in severity from minor (skin infection) to critical (secondary cancers). The overall cost of a treatment injury claim is an indicator of the severity of the injury. Of the 519 accepted claims, 513 (99%) had received ACC payment(s) totalling $26.6 million to date. Of the total cost, 52% related to compensation payments, of which $8 million was paid as weekly compensation to 85 individuals who were injured and unable to work (Table 7). Individual claim costs range from under $20 to over $700,000. The average claim cost for accepted claims paid was $51,866, and the median was $12,254. There were 72 claims that had received $500 or less and these injuries were likely to be of low severity. There were 63 claims that had received over $100,000 in payments, which likely indicates these were higher severity injuries. Fatal claims (21 out of 519 accepted claims) accounted for 17% of the total cost for radiation therapy related claims, with a total cost of $4.5 million. As expected, most of these costs were compensation payments (80% of fatal claim costs, $3.6 million), that is, weekly compensation and lump sum payments made prior to death and death benefits for surviving dependents. The remaining costs were payments for rehabilitation services (11 claims), including support for independence and vocational

Table 4: Radiation therapy injury claims by ethnicity and cover decision in the period from 1 July 2009 to 30 June 2019.

Ethnicity	**Accept**	**Decline**	**Total**	**% accept**
New Zealand European	422	357	779	54%
Māori	43	47	90	48%
Pasifika	10	19	29	34%
Asian	11	11	22	50%
Residual categories	22	12	34	65%
Other ethnicity	11	10	21	52%
Total	**519**	**456**	**975**	**53%**

rehabilitation prior to death, and payments for treatment (19 claims), including medical and hospital treatment. There were eight accepted serious injury claims in the last decade and five of these were for patients treated prior to 1990. The cost associated with serious injury claims was $3.8 million.

Discussion

ACC's treatment injury database is a unique, valuable resource that allows reporting of the incidence of treatment injuries in New Zealand. This study set out to explore treatment injuries resulting from radiation treatment between 1 July 2009 and 30 June 2019.

Radiation therapy injuries made up a very small proportion (0.8%) of total ACC treatment injury claims, with a lower acceptance rate (53%) than the total treatment injury acceptance rate (63%). To give some context, in the five financial years from 1 July 2014 to 30 June 2019, there were 124,904 cancer registrations and 42,399 new episodes of radiation treatment.[8] During that time there were 609 radiation therapy injury claims, of which 331 (54%) were accepted. ACC is a uniquely New Zealand compensation system for people who have been injured on a no-fault basis, which precludes a direct comparison with other countries.

The most common reason for declining radiation therapy injury claims was that the injury was considered an ordinary consequence of treatment (54% of all claims). In recent years the threshold of what is considered ordinary in terms of treatment injury criteria has been considered by the Courts of New Zealand. In 2018, the High Court expanded the ruling to state that

Table 5: Radiation therapy injury claims by DHB region of treatment and cover decision.

DHB region	Accept	Decline	Total	% accept
Auckland	135	129	264	51%
Bay of Plenty	26	8	34	76%
Canterbury	102	67	169	60%
Capital & Coast	63	55	118	53%
MidCentral	37	41	78	47%
Southern	55	35	90	61%
Waikato	96	68	164	59%
Other regions	5	53	58	9%

Table 6: Claim count and acceptance rate by lodging provider type.

Lodging provider	Accept	Decline	Total	% accept
DHB	167	118	285	59%
GP	231	287	518	45%
Private provider	90	42	132	68%
Other	31	9	40	78%
Total	**519**	**456**	**975**	**53%**

GP: general practitioner. DHB: district health board.

ordinary consequence means a consequence that has more than a 50% chance of occurring.[9] From 2009/10 to 2017/2018, the proportion of total injury claims declined due to ordinary consequence averaged 57%. This decreased in 2018/19 to 38%, suggesting that the broadening of the ordinary consequence threshold could have decreased the claim decline rate. The High Court ruling on ordinary consequence was recently overturned by the Court of Appeal,[10] which decided that ordinary consequence was ultimately a matter of judgment to be exercised on a case-specific basis by taking into account all the circumstances of treatment and the particular patient.

Māori and Pasifika make up 17% and 8% of the New Zealand population respectively.[11] However, they are underrepresented with respect to claim lodgement (10% and 4%) and claim acceptance (9% and 3%). Ethnicity has been reported to affect radiotherapy rates worldwide.[12–16] In New Zealand, the Cancer Control Agency recently released a report, *The State of Cancer in New Zealand 2020*, which states that Māori are 20% more likely to develop cancer, and twice as likely to die from cancer, than non-Māori.[17] Māori women with breast cancer are less likely to receive radiation therapy than New Zealand European women.[18,19] A report for the Department of Labour (now incorporated into the Ministry of Business, Innovation and Employment) in 2010, *Māori Experience of ACC*, states that Māori experiences of care in relation to ACC are dependent on Māori experiences with the rest of the health system. Healthcare disparities affect Māori access to and utilisation of ACC services.[20] Limited access to health services for diagnosis and radiation therapy, physical access and personal/whānau views and lack of trust in the New Zealand healthcare system and ACC may all contribute to under-representation in this field.

The demographics of the cohort injured by radiation therapy reflect the age and gender of the most common cancers in New Zealand treated with radiation therapy (alone or in conjunction with other modalities). Many cancers in young patients are more likely to be treated with chemotherapy, and older patients may be too fragile or have co-morbidities that preclude radiation therapy as an option.[21,22] The acceptance rate of claims varied among DHB regions and types of registered health professional lodging claims.

Radiation therapy injuries vary in severity. Of the accepted claims, 4% were classified as fatal and 2% as serious injury requiring lifelong support. Of all accepted claims, 12% had received over $100,000, indicating they were more severe injuries. The compensation component of the cost proxy may obscure the severity measure, as relatively minor injuries in the working age population may incur higher compensation costs.

Limitations

Due to the scope of this retrospective analysis, there are limitations with the information collected and there is the potential for further investigation. A conservative approach was taken to selecting the radiation therapy cohort for this analysis. Due to the deep dive process, the filter used to extract relevant claims for this analysis is unlikely to include claims falsely identified. However, it is possible that claims resulting from a combination of radiation therapy and surgery and/or chemotherapy were missed. Future analyses could use alternate date

Table 7: Cost, excluding GST, and accepted claims paid by cost group in the period from 1 July 2009 to 30 June 2019.

Cost group	Cost (ex GST)	Accepted claims paid	% of total cost
Compensation	$13,794,065	323	52%
Rehabilitation	$5,154,730	199	19%
Treatment	$7,658,455	507	29%
Total	**$26,607,250**	**513**	**100%**

fields, such as injury date or payment date, or filters could be applied to remove claims treated historically.

Client-facing ACC staff are responsible for the cover assessment of treatment injury claims and the input of data. There are guidelines on what information should be put in the various fields, but due to time constraints, workload and a lack of understanding of the data's end use, relevant information is not always captured or captured accurately. Although there are ACC processes to minimise data quality issues, some data quality issues may have been missed and this could have affected the data quality in this study.

The ACC cost information is a snapshot in time, as payments are reconciled and the total cost paid to the radiation therapy cohort increases over time as clients continue to receive services. The more recently accepted claims have had less time to accrue costs. The cost information does not include the cost of services provided under the public health acute services contract, whereby funding is distributed to DHBs, and thus could be an undercount of the true injury cost.

In summary, ACC radiation therapy injury claims are rare, and the acceptance rate is relatively low. We hope that this study will increase awareness of the ACC claim lodging process and the ordinary consequences exclusion criterion. This increase in awareness has the potential to increase appropriate claim lodgement and therefore the claim acceptance rate to better assist individuals injured through radiation therapy treatment.

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Kawa haumaru: a mātauranga Māori approach to child safety in Aotearoa New Zealand

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ABSTRACT

Enduring health inequities exist between Māori and non-Māori children within child injury prevention in Aotearoa. These inequities reflect broader patterns of health inequity experienced by Indigenous peoples globally and in Aotearoa. We assert their existence is the result of the ongoing impacts of colonisation and the dominant Pākehā framing by which injury prevention messages and interventions in Aotearoa have largely been developed. We argue the need for a strengths-based approach, grounded in mātauranga Māori (traditional Māori knowledge) and te ao Māori (traditional Māori worldview) perspectives, to form the basis of more effective child injury prevention messaging and interventions. In this viewpoint, we detail foundational elements of mātauranga Māori, tikanga (customs), kawa (practices) and mātāpono (values) that underlie Māori culture and contain protective elements and safety principles that can be readily applied to injury prevention messaging. We present two values-based child-rearing practices: (1) tuakana (older sibling/s) and teina (younger sibling/s) relationships and (2) kotahitanga (collective), which are determined by mātāpono that illustrate the value of a Māori framework. Incorporating a kaupapa Māori (Māori perspective/s) approach to injury prevention is necessary to reduce health inequities between Māori and non-Māori. Moreover, it offers a culturally safe approach that is responsive to Māori and enables tamariki (children) and whānau (families) to flourish.

Aotearoa New Zealand performs poorly with respect to child injury prevention in comparison to other high-income countries.[1–4] Moreover, the burden of injury is disproportionately borne by Indigenous children—tamariki Māori—who experience the highest ethnic-specific injury mortality and hospitalisation rates in Aotearoa.[5,6] They account for 29% of all hospitalisations due to unintentional injuries in childhood.[3] More broadly, intentional and unintentional injuries are leading causes of mortality and morbidity among Māori.[5,6]

These findings reflect broader patterns of health inequities experienced by Indigenous peoples globally[7,8] and in Aotearoa.[8–10] Such inequities illustrate breaches of key foundational documents. This includes the Universal Declaration of Human Rights (1948) and the Declaration on the Rights of Indigenous Peoples, which guarantees equity for Indigenous peoples.[11] It also breaches Māori rights outlined in Te Tiriti O Waitangi, the agreement with the Crown on which this nation is founded and which specifically guarantees equity for Māori in Aotearoa.[10–12]

To date, injury prevention messages and interventions in Aotearoa have been largely developed through a Pākehā lens. Data over time show a 25% reduction in unintentional injury hospitalisation rates among Māori tamariki (0–14 years) between 2009 and 2018.[12] However, significant disparities persist between outcomes for tamariki Māori and non-Māori children.[3,13] This suggests interventions are more effective among tamariki Pākehā and their whānau in comparison to Māori.[3,13] Indeed, Reid, Cormack and Paine[9] highlight the role of colonisation in systematically eroding Indigenous “ways of being including languages, traditional practices and the social structures necessary for their transmission” as one of the key contributing factors underpinning health inequities observed among Māori. Researchers[14,15] have also emphasised the danger of adopting a “one-size-fits-all” approach in recognition that health promotion interventions may work well among some groups of people but less effectively among others.[14,15] Reid[14] asserts that, in many cases, evaluation of generic information campaigns “shows better uptake of the intervention among those people already privileged in society and best positioned to take up new ideas, information and opportunities.”

In recognition of this systematic erosion of Indigenous (Māori) culture, we argue the need to draw on and incorporate mātauranga Māori and te ao Māori perspectives within child injury prevention messaging and interventions. Internationally, Indigenous injury prevention work echoes the need for approaches to injury prevention that are based on Indigenous knowledge.[8,16,17] Specifically, we argue that the incorporation of mātauranga Māori and te ao Māori perspectives within child injury prevention initiatives in Aotearoa will promote Māori knowledge and expertise and ultimately the wellbeing of tamariki Māori and their whānau. In particular, the status of taonga (treasured) that Māori bestow on tamariki encourages whānau to keep tamariki safe. Similarly, many aspects of tikanga, kawa and mātāpono that underlie Māori culture contain protective elements and safety principles that can be readily applied to injury prevention messaging.

We propose a strengths-based approach to support child injury prevention and cultural autonomy for Māori. Our approach is based on work by Safekids Aotearoa. Safekids Aotearoa is located within Starship Children’s Health and are tasked with helping to reduce “the high rates of preventable injury to children.”[18] The approach draws on Māori child-rearing practices and kawa haumaru (safety mechanisms) that are culturally safe and responsive to Māori and thus support tamariki and whānau to flourish. It incorporates foundational elements of mātauranga Māori, tikanga, kawa and mātāpono that are inherently protective in nature. We outline these concepts and offer examples that highlight how they can be considered from an injury prevention point of view. We then detail two values-based child-rearing practices determined by mātāpono that illustrate the value of a Māori framework: tuakana and teina relationships and kotahitanga.

Mātauranga Māori

Mātauranga Māori is shaped by te ao Māori and recognises the natural order of the world and the reciprocal relationship between Māori and their environments. It encapsulates a series of connections and accompanying responsibilities between the environment and its resources.[19] Mātauranga Māori remains central to Māori culture by reinforcing tikanga and kawa in contemporary society.[19]

Importantly, mātauranga Māori can inform child safety in a dynamic and reciprocal way, as illustrated in the pūrākau (Māori narrative) of Ranginui (sky father) and Papatūānuku (Earth mother). In this pūrākau, the environment was an inhospitable one for their tamariki to fully mature in, and thus their tamariki made the decision to force the separation of their parents’ embrace. The tamariki used open discourse to determine the best course of action. Despite opposing views between tuakana and teina, Tāne-Mahuta (God of the forests and birds, and child of Ranginui and Papatūānuku) led the action to separate Ranginui and Papatūānuku.

Although this pūrākau may sound counter-intuitive to enabling a safe environment, it reflects the balance required to support child development and risk-taking in a more holistic and affirming way, and ensures children flourish in safe and enabling environments. Ticknor[21] describes finding the right balance to supervision by providing tamariki with both the freedom and the tools to make safe informed and conscious decisions. Tāne-Mahuta and his siblings were smothered in their parents’ safe embrace, which didn’t allow for them to develop their taha tinana (physical health), taha wairua (spiritual health), taha hinengaro (psychological health) and taha whānau (family health). Post separation, Tāne-Mahuta went on to create flora and then mankind, who, as kaitiaki (guardians), have tuakana-like dominion over the flora and responsibilities to the environment.[22] Thus, the tikanga and kawa drawn upon to engage tree felling or climbing ensured that the mana (authority), mauri (life force) and tapu (sacredness) of Tāne-Mahuta, his children and mankind were safeguarded from unintentional harm.

Tikanga

Tikanga underpins conduct, policies and customs of an individual or group.[23] The word "tika" means "to be right, or correct." Thus tikanga focuses on the correct way of doing things.[22,23] This includes moral judgements about appropriate behaviours and interactions in everyday life and entails both conscious and subconscious knowledge and practices. It is deeply embedded in mātauranga Māori and te reo Māori, and it guides the relationships that co-exist between individuals, the environment and objects.[22,23]

There are unintentional child injury prevention practices that sit within the boundaries of tikanga. In the pūrākau of Mahuika (deity of fire) and Māui (prominent Polynesian character in Māori narratives), for example, Māui came to understand the dangers of fire when he barely escaped with his life after playing with his grandmother's sacred flames. This pūrākau provides both a starting point for developing a kaupapa Māori approach to burns prevention and a Māori framing for a wider understanding of safety from a child-rearing perspective.

Tikanga may also encapsulate customs that are flexible and can be adapted for contemporary understanding and practices to support the promotion of child safety.[24] For example, although neither cars nor child restraints were part of pre-colonial Māori society, practices and mechanisms put in place before setting out on journey may be regarded as tikanga that are intended to keep whānau safe: licensing, awareness of road signage, a safe vehicle with a current warrant of fitness and registration and the correct forms of restraints for tamariki are relevant to reducing child injuries from road crashes. Promoting these understandings and practices as tikanga may work to engage Māori in a more effective and culturally relevant way. These understandings can also enhance the responsiveness of local boards, councils and transport agencies, so they implement designs and traffic-calming measures that equitably protect tamariki Māori from pedestrian injuries while they walk to school.[25]

Kawa

Kawa guides the practices and relationships within and between whānau, hapū (subtribe or extended families) and iwi (tribe/s or communities).[22,24] While tikanga and kawa are interconnected, kawa is distinguished as the actions or protocols that guide the way Māori life is ordered. [22,24] Kawa thus regulates behaviours and practices in different settings and in relation to different issues. Of note, both tikanga and kawa vary from iwi to iwi.

Mead[23] argues from a te ao Māori perspective that unintentional injuries among tamariki could potentially be a consequence of a breach of tikanga and/or kawa in the reciprocal interactions between tamariki, their whānau and others. Thus, tikanga and kawa provide a regulatory function and offer guidance that can protect tamariki from unintentional harm.[23,24] For example, kawa surrounding a car journey could incorporate the singing of a seat belt rhyme in te reo Māori, by which tamariki would remind parents of the kawa haumaru for keeping themselves and their whānau safe. Alternatively, a karakia (prayer or blessing) for safe travels would serve a similar purpose.

Mātāpono

Mātāpono are the pillars upon which tikanga and kawa are founded. Durie[22] describes mātāpono as "values that underpin collective social norms." These motivate protective elements, reciprocal respect and equitable relationships with the natural, social, built and other environments. By providing a bottom-up approach to inform, adapt or create tikanga, the protective concepts incorporated in mātāpono can be pivotal to framing injury prevention messages.

- *Mana*: preserving, maintaining and nurturing the authority that tamariki Māori inherit at birth from tīpuna (ancestors), iwi, hapū, whānau and parents.
- *Mauri*: valuing and respecting the life of individuals, the collective

and their interdependence with the environment.

- *Tapu*: valuing and respecting the sacredness of taonga to ensure these are acknowledged, preserved and maintained.

Within te ao Māori, tamariki are regarded as taonga, gifted by ngā atua (Māori celestial beings) and tīpuna[26] and, therefore, understood as tapu.[23,24] Māori child-rearing practices often acknowledge tamariki as taonga.[26,27] This status is explicitly incorporated in Māori child-rearing practices, which are influenced by mātāpono that seek to protect the mauri, mana and tapu of tamariki. Key child-rearing practices of particular importance when considering injury prevention in a context where child flourishing is valued include:

- Whakapuhi: cherishing and indulging tamariki; encouraging them to be inquisitive, adaptive and to explore their environments and the people within them.[26,27]
- Aroha: caring for tamariki and fostering taha tinana, taha hinengaro, taha wairua and taha whānau wellbeing and identity.[27]
- Whakamana: building and maintaining the mana of the child.[27]
- Tuakana-teina: encouraging reciprocal mentoring between older and younger siblings. [26,29]
- Rangatiratanga: fostering the authority that tamariki inherit to lead whānau, hapū, iwi aspirations and self-determination.[26,27]
- Kaitiakitanga: teaching tamariki to be protectors of tikanga, lives, land and resources.[19,27]
- Manaakitanga: teaching tamariki to be guardians of their own and others' mana.[22,24,26,27]
- Whakatūpato: teaching tamariki to be cautious and safe in their environment and with those around them.[22,24,27]
- Kotahitanga: a collective approach to Māori child-rearing in which iwi, hapū and whānau are responsible for safe, supported and nurtured child-rearing.[22,27]

Each of these Māori child-rearing practices resonates in clear and direct ways with concepts of a child flourishing within social, physical and community contexts and environments where serious or fatal injuries and harms are prevented. Here we illustrate the implications by drawing on two of these child-rearing practices.

Tuakana-teina

Within te ao Māori and Māori child-rearing practices, a reciprocal mentoring relationship is often observed between tuakana and teina. This relationship revolves around teaching and learning exchanges[26,27] and fosters the development of mātāpono among tamariki,[27] as well as providing teina with critical guidance to safeguard and navigate tikanga and kawa.[28]

Consideration and incorporation of tuakana-teina relationships within a Māori framework for understanding injury prevention has clear potential to support and empower tamariki to take steps to keep themselves and each other safe. Indeed, the tuakana-teina relationship is regarded among many Māori as critical to tamariki development. However, such a relationship may be at odds with non-Indigenous injury prevention programmes, which often ascribe primary responsibility to adults/parents for teaching tamariki and keeping them safe. As a result, they often overlook the strengths and benefits of tuakana-teina relationships and focus solely on adult caregivers as supervisors and educators. There remains much debate regarding the effectiveness of Western, non-Indigenous injury prevention programmes that have sought to teach safety skills directly to tamariki. For example, studies evaluating road pedestrian safety skills have yielded mixed results.[30,31] Conversely, programmes based on tuakana-teina mentorship have shown improved educational outcomes for Māori.[29] While educational interventions in the absence of safer environments are likely to deny opportunities for more equitable outcomes, acknowledging and engaging the strengths of tuakana-teina relationships could provide opportunities for a broader net of mentoring supporting knowledge acquisition and behaviours that promote healthy development and safety consciousness.

Kotahitanga

Kotahitanga recognises the roles and contributions of the collective. Māori child-rearing is based on kotahitanga among iwi, hapū and whānau. In past times, kotahitanga required iwi members to be kaitiaki (guardians) of tamariki and the mauri, mana and tapu of tamariki.[22,27] Safe, supported and nurtured child-rearing was, in principle, the responsibility of all people at all levels—iwi, hapū and whānau. Specifically, kotahitanga embraces a collective and communal approach to supervising tamariki, which includes entrusting members of the wider whānau and tuakana as effective supervisors.[26,27] Similar to tuakana-teina relationships, child-rearing practices based on kotahitanga may be viewed as being at odds with non-Indigenous injury prevention programmes that emphasise the role of individual caregivers as effective supervisors of tamariki.[32]

Kotahitanga as an approach provides an opportunity to reconsider how tamariki supervision and child-rearing are understood in the context of injury prevention. Existing programmes such as Mana Ririki: Strengths-Based Māori Parenting Programme,[27] and parenting resources such as Whakatipu,[33] utilise Māori parenting techniques to improve outcomes for contemporary Māori whānau. They offer possible templates for reframing unintentional injury prevention in line with kotahitanga and, more broadly, te ao Māori perspectives. They also offer the potential to be implemented in a way that promotes the inherent strengths of Māori approaches to child-rearing.

Conclusion and recommendations

In line with other Indigenous injury prevention work,[8,16,17] we argue a strengths-based approach, founded on mātauranga Māori and inclusive of tikanga, kawa and mātāpono, offers an alternative to the non-Indigenous programmes that have formed the mainstay of child injury prevention in Aotearoa. We believe clear links should be established between Māori cultural values and knowledge and evidence-based injury prevention strategies. We argue that, in doing so, injury prevention approaches will better reflect the fair, just and ethical governance guaranteed to Māori in Article 1 of Te Tiriti o Waitangi.

Safekids Aotearoa has begun shifting the focus of child injury prevention messaging and interventions to be grounded in kaupapa Māori approaches informed by the critical insights offered through kawa haumaru. In 2019, Safekids Aotearoa curated video resources that centred on te ao Māori and mātauranga Māori with a panel of kaumātua (elders) and Māori injury prevention staff. These video resources share fundamental insights into tikanga, kawa and mātauranga Māori as safety mechanisms that encompass a whānau-approach to safety within the home. Safekids Aotearoa has also established a Māori expert group to contribute to advocacy, research and kaitiaki of mātauranga Māori interventions and outcomes for tamariki Māori. Further, Safekids Aotearoa are presently exploring the development of a Māori parenting and shared-experience story-telling video series that highlights Māori cultural contexts of parenting and cultural knowledge transference.

Such work is similar to the New Zealand Accident Compensation Corporation's (ACC's) My Home is My Marae approach, the purpose of which was to equip and empower Māori communities with the necessary knowledge to identify and reduce hazards in their own homes.[34]

These examples illustrate the increasing awareness of the imperative to embed Indigenous values and practices to improve unintentional injury outcomes for Māori.[34,35] As Reid[36] states: "A critical expression of fair, just and ethical governance is equity." Evidence to date suggests that the realisation of the latter is systematically undermined by Western-centric prioritisation in approaches to service design, intervention development, research and funding.[37]

We recommend the following actions to assist in re-shaping injury prevention in Aotearoa and to achieve equitable outcomes for tamariki Māori:

- Develop approaches for collecting mātauranga Māori narratives and evidence that can inform kaupapa Māori tools and strategies to prevent child injury.

- Reconsider unintentional child injury prevention approaches to reflect mātauranga Māori, a communal approach to child-rearing and the role of tuakana-teina relationships.
- Access and utilise practices embedded within Māori parenting training to support Safekids Aotearoa's unintentional child injury prevention programmes and messages and, at the same time, work with existing Māori parenting programme providers to embed injury prevention messages and practices.
- Challenge dominant, deficit-framed narratives about the reasons why tamariki Māori are at increased risk of injury that do not acknowledge the impacts of colonisation, loss of culture and identity and pervasive failures of health systems.

In summary, this viewpoint highlights key elements of mātauranga Māori, tikanga, kawa and mātāpono that we argue should be incorporated into a kaupapa Māori approach to injury prevention. We advocate that this is necessary to reduce health inequities between Māori and non-Māori and advance Māori aspirations. Kawa haumaru provides an opportunity not only to collate mātauranga Māori injury prevention and initiatives, but to revitalise Māori child-rearing and parenting practices that contribute to the holistic safety and well-being of whānau, hapū and iwi.

We recognise that this approach requires ongoing consultation and research to identify mātauranga Māori and local insights that can be linked to injury prevention aspirations for all New Zealanders. It also requires the development of public funding mechanisms, evaluation frameworks, dissemination processes and timeframes that reflect Māori tikanga and kawa for sharing knowledge and decision making.

Glossary

- Aotearoa: New Zealand
- atua: Māori celestial beings
- hapū: sub-tribe or extended families
- iwi: tribe/s or communities
- kaitiaki: guardians
- karakia: prayer or blessing
- kaupapa Māori: Māori perspective/s
- kaumātua: elders
- kawa: practices
- kawa haumaru: safety mechanisms
- kotahitanga: collective
- mana: authority
- Māori: Indigenous person or people in Aotearoa
- mātāpono: values
- mātauranga Māori: Māori knowledge
- mauri: life force
- Papatūānuku: Earth mother
- pūrākau: Māori narratives
- Ranginui: Sky father
- taha hinengaro: psychological health
- taha tinana: physical health
- taha wairua: spiritual health
- taha whānau: family health
- tamariki: children
- Tāne-Mahuta: God of the forests and birds, and child of Ranginui and Papatūānuku
- taonga: treasured
- tapu: sacredness
- te ao Māori: Māori world view
- teina: younger sibling/s
- tikanga: customs
- tīpuna: ancestors/s
- tuakana: older sibling/s
- whānau: families

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Spontaneous pneumomediastinum of delivery: a diagnosis of exclusion

Sally Harrison

Spontaneous pneumomediastinum of delivery, also known as Hamman's syndrome, is a rare complication of childbirth occurring in around one in 2,000–100,000 vaginal deliveries.[1] More sinister pathology, including oesophageal rupture, must be excluded in these patients, and general surgical and cardiothoracic surgery teams are often consulted as a result. It is important that obstetric and surgical teams are aware of the presenting features of this condition and are wary of a diagnosis of Hamman's syndrome without appropriate investigation.

Detailed below is a case report of pneumomediastinum of delivery that occurred at Dunedin Hospital.

Case report

A 26-year-old primiparous woman with a gestational age of 40+1 had a normal vaginal delivery of a 3,930g baby and developed chest tightness a few hours afterwards. She did not experience hyperemesis during her labour and the second stage of her labour lasted 93 minutes. She suffered a second-degree perineal tear requiring suturing. She had no past medical history, including of respiratory disease, and was a lifelong non-smoker and not a user of illicit drugs.

The patient subsequently developed swelling over her right cheek and eye with vocal change but no shortness of breath. On examination, she had normal observations with no oxygen requirement and breath sounds were present and equal.

Chest radiograph confirmed pneumomediastinum and cervical subcutaneous emphysema (Figure 1). Although there was concern regarding undue radiation to this patient's lactating breasts, CT chest was organised as the serious and life-threatening condition of oesophageal rupture could not be ruled out on plain film. Subsequent CT chest showed a large volume pneumomediastinum with subcutaneous emphysema extending along the chest wall and neck (Figure 2). There were small bilateral pneumothoraces, best appreciated in the oblique fissures. There was no defect seen along the tracheobronchial tree and no pleural effusion to suggest oesophageal rupture.

The patient's pneumothoraces were managed conservatively and there was improvement in her symptoms and chest x-ray within 24 hours. She was subsequently discharged and advised it was unlikely she would have another episode of pneumomediastinum in her next pregnancy.

Discussion

Spontaneous pneumomediastinum of delivery should be a diagnosis of exclusion. It presents most commonly with pleuritic chest pain, but also shortness of breath, cough, dysphonia, dysphagia and abdominal discomfort.[2] Subcutaneous emphysema is often the first obvious sign of this condition.[2] Other important differential diagnoses in recently labouring women include oesophageal rupture, pneumothorax, pulmonary embolism and acute asthma.[2]

Pneumomediastinum of delivery is due to increased intrathoracic pressure produced during labour, causing alveolar and small bronchiolar rupture.[3] This leads to air tracking through the bronchovascular planes towards the hilum and then being released into the mediastinal space.[3] Air preferentially travels towards the medi-

Figure 1: Chest radiograph depicting pneumomediastinum and bilateral subcutaneous emphysema in the neck.

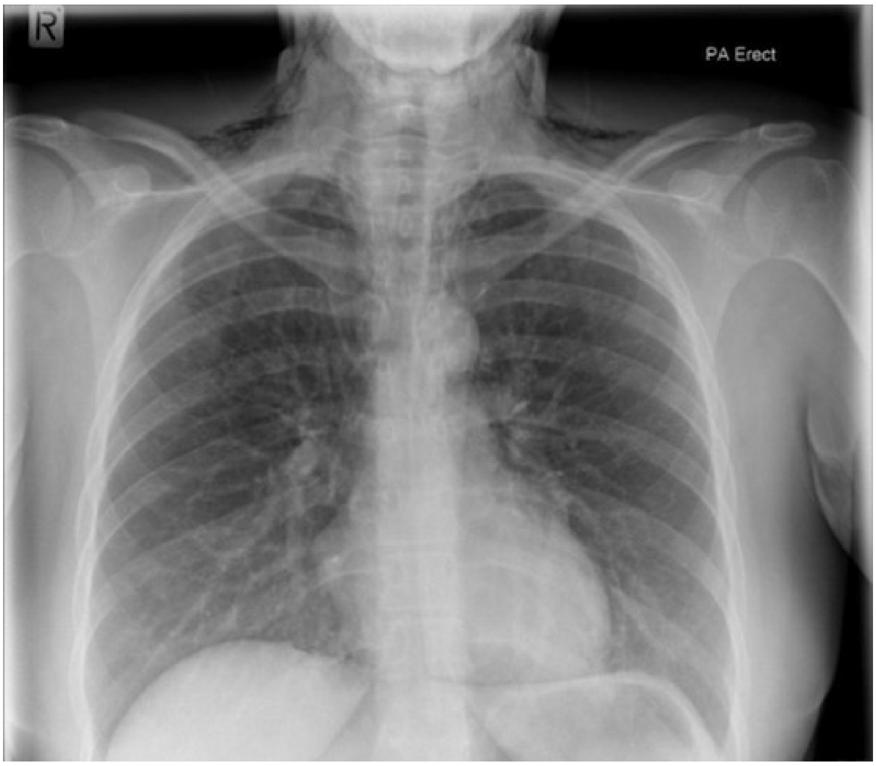

Figure 2: CT chest coronal plane demonstrating pneumomediastinum and bilateral neck subcutaneous emphysema.

astinum due to the Macklin effect, which describes a declining pressure gradient from the lung interstitium to the mediastinum.[3] Air may also come between the layers of the pleura and cause a pneumothorax.[4]

Pneumomediastinum can frequently be seen during the second stage (but not necessarily with obstruction) in women who have exaggerated pushing or Valsalva movement during labour.[5] Pneumomediastinum is more likely to occur in primiparous women who may not fully appreciate the appropriate times to bear down during their delivery.[6]

There should be high index of suspicion for oesophageal rupture in any labouring patient who has pneumomediastinum, whether or not they have emesis.[7] This is the most significant surgical diagnosis that may also present with pneumomediastinum. Contrast CT chest with IV or oral contrast is the gold standard of investigation used to identify an oesophageal perforation.[7] A risk–benefit analysis should be made for each individual patient regarding the likelihood of oesophageal rupture, as there is increased chance of future breast cancer from the exposure of lactating breasts to ionizing radiation.[8]

In the absence of obvious oesophageal, airway or lung injury, management of spontaneous pneumomediastinum is conservative, consisting of analgesia and oxygen (if required) and serial imaging to ensure resolution.[2] Patients are not at greater risk of recurrence in subsequent labours, but it has been suggested, without significant evidence, that epidural anaesthetics to reduce inappropriate straining may be of benefit.[5] Additionally, nitric oxide for analgesia may increase intra-alveolar pressure, and so should be omitted.[5]

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Pacific countries lead the way on sugary drinks taxes: lessons for New Zealand

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New Zealand has one of the highest rates of obesity in the OECD, and the health burden of death and disability from obesity and being overweight has increased by 26% in a decade to become the second largest single cause of health loss after tobacco.[1] An obesogenic environment, wherein marketing of and access to cheap junk food and sugary drinks is widespread, has been clearly described.[2,3] The problem with an environment that encourages sugary drinks consumption is its link to dental decay, obesity, diabetes, cardiovascular disease and premature mortality.[4–7] Furthermore, the obesogenic food environment in New Zealand is patterned by deprivation[2] and contributes to health inequities.

In many Pacific countries, obesity and high blood glucose are the greatest contributors to death and disability (eg, Cook Islands, Samoa, Tonga).[1] There are major fiscal implications from obesity-related disease, and this is placing increasing demands on fragile health systems. In response to these problems, Pacific leaders have declared a non-communicable disease (NCD) crisis.

Globalisation and trade are major drivers of the obesogenic environment. New Zealand and Australia have "Pacific reset" policies that direct further investment in the region towards improved wellbeing and economic development. New Zealand and Australia also contribute to health services for Pacific populations (eg, via health and aid budgets). Yet, at the same time, they continue to profit from export of sugar-sweetened beverages (SSBs) to the region[8] and promote trade and tariff reductions (eg, via the PACER-Plus trade agreement) that have a disproportionate benefit to their own economies.[9] Thus New Zealand and Australia are complicit in the Pacific NCD crisis. New Zealand is reportedly the largest export earner from sugary drinks to the Pacific, followed closely by the United States.[8] This is especially concerning in a region where the health system does not have the capacity to fully manage and treat the health consequences.[10]

SSB taxes are recommended by the World Health Organization (WHO)[11] and regarded as a key strategy for obesity prevention. A SSB tax is useful because it can help to address the obesogenic food environment by supporting healthier beverage options and choices. There is ample evidence that SSB taxes are an effective policy for addressing purchasing and dietary intake of taxed beverages, as consistently demonstrated in empirical studies of SSB taxes internationally. In one systematic review, consumers from every examined country responded to SSB taxes by reducing purchases of SSBs and, in some settings, increasing purchases of water.[12] SSB taxes have been found to be effective in Tonga[13] (and to some extent the Cook Islands[14]), and price increases have been the major pathway of effect. SSB taxes in Tonga have likely contributed to a healthier diet, with significant declines in imports and only a small increase in locally manufactured soft drinks.[13,15]

SSB taxes are one of the most widely used obesity prevention measures in the Pacific region. One-third of Pacific Island countries and territories (PICTs) have increased SSB taxes by levels recommended by WHO for achieving health benefits since 2000.[16] Although the Pacific is not traditionally looked to for leadership in NCD prevention, there are some excellent examples of SSB tax designs, including the tiered volumetric tax in Tonga (T$1.50/L for beverages with sugar >5g/100ml and ≤20g/100ml) targeting a broad range of SSBs that was introduced in 2017.[13]

Healthy substitution patterns have been reported after introduction of SSB taxes in several jurisdictions.[12] Bottled water was an important substitute internationally and significantly so in Tonga,[13] especially in high-income households.[17] Substitution to artificially sweetened beverages (albeit less preferable than water from a health perspective) was also seen in Tonga and the Cook Islands after taxes on these products were removed.[13,14] However, some unhealthy substitution patterns in the Pacific have been described (eg, shifts to locally produced soft drinks),[16] and this can limit health benefits. Pacific SSB taxes are generally lower for locally manufactured SSBs than imported SSBs, and even when a uniform SSB tax was legislated (eg, in Tonga and the Cook Islands), poor implementation with respect to locally produced beverages promoted shifts to these products.[16]

The impacts of SSB taxes by socioeconomic position remain unclear internationally, and further research is needed from more settings. Nevertheless, low-income households in Tonga appeared to benefit from greater relative declines in soft drink expenditure than high-income households (however, the pattern was unknown for volumes).[17] Low-income households also continued to spend a greater proportion of their incomes on taxed beverages (although they spent less on SSBs post tax in absolute terms).

Strengthened SSB tax designs can address unhealthy substitution patterns by taxing imported and locally manufactured SSBs equally, by prioritising implementation and by targeting all commonly consumed SSBs, including powdered sachet drinks and sugar-sweetened fruit juices. SSB taxes that use volumetric, tiered or nutrient-specific designs[18] can limit shifts to purchasing cheap or bulk SSBs (such shifts are more likely with ad valorem taxes). Improving access to safe drinking water in homes may also promote healthier substitution patterns. Investment of tax revenue into the health system and obesity prevention is an option for fairer distribution of SSB tax benefits (eg, by supporting safe drinking water or paying for free dental care). Urgent attention is needed to strengthen SSB tax policies and to introduce SSB excise taxes that address SSB consumption and the NCD crisis in the Pacific region.

New Zealand can learn from the Pacific example. Well-designed SSB taxes, such as levies on sugary drinks manufacturers, are a major tool and one of the most evidence-based prevention measures for addressing NCD risk factors in the Pacific and internationally. New Zealand and other high-income Pacific trading partners can learn from the willingness of PICTs to introduce SSB taxes and then continually improve and develop their policies in response to monitoring and advice, such as has occurred in Tonga. It is time for genuine action on preventing obesity and improving oral health. We must refuse to further sacrifice health to industry interests. SSB taxes are a key element of a concerted effort to reverse unhealthy trends in diet, obesity, oral health, NCDs and health inequalities.

New Zealand and other Pacific trade partners also have an ethical obligation to support PICTs to reach their NCD policy goals. This includes supporting the introduction and evaluation of health-promoting policies like SSB excise taxes or import bans (such as in Tokelau), further investing in safe drinking water in the Pacific and carving out explicit health, social and environmental objectives in trade agreements so partners can optimise their health goals.[19]

Competing interests:
Nil.

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How has long-acting reversible contraceptive provision at Family Planning clinics in Aotearoa New Zealand changed since PHARMAC funded intra-uterine systems for contraception?

Beth Messenger, Amy Beliveau, Mike Clark, Caroline Fyfe, Alison Green

Our article How has contraceptive provision at Family Planning clinics in Aotearoa New Zealand changed between 2009, 2014 and 2019: a cross-sectional analysis, published in the 30 July issue of the *New Zealand Medical Journal*, noted that the full impact of the PHARMAC funding change to the intra-uterine system (IUS) could not be detected because of the timing of our research. This letter provides more recent data on IUS starts among Family Planning clients following the funding change.

Here we report de-identified administrative data (refer to our article for more information about research methodology and terminology) about the type of long-acting reversible contraceptive (LARC) start provided to Family Planning clients for three months (November–January) across four time-periods from November 2017 to January 2021. Three months of data, rather than a full year's, are reported because of the impact of COVID-19 on the number of LARC starts in 2020 and 2021. While Family Planning continued seeing clients during COVID-19 lockdowns, the number of in-person consultations for LARC starts were fewer than under normal circumstances. We present the actual number of LARC starts by ethnicity and LARC starts as a proportion of all types of LARCs, but we have not conducted any further statistical analysis. The data are for observation; they are not formal research findings.

The data show that, since PHARMAC started funding IUS for contraception at the end of November 2019, there has been a large increase in IUS starts (Table 1) and IUS starts as a proportion of all LARC starts. The percentage increase of IUS starts from 2018/19 to 2020/21 is nearly 400% among Pasifika clients, 200% among Māori clients and about 140% among NZ European/Other. In contrast, the number of IUS starts remains relatively consistent when comparing the two periods prior to funding (2017/18 and 2018/19). It is interesting to note that our original research found a statistically significant reduction in intrauterine contraceptives (IUC) starts for Pasifika clients (25% to 19%) between 2009 and 2019, presumably because of the subsiding of the implant from 2010. Although these data show the greatest increase in IUS starts for Pasifika clients between 2018/19 and 2020/21, in 2020/21 Pasifika are still the ethnic group least likely to start an IUS compared to a copper intrauterine device (IUD) and implant. This information provides another example of the need for more information about factors influencing contraceptive decision-making by ethnicity.

These data support the findings and conclusions in our original research article, indicating that the cost of IUS was a barrier to access prior to the funding decision. However, it does not provide any other information about the observed differences in contraceptive starts by ethnicity. As noted in the original article, contraceptive starts are influenced by a range of factors, of which cost is only one. For example, cost does not explain why Māori and Pasifika clients start implants at much higher proportions than NZ European/Other clients in 2020/2021, since all LARCs are funded during this time.

Contraceptive starts are influenced by other factors, such as client preference and clinician influence. For example: How does the lived experience of contraception among family and friends impact contraceptive decision-making? How does clinician preference and/or unconscious bias impact the way that information is delivered to clients? When considering equity in access to contraception for Māori and Pasifika people, the potential impact of racism within the health sector cannot be ignored.[1,2] Further research is needed to fully understand the observed differences in contraceptive starts by ethnicity.

As stated in the original research article, Family Planning data cannot be compared with data from other primary care providers because this information is not collected consistently or comprehensively. This means policies on contraceptive access in primary care are not currently based on evidence. Policies must enable people to choose the contraceptive type that works best for them by removing barriers to accessing contraception and also by protecting people against bias and coercion.[3]

Reproductive rights—the right to decide if and when to have a child and to have control of reproductive decision-making and fertility—is central to wellbeing and self-determination, and any barriers to people exercising these rights fully should be identified and addressed.

Table 1: Number and proportion of LARC starts by type and ethnicity in four periods.

		2017/18 No. of starts	2017/18 % as a proportion of all LARC starts	2018/19 No. of starts	2018/19 % as a proportion of all LARC starts	2019/20 No. of starts	2019/20 % as a proportion of all LARC starts	2020/21 No. of starts	2020/21 % as a proportion of all LARC starts
Asian	**Implant**	118	35%	150	38%	156	34%	162	36%
	IUD	154	46%	167	42%	88	19%	103	23%
	IUS	62	19%	79	20%	214	47%	190	42%
Māori	**Implant**	244	57%	319	61%	237	44%	247	48%
	IUD	117	27%	133	25%	63	12%	50	10%
	IUS	68	16%	72	14%	242	45%	214	42%
NZ European/ Other	**Implant**	694	36%	754	35%	555	22%	673	26%
	IUD	714	37%	784	37%	396	16%	460	18%
	IUS	547	28%	593	28%	1529	62%	1419	56%
Pasifika	**Implant**	122	59%	139	64%	125	53%	122	53%
	IUD	67	32%	61	28%	33	14%	27	12%
	IUS	18	9%	16	7%	80	34%	80	35%

IUS: Intra-uterine system. IUD: copper intrauterine device.

Competing interests:

Beth Messenger, Amy Beliveau and Mike Clark report they are employees of Family Planning. Beth Messenger also reports she is Chair of the New Zealand College of Sexual and Reproductive Health, and that she was a member of the Ministry of Health National Contraception Guidelines Steering Group.

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Ministry stops measuring the effect of screening on access to diagnostic colonoscopy

Phil Bagshaw, Gil Barbezat, Brian Cox, Paula Goodman, Dave McKay, Murray Pfeifer, Melissa Vining

In New Zealand, the Southern region has historically had among the highest incidence and mortality rates for colorectal cancer,[1] and considering the region has also had among the highest rates of late and advanced presentations of colorectal cancer to A&E, it seems paradoxical that the Southern region has among the lowest rates of colonoscopy.

Following critical reviews of the Southern Region's service, it was agreed that all patients referred for colonoscopy should be documented. The aim was to trace patients' ultimate outcomes from their longer-term follow-up. But recent information obtained from an Official Information Act request (Ref: H202108227) indicates that the "Guide to Manage Colonoscopy Wait Time Indicator Performance" has been removed from the Ministry of Health (MoH) website, as it "no longer reflects MoH expectations." Replacement is not envisaged until after review of the health system. Predicted changes to the policy include removal of Section 8 (declined colonoscopy referrals) as it is "not a requirement" and "it cannot be nationally monitored."

Our confusion is compounded by assurance from an authoritative source that all patients who were declined colonoscopy referrals were being recorded, at least until the end of May, which was when the MoH guide was taken down. This measure of colonoscopy performance for symptomatic patients is essential, but it appears to have now been deliberately discontinued. If so, why? We have good reason to believe that this matter can be resolved, and patient management decisions improved, only by the collection of reliable data that is independently verifiable. To claim that can now not be monitored ignores the obligation of care for symptomatic patients for each district health board while screening occurs.

Competing interests:

Nil.

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Navigating the maze of DHB locality authorisation

Patrick Bartosch

As a remote, first-year PhD student in health sciences at the University of Otago, I have become used to managing a variety of challenges that the global pandemic has brought along with it: taking calls in the middle of the night (I live in the Netherlands, waiting for New Zealand to open its borders), getting together with my supervisors via Zoom only (we have yet to meet in person) and navigating the bureaucratic landscape of gaining ethics approval and applying for scholarship and funding at the university while being outside of the country. All of this I expected when I started the programme in November 2020.

What I did not expect was the rather dysfunctional procedure of gaining locality authorisation from four district health boards (DHBs): Auckland, Canterbury, Capital & Coast and Southern. I started the process of applying for locality authorisation in April 2021 and, just this past week (September 2021), received approval from the last DHB. My research is as low-risk as it gets—I am talking to healthcare providers and patients about their experience within the healthcare system. I am not asking for clinical information. I am not taking samples. I am not testing new compounds on people. I am only talking to a handful of people in each district. And yet, the process of pursuing locality authorisation was cumbersome and needlessly frustrating.

The one thing that confuses me the most is how the process of receiving locality authorisation differs depending on the district. One district classified my research as “ultra-low risk” and I did not even need to apply for locality authorisation. Another also classified it as “ultra-low risk” and yet I had to submit six different forms of documentation and still go through the entire approval process. The other two districts did not even offer the option of labelling it “low risk,” meaning I had to go through the whole cumbersome process, which took months each time.

Two DHBs asked me to identify clinical leaders for the service lines that I planned on including in my research and to get their signatures on the authorisation form. One DHB was kind enough to provide me with a list of these clinical leaders, but the other just emailed me a friendly “Good luck!” in finding them—from the Netherlands. The clinical leaders are not listed on that DHB’s website and several emails from me to the DHB research office asking for their names and contact details went unanswered. I ended up emailing random physicians listed on the service web pages, asking them who their clinical leaders were.

Ultimately, all but one DHB asked me to find someone among their employed physicians to sign the form as a Principal Investigator (PI), a formality that has no impact whatsoever on my research as these PIs don’t have to do anything else but sign the form. For low-risk research, this is a bureaucratic requirement that serves no purpose beyond causing additional work to me as the researcher. I asked a member of the research office at one DHB for a PI in their district whom I could approach, but they could not help me and instead referred me to my supervisors (who are from a completely different district) for advice on identifying a PI.

As a foreigner who was not familiar with the New Zealand DHBs before starting the programme, this process has caused me headaches. And it has also been very confusing, as many of the steps towards receiving locality authorisation make no rational sense at all. They appear to be bureaucratic principles that were once introduced and, apparently, have not been seriously questioned since. They also cause unnecessary work not just for me as a student, but also for the DHBs. My research will not significantly or directly affect the

DHBs, their employees or the patients they serve.

The sad truth is that the current processes of gaining locality authorisation are discouraging researchers from conducting valuable research. They are a hurdle that is utterly unnecessary (no comparable processes exist in the other two countries included in my project). If locality authorisation is indeed necessary, the process should be coherent and pragmatic. Currently, it is locking researchers who are not from within the system out of the research ecosphere. International students may decide to take their research elsewhere, which would be a shame for New Zealand and for patients who may ultimately benefit from the research.

I understand why these processes were introduced in the first place, but there has to be a way to make them more reasonable and faster. If a research project is ultra-low risk, as is the case with mine, I should not have to go through full-scale locality authorisation. As New Zealand embarks on significant healthcare reforms over the next year, with the introduction of Health New Zealand and the merger of the DHBs by the middle of 2022, there is a real opportunity to improve on some of these processes.

I hope receiving locality authorisation from Health New Zealand will be a much more streamlined and simple process. The first question that should be answered and evaluated is: What is the risk associated with a research project? If the risk is low, then locality authorisation should be quick and brief. And it should be the same across all of New Zealand. One central approval procedure should be introduced. This would not only help students and researchers. It would also save Health New Zealand employees a lot of time.

Competing interests:

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Dr William (Bill) Taylor, FRCS

13 May 1938–5 September 2021

Dr William (Bill) Taylor passed away on 5 September 2021 at the age of 83. Sadly, he had suffered from ill-health in his last few years.

Bill was born in Whanganui and attended St Patrick's College in Silverstream, Upper Hutt, and subsequently enrolled at the Otago Medical School.

Upon graduation and completion of his house surgeon years, Bill was appointed in 1965 as the first eye registrar at Auckland Hospital at the behest of Dr Calvin Ring who was the departmental head and pre-eminent ophthalmologist of the day. Bill obviously impressed Dr Ring as in his annual departmental report; Dr Ring stated, "W (Bill) Taylor had been appointed as a registrar and was helping fully in the running of both the outpatient section and the wards." The following year, 1966, Dr Ring wrote, "Our registrar Dr Taylor provided great help in arranging and taking part in the teaching activities. Appreciation of his generous help with all clinical matters must also be recorded." Clearly Bill's merits were recognised, prompting him after two years as an eye registrar in Auckland to travel to London where he was appointed to "the house" at Moorfields Eye Hospital. Following completion of the registrar programme, Bill remained at Moorfields for what today would be equivalent to a medical retinal fellowship with Professor Alan Bird and subsequently surgical retinal training with Dr Lorimer Fison.

Bill returned to Auckland in 1972 as the inaugural full-time Ophthalmic Tutor Specialist, a post he held for two years. Bruce Hadden was a second-year registrar at that time, and Drs Gillian Clover and Ian Hass became registrars the following year. Those and the registrars who followed benefited greatly from Bill's enthusiastic teaching across the whole field of ophthalmology. His breadth of knowledge and surgical skills were legendary, remembering at that time ophthalmologists were generalists. Bill revolutionised the Department's teaching programme and cajoled all the part-time visiting consultants to contribute. He instituted a weekly retinal fluorescein angiography meeting. He further developed the ophthalmic sub-specialties, which had been initiated in the fields of retina and strabismus by Dr Hylton Le Grice, and very much in retina by Dr Harold Coop. In addition to his expertise in medical and surgical retina, Bill also had a special interest in orbital surgery and essentially developed a tertiary referral centre.

In 1974 Bill accepted a part-time post as a visiting ophthalmic surgeon at Auckland

Hospital and at the same time joined Dr George Fenwick in private practice in Mount Street. He also developed a peripheral practice in Henderson. Shortly thereafter Bill was appointed as the Head of the Auckland Hospital Eye Department as Dr Calvin Ring had retired from hospital practice.

Bill remained committed to the public system, and he put much time and effort into planning an extensive new fit-out of the Eye Department in the Wallace Block. It was intended to be short-term, as the 1920s Wallace Block was an earthquake risk and was due for demolition in 1978. That did not eventuate, and it continued to house the Department of Ophthalmology until 2004 when the Department shifted to Greenlane Clinical Centre and the Wallace Block was demolished. As well as administering the Department, Bill continued organising comprehensive teaching programmes for the house surgeons and registrars, mostly in his own time. He organised a very successful conference of the Auckland ophthalmologists in which he coerced every consultant to give a presentation and invited Professor Ian Constable of the Lions Eye Institute in Perth as the guest speaker. It was a resounding success, academically and socially.

In 1982 Bill and Bruce Hadden together set up a retinal fluorescein angiogram and argon laser facility in the private sector, a first for New Zealand. After around five years, Bill bought out Bruce's share, and sometime after that Dr Philip Polkinghorne joined Bill in private practice.

Bill was the principal driver in establishing New Zealand's first multi-sub-specialty group practice, which opened in 1993 with Bill, Philip Polkinghorne, Paul Rosser, and David Pendergrast. Dr Stephen Best joined shortly after. Initially called St Mark's Eye Centre, it then morphed into Auckland Eye.

Bill was a mover and shaker. He advanced ophthalmology in Auckland, especially in the sub-specialty of retina, and in teaching and training, thus paving the way for trainees to obtain their specialty qualifications in Auckland before further sub-specialty experience overseas.

Although an excellent surgeon, Bill retired from surgery unusually early, partly because like many graduates from Moorfields in that era, he remained sceptical of intra-ocular lenses because of the many early failures they had to deal with in those pioneering times.

Outside of medicine, Bill was Chairman of the Board of Governors of Sacred Heart College (Auckland) and a committed Catholic, providing low-cost eye-care to the clergy of Auckland for decades. In retirement, both he and Jo were active members of Remuera Golf Club in Auckland and regularly travelled to the UK (particularly Scotland) to see family, trace family history, and play golf. He became a keen proponent of long-line fishing off the beach at the family holiday bach on the Coromandel Peninsula.

Bill is survived by his devoted wife Jo of 58 years, and by their sons William, John, and Andrew, and their daughter Louise.

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Cases for Diagnosis of Syphilis of the Nervous System

1921

Among the following four cases there were two in which syphilis of the nervous system was undoubted, but which presented other points of clinical interest, and two in which it became necessary to decide upon the value of a negative Wassermann reaction.

Case 1.—Tabes dorsalis with extreme muscular wasting.—This patient was recently in Dunedin Hospital under my friend and colleague, Dr. Frank Fitchett, and I am indebted to him for permission to publish the notes in this series.

A.B., aged 64, stated to have acquired syphilis at the age of 58, unusually late in life to meet with that misfortune.

At the age of 60 was out shooing in perfectly good health. He suddenly took a "staggering fit" and found himself stepping off to the right while attempting to go forward. He at once gave up and went home.

Since then there has been progressive wasting and loss of power in the arms, but he can give no account of the order in which the segments were attacked. The wasting is confined to the arms, but there is considerable general weakness, and for the last few months there have been pains in the joints of the right leg, and shooting pains in the thigh.

On examination there is extreme wasting of both arms, which are precisely in the condition found in progressive muscular atrophy, and there can be no doubt that there is chronic anterior poliomyelitis on both sides in the cervical enlargement of the cord.

The two arms are not quite symmetrically affected, but nearly so. In the shoulders there is no abduction, the deltoids being both quite wasted, there is slight adduction by the pectorals, the left being a little the stronger.

On the elbows there is no flexion, but extension is possible, strongest on the left. In each hand the wrists and fingers can be flexed together, but not independently, there is a fair finger grip, the wrist flexing at the same time, the left fingers are stronger, but there is better use in the right thumb. There is some permanent flexion of the fingers, especially on the left. There is no active extension of wrist or fingers. There is very marked interosseal, thenar and hypothenar wasting on the left, less on the right, and in the right thenar muscles there is some fibrillary twitching. There is no pain in the arm and no sensory change, and the deep reflexes are abolished.

The neck and trunk movements are merely feeble, he can sit and stand with the head fairly erect.

In the legs there is no wasting, and all normal movements can be performed with some degree of force through fair range. He can stand and walk feebly.

Cranial nerves.—There is diplopia, object one above the other. The pupils are small, unequal and inactive to light, but react to convergence. The other cranial nerves are unaffected.

Reflexes.—The deep reflexes are absent in the legs, there is no knee-jerk or ankle-jerk. The sphincters are unaffected.

Sensation.—There is no obvious loss of sensation in the skin, but the muscle pressure sense in the legs is absent.

Co-ordination.—This cannot be tested in the arms; the heel-knee test is performed accurately in bed, the gait is very feeble, but not typically ataxic, and Romberg's symptom is present in only very slight degree.

The Wassermann reaction was positive.

The syphilitic history, the positive Wassermann reaction, the diplopia, the Argyl-Robertson pupil, the absent knee-jerk, the loss of muscle-pressure sense, and the shooting pains do not leave the diagnosis in doubt, but the muscular wasting is present in a remarkable degree for a case of tabes. Muscular wasting of varying extent is not infrequent in that disease, opthalmoplegias probably of neuritic origin are common, and peroneal wasting with inversion of the foot can fairly often be found. This condition, which is quite indistinguishable from progressive muscular atrophy, though rare, must, I think, occasionally occur, for Purves Stewart ("The Diagnosis of Nervous Diseases," 5th edition) figures a case with the note "Progressive muscular atrophy in a man aged 32. The patient also was tabetic."

Case 2.—Menière's Disease of Syphilitic Origin.—C.D., aged 55. Syphilis in youth. Five years ago he had a "stroke," in which there was sudden onset of double vision and staggering gait. This passed off spontaneously, and there was fairly complete recovery in about six weeks.

Two years ago, while recovering from influenza, on getting out of bed, he had sudden confusion, loss of balance and vomiting. The double vision recurred, and has continued along with dizziness, weakness in the legs and loss of sense of micturition. The dizziness is induced by rapid movement, especially in traffic, and there is an inclination to fall forward. In the diplopia objects are side by side, and vary with the position of the head.

Cranial Nerves.—The pupils are small and irregular, the left is slightly larger than the right, they react feebly to light and convergence, there is horizontal nystagmus to the left, the movement beyond the middle line is very ill maintained. There is vertical nystagmus on looking to the right, of smaller excursion, and with better outward movement. The left palpebral fissure is slightly less than the right. There is complete nerve deafness on the right, and a considerable degree on the left. Other cranial nerves are normal.

Motor power in the limbs is normal.

Skin sensation is normal, but muscle pressure sense and vibration sense are diminished in the legs.

Reflexes.—Superficial; abdominal not obtained. Planter response, an indefinite extension, not a true Babinski response. Deep reflexes all brisk. No clonus.

Sphincters.—Some delay in micturition. Defæcation unaffected.

Co-ordination of hands normal, walks on wide base, but nothing else detected.

The pupils, the loss of muscle pressure sense and of the sense of micturition were suspicious. The blood was examined, and returned as "Wassermann + +."

Specific treatment produced some general improvement.

Acute labyrinthitis (Menière's disease) occasionally occurs in syphilis, due to hæmorrhage into the labyrinth. In the attack there is intense vertigo, vomiting, disturbance of equilibration, and well marked nystagmus towards the unaffected side. The severe symptoms subside, but nystagmus persists for a considerable time, and movements of the head produce vertigo; unilateral nerve deafness is permanent: Aldren Turner and Grainger Stewart, "A Textbook of Nervous Diseases."

It is a rare condition; this case appears to agree with the description quoted.

Case 3.—A case for diagnosis.—E.F., a middle-aged patient, complained of some irrelevant symptoms, but on routine examination it was found that the pupils were inactive to light and convergence, and the right knee jerk was absent. There was some frequency of micturition. The deep reflexes in the arms, the left knee jerk and the angle jerks were all present. There was no loss of muscle pressure sense and no inco-ordination.

The Wassermann reaction was negative, both in the blood and the cerebro-spinal fluid, and in the latter there was no excess of lymphocytes.

In this case specific infection was in the last degree improbable, but in the absence of laboratory support an absent knee jerk and inactive pupils would of necessity arouse suspicion, and they remain unexplained. There was, however, no loss whatever of muscle pressure sense, to which the present writer attaches extreme importance in the diagnosis of tabes. The most characteristic symptoms depend on the damage to that part of the cord which conducts impulses from the muscles. This explains the loss of sense of position, and so the sensory inco-ordination, Romberg's sign, and the characteristic gait. Loss of sense of pressure on the muscles is naturally to be expected, and is rarely if ever absent.

The reactions of the blood and cerebro-spinal fluid, and the absence of lymphocytosis in addition, justified a dismissal of the diagnosis of tabes.

Case 4.—A case for diagnosis.—G.G., a middle-aged patient, had syphilis in youth and was treated by a well known expErt. He has been unable to concentrate on his work for some time, and has suffered from sciatic pain, weakness in the legs and fatigue.

The puils are very small, and do not react to light or convergence. There is deafness in the right ear.

There is slight thoracic analgesia and slight loss of muscle pressure sense in the legs: both there are so slight as to be doubtful. Movements are normal, but there is double flatfoot, and this probably accounts for some unsteadiness in the gait, which is not definitely ataxic.

The arms jerks and knee jerks are present, but one ankle jerk is absent.

Added to this there is slight mental exaltation, and considerable amnesia for words, which together with the pupils, the absent ankle jerk, the dubious muscle pressure sense, and the specific history, make a suspicious combination. But here again the Wassermann reaction was negative, both in blood and cerebro-spinal fluid, nor was there any lymphocytosis in the latter.

This is a case in which one can only accept a negative with some reluctance, whereas in the previous case a positive finding would have caused great surprise. Negative information, of course, will not compare with positive for value, and in this case I feel that the clinical examination, indefinite as its conclusions are, better justifies a positive diagnosis of syphilis of the nervous system than the negative Wassermann reaction justifies the contrary.

URL:
www.nzma.org.nz/journal-articles/cases-for-diagnosis-of-syphilis-of-the-nervous-system

Abstracts for the 257th Otago Medical School Research Society Summer Student Speaker Awards, Wednesday 5 May 2021

A Pacific approach to investigating Pacific tertiary students' understandings of sexual and reproductive well-being

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The Pacific peoples are the fastest growing population in Aotearoa New Zealand. Historically sexuality education has fallen short of incorporating Pacific cultural perspectives and worldviews. Contemporary efforts to recognise the uniqueness of Pacific Aotearoa has brought rise to strategic frameworks, such as the Pasifika Education Plan and Tapasā Cultural Competencies Framework. These strategies fail to address the shame and discomfort Pacific communities feel around these health topics.

With a Pacific approach, we investigated Pacific students' understandings of sexual and reproductive well-being. Students at the University of Otago in 2020 who identified as Pacific Islanders were invited to participate. This research employed an exploratory mixed method approach directed by the *Kakala* research model and *talanoa* (discussion) methodology. Cultural advisory groups supported the development of an online survey using REDCap software. *Talanoa* interviews enriched the findings of the survey and were thematically coded and analyzed through Nvivo software.

Participants (n = 82) ranged in age (mean = 22.85 yrs), genders (4), disciplines (4) and ethnic groups (20). Some participants displayed broad and holistic understandings of general health and well-being, acknowledging the complex factors contributing to an individual's state of being. Some participants struggled to differentiate the distinct topics of sexual and reproductive well-being. Participants expressed the primary origins of their knowledge to be from peers and family/community members. Participants stated that formal sexuality education often had detrimental effects to their understandings of well-being.

Contemporary perceptions of contraception, venereal diseases and sexual identity clash with traditional cultural perceptions of these topics. Through a strengths-based lens, this data informs changes required for current teaching practices to be culturally responsible. These recommendations are presented in an effort to form culturally effective policies within the Department of Anatomy at the University of Otago; a university within the Pacific region.

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Using fluorescence-activated cell sorting to characterise drug-tolerant A375 melanoma populations

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Cancer drug resistance was long believed to arise from pre-existing mutations that allow rare tumour cells to survive. Increasing evidence suggests a non-genetic component provides reversible advantages to a small, rare subpopulation of tolerant cells. Examining tolerant cell populations for markers of cellular plasticity could tell us whether these survival mechanisms already exist within tolerant cells or whether they can be induced using targeted therapies.

This project aimed to characterise vemurafenib-tolerant subpopulations in the A375 melanoma cell line. Using fluorescence-activated cell sorting we divided cells into groups based on expression of rare markers—AXL, CD36, NGFR and MART-1—selected to represent the four different cell populations observed in drug-tolerant melanoma. These markers are highly expressed on the cell surface making them ideal targets for cell sorting. Differences were analysed in untreated cells and drug-tolerant cells surviving vemurafenib treatment. Pluripotency factors were analysed using real-time PCR.

Both NGFR (64.3%) and AXL (91.6%) had substantial numbers of positive cells in the untreated population. NGFR+ cells increased with treatment to 96.0% while AXL decreased (19.6%). MART-1 remained unchanged with treatment (4.49% in untreated populations and 3.14% in treated populations) while CD36+ cells were low in untreated populations (2.74%) and increased dramatically with treatment to 48.4%. Further experiments are required to confirm these preliminary data. Analysis of pluripotency markers showed that relative to the untreated control, levels of OCT3/4 and NANOG increased by 25-fold ($P < 0.0001$) and 50-fold ($P < 0.05$), respectively.

Our FACS results identified clear differences in treated and untreated populations for three out of the four markers used. We also found distinct differences in how subpopulations change with treatment. This suggests that while the tolerant cells display a baseline level of pre-existing plasticity, external cues such as vemurafenib can induce additional expression of key markers that facilitate survival.

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The Public Health Unit role in managing COVID-19: a Nelson Marlborough DHB Public Health Unit case study

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The emergence of COVID-19 as a global pandemic in 2020 provided immense challenges to Public Health Units (PHUs) across New Zealand. PHUs were tasked with identifying COVID-19 cases, tracing their contacts, and managing quarantine and isolation for those with COVID-19. This qualitative case study aimed to investigate the delivery of public health services in the high intensity COVID-19 pandemic situation in the Nelson Marlborough District Health Board (NMDHB) to identify good practice and areas for possible future improvement.

Data were collected through semi-structured interviews (N=13 key informants) and from NMDHB documents; analysed according to Donabedian's Quality of Care framework. Key informants were purposively sampled for their roles in managing COVID-19 within the NMDHB. During the interviews, participants were asked to describe their experiences and perceptions of the COVID-19 response. Interviews were recorded and transcribed. Interview and documentary data were analysed thematically by the first author and reviewed jointly by the research team for confirmation.

Participants identified consistency with the PHU's Operational Plan and the national Coordinated Incident Management System, formal training sessions, preparedness to work remotely, frequent external communication and cultural adaptation of the case investigation template as strengths of the response to COVID-19. Limitations arose from the need to train colleagues shifting into pandemic management roles while remaining responsible for their own work, and unclear or inconsistent internal communication channels.

Increased training and clear channels of internal communication were identified as two priority areas for improvement within the NMDHB PHU. Focusing on these areas is recommended to increase future preparedness and efficiency of PHUs responding to COVID-19 and future pandemics.

Supported by the Otago Medical School Summer Research Scholarship.

Accuracy and clinical impact of point-of-care cardiac ultrasound in the emergency department: a retrospective cohort study

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There is a lack of evidence regarding how point-of-care ultrasound (POCUS) is used in patient management in New Zealand emergency departments (EDs). This study aimed to assess the diagnostic performance and utilisation of cardiac POCUS in the Dunedin ED.

We analysed 211 cardiac POCUS scans performed in Dunedin ED between October 2019 and May 2020 after excluding single view cardiac examinations performed as part of FAST (Focused Assessment with Sonography for Trauma), patients under 16 years of age, missing identifier and demographic data. Pericardial effusion, left ventricular systolic dysfunction (LVSD), right ventricular systolic dysfunction (RVSD) and right ventricular (RV) dilation were investigated. An expert echocardiographer and ED ultrasound expert independently reviewed the scans. Cohen's Kappa analysis demonstrated almost perfect agreement for pericardial effusion ($\kappa = 0.88$), substantial agreement for LVSD ($\kappa = 0.76$) and moderate agreement for RVSD ($\kappa = 0.58$) and RV dilation ($\kappa = 0.53$).

One-third of the scans were undocumented (33.2%). The scans were mostly suboptimal (ie, only basic interpretation is possible) or poor quality (ie meaningful interpretation was not permittable) for the five cardiac views parasternal long axis (PLAX), parasternal short axis (PSAX), apical four chamber (A4C), subcostal (SC) and inferior vena cava (IVC). Sensitivity for pericardial effusion was low compared to expert echocardiographer (66.7%, 95% CI 22.2–95.7) and

ED ultrasound expert reviews (83.3%, 95% CI 35.9–99.6). Specificity for pericardial effusion was high compared to expert echocardiographer (86.7%, 95% CI 76.8–93.4) and ED ultrasound expert reviews (88.2%, 95% CI 79.8–93.9). A similar trend was observed for LVSD, RVSD and RV dilation. Common technical errors identified were off-axis structures, artifacts and inappropriate depth.

A formalised credentialed training pathway is recommended to ensure clinicians are capable of using POCUS accurately and reporting all findings in accordance with the Australasian College of Emergency Medicine guidelines.

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Te taha hinengaro ki Waitaki: mental distress and wellbeing service provision in the Waitaki District

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A community approach to researching services is important in understanding mental health in small population centres. This study aimed to assess the availability of mental health and wellness services in the Waitaki District, assess the impact of COVID-19 locally and assess interest in a form of training for non-professional staff. Extensive consultation with relevant stakeholders, conducted prior to fieldwork, allowed the team to incorporate an element of co-design into the study protocol.

A purposive sample of 28 mental health service providers was interviewed between November 2020 and January 2021 using a semi-structured schedule. Interviews were recorded, transcribed, and analysed using a General Inductive approach. Analysis was conducted by the first author and reviewed by the research team.

Results showed that participants identified benefits in a close-knit community and in existing well-organised networks of providers, which were generally effective in providing opportunities for sharing developments in services. Most of the providers expressed frustration at overstretched secondary care services and primary health counselling, and suggested increased funding. Specific services for several groups, including Māori, the large Pasifika communities, children and youth, and more remotely located people, were identified as insufficient. The COVID-19 pandemic has led to both increases and decreases in demand for different services during varying Alert Levels.

This project provides the Waitaki community with a snapshot of their services as they are seen by local providers and the team is offering to speak to local groups, as well as planning further mental health research based in this community, given the relationships we have now developed locally. This research can also be used to add to growing knowledge about the way Aotearoa's smaller communities care for their members.

Supported by an Otago Medical School Summer Research Scholarship.

Cannabis and small airway function in mid-adult life

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Cannabis is one of the most widely used recreational drugs world-wide. Despite the high prevalence of cannabis use, we do not understand the potential impact it has on respiratory health. Previous studies have shown that cannabis smoking affects the lungs, although the effects appear to be different to tobacco. The long-term effects of cannabis smoking on small airways remain unclear. This study aimed to investigate the effects of cannabis smoking on small airway function in an adult population at age 45 years.

We determined the association between how much cannabis participants have smoked in joint-years and their small airway function measured by impulse oscillometry (IOS) parameters at 45 years in the Dunedin Multidisciplinary Health and Development Study (a cohort of 1037 individuals born in 1972/1973). Three individuals with IOS values more than 5 SDs from the mean were excluded. The IOS parameters R5,R20,R5-R20 capture airway resistance while AX,X5 and Fres reflect lung reactance. The parameters R5,R20,R5-R20,AX and Fres were transformed using natural logarithms to achieve parametric distributions. Analyses for IOS measures were performed using multiple linear regression models that adjusted for tobacco pack-years, BMI, and height.

The findings indicate that cannabis smoking was significantly associated with pre-bronchodilator R5-R20, R5, X5, AX and Fres but was not associated with R20. This suggests that cannabis smoking is associated with small airway dysfunction at 45.

Cannabis smoking is associated with changes in small airway function at age 45 and the findings indicate that peripheral airway function needs to be considered when assessing the impact of cannabis exposure on pulmonary physiology.

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Estrogen deprivation prolongs the sexual refractory period and dampens the Coolidge effect in male rats

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Estrogen is involved in normal male sexual function. Here, we explored estrogen's role on both the sexual refractory period (ie, the time when males cannot be sexually aroused after an ejaculation) and the Coolidge effect (ie, a shortening of the refractory period when a novel sexual partner is introduced after ejaculation) in male rats. This research may be relevant to estrogen-deprived men such as those with natural cause (due to genetic or hormonal conditions) or due to various treatments (eg, cancer treatment).

Sexually experienced adult male rats were assigned to a daily treatment of either saline (7 rats, control group) or a drug that blocks estrogen production (fadrozole dissolved in saline, 1mg/kg/day, 8 rats, estrogen-deprived group). After 29 days, they were mated with a female until sexual satiety (no longer showing ejaculation) was reached, and then a novel female replaced the first.

With the first female, the refractory period after the first ejaculation was longer in the estrogen-deprived group (median = 688.74 (interquartile range = 497.53) s) than in the control group (262.52 (25.87) s) (U = 6.00, P < .05). However, the time to reach sexual satiety was shorter in the estrogen-deprived (892.33 ± 647.71 s) rats compared to a control (3480.13 ± 670.10 s, t(11) = 7.047, P < .001). Coincidentally, the total number of ejaculations was fewer in the estrogen-deprived (1.25 ± 1.04) group than the control group (5.71± 1.60, t(13) = 6.495, P < .001).

Following introduction of the second female, the Coolidge effect occurred in both groups at the same rate. However, the proportion of rats displaying ejaculation with the novel female was higher in the control group (71.4%) than the estrogen-deprived group (12.5%) (χ^2(1) = 5.402, P < .05).

Overall, estrogen contributes to the regulation of the refractory period and to a lesser extent, the Coolidge effect. Our findings provide further evidence on the role of estrogen in male sexual refractory period, and that estrogen supplementation may potentially help maintain sexual activity in hormone-deprived males.

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Effects of Seneca Valley virus with clinically available chemotherapeutic drugs on 3D tumour-like cell cultures of BT549 triple negative breast cancer cells

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Triple negative breast cancer (TNBC) makes up approximately 15%–20% of all breast cancers. There is currently no targeted therapy against TNBC. Oncolytic virotherapy, the use of viruses to eliminate cancer cells, is a promising strategy for targeted cancer therapy. Seneca Valley virus (SVV), a novel oncolytic virus, shows high affinity for tumours and no affinity for healthy tissue. The cellular receptor responsible for this affinity is anthrax toxin receptor 1 (ANTXR1) also known as tumour endothelial marker 8 (TEM8). TEM8 is present in over 60% of human solid cancers including TNBC and absent in healthy tissue. Clinical trials of SVV as a monotherapy have proven the safety of the treatment but yielded inconclusive results of therapeutic efficacy.

This study explored combination therapies of SVV and three clinically approved drugs (Filgotinib, RAD001, and SAHA) on tumour-like 3D cell cultures (tumourspheres) of a TNBC cell line (BT549) that showed resistance to SVV in 2D attached culture. BT549 tumourspheres were grown and treated with SVV only and combinations of SVV with one of Filgotinib, RAD001, and SAHA. After five days, cell viability was measured using an ATP bioluminescence assay.

There was significant reduction in cell viability across all condition groups (SVV only, drug only and SVV-drug combinations) when compared to the control. A reduction in cell viability of 62.6% (±7.2%) was observed in the SVV only treated group. The most potent combination therapy was SVV with Filgotinib which yielded a reduction in cell viability of 74.9% (±1.6%).

The susceptibility of BT549 tumourspheres to SVV suggested by the data provides strong grounds for progression into testing of SVV on tumours in animal models. The efficacy of SVV-drug combination therapies showed promise but requires further investigation to distinguish whether the effects were a product of mechanistic SVV-drug symbiosis or simple cumulative effects of concurrent SVV and drug treatment.

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