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Are patients receiving recommended bone protection therapy after a non-hip fracture? A retrospective study of the Fracture Liaison Service at Counties Manukau District Health Board

Ruveena Kaur, Sunita Paul, Elizabeth Prasad, Brandon Orr-Walker

An estimated 1 in 3 women and 1 in 5 men will experience a fragility fracture in their lifetime. Once a fracture occurs, a patient's risk of subsequent fracture is increased, and bone protection medication may be recommended to reduce the risk. A fracture risk assessment is performed by the Fracture Liaison Service at Middlemore Hospital. However, due to a lack of funding, treatment implantation is left with the patient's general practitioner. 1 in 5 patients newly referred to the Fracture Liaison Service had a history of a previous fracture. Nearly one third of patients who were recommended bone protection therapy did not receive this in a timely manner. This highlights an important issue of resource limitation. Addressing this may prevent further fracture, potential disability and loss of income for the patient, as well as from an economic perspective, reducing the need for medical intervention and/or hospital admission should a further fracture occur.

Artificial intelligence improves adenoma detection rate during colonoscopy

Cameron Schauer, Michael Chieng, Michael Wang, Michelle Neave, Sarah Watson, Marius Van Rijnsoever, Russell Walmsley, Ali Jafer

This is the first study in New Zealand to use an artificial intelligence machine during colonoscopy to help with finding bowel polyps, which may develop into colon cancer. The machine processes images real time and superimposes a green box over suspected abnormalities on the screen. This resulted in a 59% relative, or 9% absolute increase in precancerous polyp detection compared to colonoscopy without using it.

Illness perceptions and diabetes self-care behaviours in Māori and New Zealand Europeans with type 2 diabetes mellitus: a cross-sectional study

Jordine Romana, Mikaela Law, Rinki Murphy, Eva Morunga, Elizabeth Broadbent

This study asked 85 Māori and 85 NZ European patients who were attending diabetes clinics about their illness. Māori patients had poorer diabetes-related health outcomes and less healthy behaviours than NZ Europeans. Across both cultures, greater perceptions that treatment could control diabetes were associated with better medication adherence. To help address these health inequities, culturally appropriate psychosocial interventions need to be developed.

An evaluation of a New Zealand "vape to quit smoking" programme

Kelly S Burrowes, Chloe Fuge, Tori Murray, Jonathan Amos, Suzanne Pitama, Lutz Beckert

We compared the use of smoking cessation aids across different ethnic groups and age groups within a large New Zealand cohort and assessed the uptake and effectiveness of e-cigarettes for smoking cessation via a "vape to quit" initiative. The final dataset analysed including 1,118 participants; 66.6% NZ European, 28.1% Māori, 3.1% Pacific, 2.2% Asian. The use of vaping products, predominantly nicotine-containing products, to support smoking cessation has increased rapidly over time. We followed up 100 participants who had used vaping to quit smoking and found that after six months 16% were smoke and vapefree, 31% were smokefree and vaping, 31% were smoking and not vaping, and 22% were smoking and vaping. Nicotine containing e-cigarettes are showing potential in smoking cessation programmes in support of the Smokefree Aotearoa 2025; however, 22% of those in the "vape to quit" programme became dual users.

Whakarongorau abdominal pain review

Matt Wright, Fiona Pienaar

A study that looked at abdominal pain calls to Healthline, with this being the most common symptom that people call about. It described the types of callers, where they live, what time they call and then the recommended outcome from the calls. It showed that the callers to Healthline are broadly similar to other parts of the New Zealand healthcare system, for instance general practice and emergency departments. It compared the response to other countries and showed that the outcomes are likely as good or better. Whakarongorau is the organisation that runs Healthline and will continue to use the data around clinician behaviour to improve the overall care, by decreasing variation in responses.

A service evaluation to explore Māori experiences of direct-acting antiviral hepatitis C treatment in Aotearoa New Zealand

Joanna Hikaka, Lavinia Perumal, Natalie Gauld, Marara Metekingi, Rachel Mackie, Jenny Richards, Karen Bartholomew

Hepatitis C is a virus which is spread by blood-to-blood contact and affects up to 50,000 New Zealanders. Left untreated, it can cause liver damage which can impact daily life, however there is now a new and effective medicine which can cure hepatitis C in almost all those that are treated. This study focused on Māori experiences of hepatitis C treatment to help ensure that services that are designed are safe and effective for Māori. Participants expressed that treatment had positive benefits on mental and physical health. Proactive health professionals that made real connections with people and provided wrap-around services were valued.

Epidemiology of carbapenem resistant *Acinetobacter baumannii* in New Zealand

Matthew R Blakiston, Mark B Schultz, Indira Basu, Susan A Ballard, Deborah Williamson, Sally Roberts

The multi-drug resistant bacteria *Acinetobacter baumannii* is an important cause of hospital associated infection globally. There is increasing identification of multi-drug resistant *Acinetobacter baumannii* in New Zealand. This has occurred in association with the spread of a single strain between hospitals in Fiji, Samoa, and New Zealand.

Audit of cervical excision depth of large loop excision of the transformation zone procedures at Counties Manukau District Health Board

Sita T Clark, Hilary R Barker, Luke R Bradshaw, Jyoti Kathuria, Charlotte Oyston

This is the first study to audit the outcomes of patients undergoing large loop excision of the transformation zone (LLETZ) procedures at Counties Manukau District Health Board (CMDHB), relative to established colposcopy guidelines and standards of care. Differences in the excision depths were identified relative to Public Health England's (PHE) established thresholds, with a large proportion of excisions being too shallow, particularly in patients with type 2 and type 3 transformation zones (TZ). These findings highlight the importance of considering the associated risks of LLETZ procedures in individual patients and the need to adapt the surgical approach and equipment used accordingly. Importantly, this study has also identified reduced rates of LLETZ procedures in Māori and Pasifika patients, emphasising the need for improved screening in these high-risk communities going forward. Finally, this study has highlighted the need to audit LLETZ procedures in other DHBs in New Zealand to identify issues and optimise the quality of care for CIN provided nationwide.

E-cigarette use patterns, brand preference and knowledge about vaping among teenagers (13–16 years) and parents of children attending Christchurch Hospital

Andreas Nicolaou, Amy Moore, Ben Wamamili, Tony Walls, Philip Pattemore

We conducted an anonymous online survey in the paediatric outpatient department at Christchurch Hospital from December 2021 to February 2022. The survey assessed e-cigarette use (vaping), brand preferences, and knowledge about vaping among teenagers aged 13-16 years and parents aged 17 years or older: 42 teenagers and 53 parents participated. Parents were more likely to vape at least once a month (15.1%) than teenagers (7.1%) and to vape in home or in car when other people were present. Teenagers vaped for curiosity and flavours and obtained vape products from sources other than vape shops.

Pākehā/Palangi positionality: disentangling power and paralysis

Andi Crawford, Fiona Langridge

This paper, written by two Pākehā/Palangi women working in Māori and Pasifika Health in Aotearoa, is a perspective on how tangata Tiriti health professionals and researchers must do better in our approach to improving health outcomes. Power is a key contributor to the perpetuation of colonisation and systemic racism in our health system. Paralysis immobilises us due to racism, apathy, guilt and fear of doing wrong. Positionality can move us out of paralysis by being conscious and open about our biases, perspectives, values, privileges, beliefs, superiority and identities. We suggest four practical tools of engagement (Learn, Reflect, Serve/Act, Disrupt) as approaches to dismantle power systems, overcome paralysis and recognise positionality.

Does the smokefree generation proposal go far enough?

Janet Hoek, Andrew Waa, Richard Edwards

The Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Bill currently progressing through Parliament will establish a smokefree generation (SFG) by ending the sale of smoked tobacco products to people born on or after 1 January 2009.[1–3] Creating a cohort that may never legally be sold tobacco extends protection provided by age restrictions and, alongside denicotinisation and greatly reduced tobacco availability, means that future generations have a realistic prospect of enjoying a truly smokefree future.[1,2]

The SFG challenges perceptions of smoking as a coming-of-age ritual, and signals that tobacco use is never safe.[2–4] The policy recognises the sustained threat to safety and wellbeing that tobacco poses, upholds young people's right to protection from a uniquely harmful product, and addresses historical anomalies that have allowed tobacco to be sold as though it were a normal consumer item.[2,5,6] More generally, age-appropriate restrictions regulate many activities that pose risks, such as drinking alcohol and driving; the SFG recognises that the risks smoking presents greatly outweigh any potential "benefits" at all ages.[7]

Introducing a SFG policy will frame smoking as socially unacceptable,[8] prevent sales to youth and young adult over time, and help ensure that smoking prevalence can never rise again.[2] Even if some initial leakage between those able to buy tobacco and those covered by the policy occurs, the SFG will still reduce smoking uptake among young people, and the increasing age gap between those able and not able to buy tobacco will decrease social supply over time.[2]

Importantly, the SFG does not make smoking itself illegal; it focusses on the sale of tobacco, not on the purchase or use of tobacco, and will not penalise young people (or any other people who smoke) for buying or using tobacco. No sections in the Bill prohibit smoking or tobacco use, or make either of these illegal.

The SFG will provide important new protections that benefit young people and shield them from tobacco companies' continuing efforts to recruit them. Formerly, secret industry documents reveal that tobacco companies referred to young people as "replacement smokers";[9] the consumer pipeline they require to replace those people their products kill. Policy makers responded to this cynical marketing by increasing age restrictions; for example, the US Tobacco 21 policy restricts tobacco sales to people aged 21 or over. However, age restriction measures may inadvertently suggest that, once young people reach a certain age, smoking poses fewer risks and may even be "safe" or "acceptable".[2,7] Furthermore, age restrictions may only delay the emergence of "replacement smokers" rather than shut down the pipeline altogether.

Recent evidence makes it clear that declines in smoking prevalence have not occurred evenly across all population groups. For example, 9.3% of 14 to 15-year-old Māori students reported regular (i.e., at least monthly) smoking in the 2021 Snapshot Survey conducted by Action on Smoking and Health NZ (ASH NZ) (c.f. 2.7% of NZ European students).[10] The most recent New Zealand Health Survey estimated current (i.e., at least monthly) smoking prevalence among 18 to 24-year-olds at 11.8%.[11] More detailed analyses of the 2019/2020 New Zealand Health Survey data reveal that, while overall smoking prevalence among young people aged 15–24 was 12.4%, among Māori it was 26.4%, and among non-Māori, 9.0%.[12] The SFG will address persistent inequities, help reduce smoking prevalence to less than five percent among *all* population groups, and enable adolescents to enjoy smokefree lives as young people and as they age.

By reframing tobacco as an abnormal and harmful product, the SFG policy explicitly rejects tobacco companies' specious claims that smoking is an "informed choice".[1,2,4,13,14] Instead, the policy recognises that smoking experimentation typically begins socially, often when young people are influenced by alcohol or peer pressure and do not understand that tobacco products are engineered to foster rapid addiction.[14] Virtually no one who experiments with smoking fully comprehends what living with addiction would be like; nor do they adequately appreciate the risks of life-long smoking, appropriately apply these risks to themselves, or accept the consequences.[14] The SFG rec-

ognises "informed choice" as a misnomer created and propagated by tobacco companies to deflect blame for the harms their products cause onto the people they have addicted.

While Aotearoa New Zealand would be the first country to introduce an SFG, it is not the first jurisdiction to introduce this measure. Brookline, Massachusetts, does not allow sales of tobacco products to anyone born after 1 January 2000, and the Khan review has recently proposed that the UK introduce a SFG policy.[15,16] Nor should being the first nation to introduce a policy be viewed as a limitation. Ten years ago, Australia was the first country to introduce plain packaging, a measure now implemented (or planned) by 23 other countries. Plain packaging is now recognised as having accelerated declines in tobacco consumption;[17] furthermore, three cases taken by tobacco companies seeking to overturn the legislation have met with comprehensive defeats.[18] In addition to industry opposition, which typically indicates a measure's likely effectiveness, we have good evidence about the benefits an SFG policy will bring. For example, an Aotearoa New Zealand study estimated that a SFG policy could halve smoking prevalence within 14 years among people aged 45 and under, and bring 5.6 times the health gain per capita to Māori relative to non-Māori.[19]

In short, the SFG will protect young people's ability to lead free and fulfilling lives. The high regret among people who smoke, many of whom have made multiple quit attempts,[20] suggests preventing smoking uptake among rangatahi will promote, not diminish, autonomy. Nor do arguments the SFG compromises freedoms carry any weight. Having refined tobacco products to ensure maximum addictiveness,[21] tobacco companies opposing the SFG face an unresolvable logical problem: they cannot continue to create highly addictive products that compromise freedom and yet, at the same time, argue that "freedom" demands access to these products.

The theory, logic and evidence supporting the SFG are robust, while opposition to it is typically self-interested, compromised and flawed. *Yet, should we be content with a smokefree generation?* Evidence of rising vaping among young people suggests an opportunity to go further and consider a nicotine free generation.[10,22] This measure would align more closely with the original Tupeka Kore vision (of a tobacco free society) and could ensure inequities in smoking prevalence addressed by the SFG are not simply replaced by inequities in vaping prevalence, which current data indicate already exist.[10,22] Both Malaysia and Denmark have announced plans to disallow sales of tobacco *and* nicotine products to anyone born after 2005 and 2010, respectively.[23,24] As the Bill wends its way through Parliament, it is surely time to ask whether the SFG provides sufficiently comprehensive protection to rangatahi.

While vaping products may have a role to play as harm reduced alternatives to smoked tobacco when denicotinisation occurs and tobacco becomes less easily available, their uptake among young people, many of whom had not previously smoked,[25] questions the effectiveness of existing regulations. An NFG policy would not remove vaping products from the market but could protect young people where current approaches have not. It is time to begin this discussion.

COMPETING INTERESTS
Nil.

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The present healthcare crises and the delusion of looking for an answer to this in the restructuring of the health system

Frank Frizelle

The New Zealand primary and secondary health sectors are struggling to provide an adequate service and meet demand. There is a daily diet of media stories concerning patients, nurses and doctors all frustrated with issues of access and delivery, and with delays and breakdowns at every step. There are delays in assessing family doctors; delays in access to secondary care; delays with access to tests (e.g., radiology and colonoscopy); as well delays in access to elective and cancer surgery. Over the last few months, most large public hospitals have had to put a pause on seeing follow-up patients and patients for non-urgent first assessments, and they have also had to defer elective non urgent surgery. Those of us fortunate enough to be able to work in the delivery of care witness this struggle on daily basis. The media-inspired declarations from the leadership of Te Whatu Ora – Health New Zealand, such as the recent one stating that all patients on waiting lists should be given a date, show just how far away from the reality of service delivery senior management in the healthcare system really are.

This evolving "second COVID disaster" is happening on at a critical moment of change in the New Zealand health sector, with the birth of Te Whatu Ora – Health New Zealand and Te Aka Whai Ora – Māori Health Authority into this turbulent environment, and with Manatū Hauora – the Ministry of Health's refocusing on policy and strategy.

This new system aims to separate the functions of Manatū Hauora – the Ministry of Health from Te Whatu Ora – Health New Zealand. Te Whatu Ora – Health New Zealand will take over the planning and commissioning of services, and the functions of the previous district health boards (DHBs),[1] while Manatū Hauora – the Ministry of Health will be focused on policy, strategy and regulation.[2] Te Aka Whai Ora – Māori Health Authority has been newly created to work alongside Te Whatu Ora – Health New Zealand to help achieve equitable health outcomes for Māori.[3]

I have worked in the public health sector for almost 40 years so this is not the first, or even the second, time that I have seen the deck chairs reorganised, with aspirational goals that seemed relevant to the cultural, societal and political values at the time. Prior to the recently deceased DHB system had three predecessors: the Area Health Boards (1983–1989), the Regional Health Authorities and Crown Health Enterprises (1993–1997), and the Health Funding Authority (HFA) and Hospital and Health Services (1998–2001). The neoliberal polices of the day meant that the governments of 1984–1993, then led by Labour and subsequently National, introduced major changes designed to get area health boards (later Crown Health Enterprises (CHEs)) to compete and respond to market forces. Many of these introduced polices lasted only a short time—such as charging $50 per night while in a public hospital—and others are still with us—such as prescription charges. DHBs were born on 1 January 2001, and deceased on 30 June 2022. They were responsible for healthcare in their geographical region, and were aimed to provide services in keeping with the needs and values of their region. Each of these major restructurings of the health system, aimed to improve the health of New Zealanders with the views and values of their time. However, now in the rear-view mirror they look very naïve, both in regard to their goals and in how they expected to achieve them, which was very much influenced by the public and political beliefs of their era.

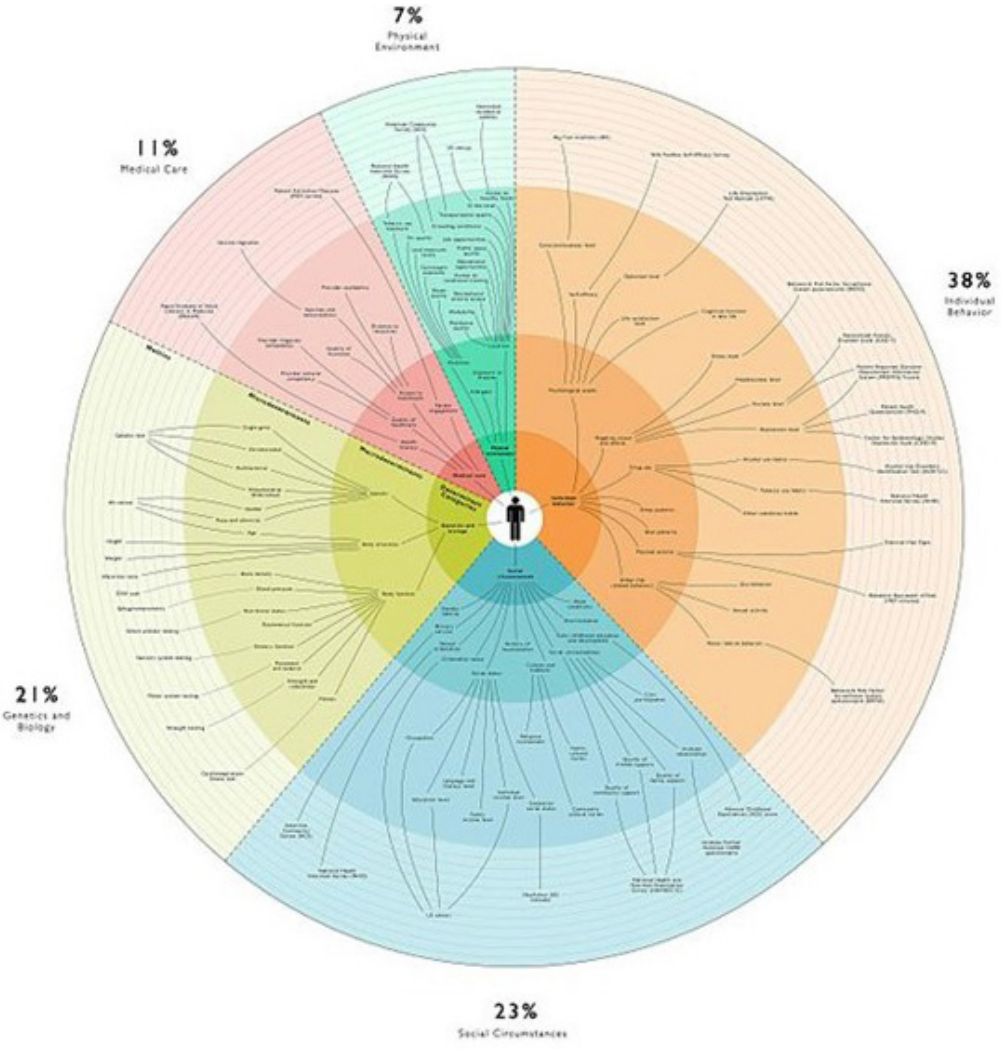
The present changes with the creation of Te Whatu Ora – Health New Zealand involve a plan to centralise New Zealand's healthcare system, and end what has been characterised as a "*postcode lottery*" of care.[1] The in parallel, Te Aka Whai Ora – Māori Health Authority aims to ensure that Māori receive equitable healthcare. Healthcare equity has been accepted as an important goal for this new system.[3]

Healthcare equity is an important and very laudable goal for the restructured health system.

The *NZMJ* has published many studies demonstrating the damaging impact of inequities of outcomes in healthcare, and various interventions. It is important to remember that the determinants of health are only minimally affected by the delivery of clinical care, and to achieve equity of health outcomes a broader view of health is required, especially addressing the socio-economic factors and the health behaviours of the population (e.g., smoking, obesity, alcohol etc.),[4] as this is where the greatest gains are achieved despite the unpopularly of many such measures (see Figure 1[5]). These are the issues that the broader government policies and the refocused Manatū Hauora – Ministry of Health need to deal with. However, this will not immediately help the present crisis; it may in fact make it worse in the short term by diverting attention and resources from the immediate issues.

The current reorganisation is not directly responsible for the mess that the heath system is in at present. The influence and impacts of COVID-19 can be seen in how many countries where healthcare systems are struggling with delivery—what has been called the "second COVID disaster". While healthcare is complex and adaptive, with performance and behaviours changing over time, one cannot completely understand or predict how it will perform in regards to any change by merely looking at the individual parts.[6] The lack of adequate planning for the inevitable increased clinical demand in the COVID-19 recovery period is disappointing. The various declarations coming out of Te Whatu Ora – Health New Zealand have clearly shown their detachment from realities in healthcare currently, and that suggests a lack of understanding of the present barriers to healthcare delivery experienced by clinical staff, and also reduces confidence in this new leadership of the health sector.

Figure 1: The determinants of social health.



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Are patients receiving recommended bone protection therapy after a non-hip fracture? A retrospective study of the Fracture Liaison Service at Counties Manukau District Health Board

Ruveena Kaur, Sunita Paul, Elizabeth Prasad, Brandon Orr-Walker

ABSTRACT

AIM: To review the Fracture Liaison Service (FLS) recommendations for bone protection therapy and assess treatment implementation in the community.

METHOD: All patients screened from 1 January to 31 March 2019 at Counties Manukau District Health Board were evaluated. Exclusion criteria included death within six months following sentinel fracture, and hip fractures, which are studied elsewhere.

Patient risk factors assessed included age, gender, type of fracture, history of previous fracture, and dual X-ray absorptiometry scan results if performed. If bone protection therapy was recommended, electronic dispensing records were utilised as a proxy for treatment initiation.

RESULTS: One hundred and sixty-nine of the 238 patients referred were included. Thirty-seven patients had evidence of a previous fragility fracture, with thirteen patients not on bone protection treatment following their prior fracture.

Of the 99 patients in the study recommended bone protection therapy, 31.3% (n=31) did not have this dispensed at six months following written FLS assessment. Three of thirteen patients with a previous fragility fracture and not on bone protection treatment, still did not have this dispensed at six months.

CONCLUSION: A high proportion of patients recommended bone protection therapy did not receive this in a timely manner, including patients with a history of repeated fracture.

Fragility fracture due to underlying osteoporosis is a leading cause of morbidity and mortality in our ageing population. An estimated one in three women, and one in five men, will experience a fragility fracture in their lifetime.[1] Bone mass and quality reduces from age thirty onwards, with a period of rapid decline in post-menopausal women as oestrogen is depleted, prior to returning to initial rates.[2] Non-modifiable risk factors for fragility fracture include increasing age, female gender, early menopause, previous fragility fracture, and family history of fracture. Modifiable risk factors include low body weight, cigarette smoking, excess alcohol and sustained glucocorticoid use.[3]

The purpose of a fracture liaison service (FLS) is to identify patients with a fracture, assess for osteoporosis, commence secondary prevention therapy, and if applicable, referral to a falls prevention program.[4,5] A metanalyses demonstrated a doubling of one's future risk of fracture upon initial fracture.[6] FLS is a cost-effective, if not cost-saving, intervention at reducing risk of re-fracture, and is associated with a 3% absolute risk reduction in mortality compared to non-FLS controls (20% relative risk reduction in mortality).[7]

In 2015, the FLS at Counties Manukau District Health Board (CMDHB) was formed.[8] This service currently comprises two geriatricians (one of whom is the FLS lead clinician), one endocrinologist, a service manager, and an FLS coordinator. Referrals are received for patients with a fracture aged 50 and above, from the emergency department, inpatient nursing hand overs, fracture clinics, and radiology.

At CMDHB, the FLS assesses a patient's mechanism of fracture, their risk factors, and may request a bone density scan to evaluate osteoporosis risk. If treatment is recommended, bisphosphonates are the first option, and are available in either oral or intravenous formulations. Where feasible, CMDHB aims to administer zoledronate during the inpatient hospital admission. Teriparatide and denosumab can be applied for via special authority, with the

former for interval fracture despite bisphosphonate treatment, and latter reserved for those with severe renal impairment contraindicating zoledronate use. All funded osteoporosis treatments, including those that require special authority, can be prescribed by any vocationally registered medical practitioner. The FLS assessment and treatment recommendation letter is posted to the patient and a copy sent to the general practitioner (GP). The prescription of bone protection medication is left with the GP and CMDHB currently does not have the capacity to administer zoledronate in an outpatient setting. The patient is generally not reviewed by a physician face-to-face, although recommendations may include for him/her to be seen by a specialist clinic.

This retrospective study aims to assess if osteoporosis treatment recommendation is implemented in the community. We aim for 90% of patients who are recommended pharmacological treatment to have this initiated, which is the gold standard set by the International Osteoporosis Foundation.[9]

Method

All patients referred for FLS assessment at Middlemore Hospital in Auckland, between 1 January 2019 and 31 March 2019, were reviewed. Patients were excluded if they died within 6 months of fracture or if the type of fracture was a hip fracture. Hip fracture outcomes are well documented in the Australia and New Zealand Hip Fracture Registry (ANZHFR), with this group of patients having a distinct focus addressing osteoporosis treatment.[11] Ethics approval was obtained from the Research Office at CMDHB.

Patient information collected included age, gender, ethnicity, and height and weight to calculate the body mass index (BMI). Clinical notes were reviewed regarding the patient's medical history, particularly a history of rheumatoid arthritis and/or other conditions suggestive of secondary osteoporosis. Glucocorticoid use, a history of previous fracture, smoking status, alcohol consumption and parental history of hip fracture, were all noted. If a patient had dual X-ray absorptiometry scan (DXA) performed the bone mineral density (BMD) at the femoral neck was noted, and together with the above variables, was used to complete the Fracture Risk Assessment Tool (FRAX) calculation.[12] Fracture prevention treatment is indicated if the 10-year risk of fracture at the hip is ≥3% or ≥20% risk of a major osteoporotic fracture.[12] Other information collected included the type of fracture, if bone protection therapy had been previously dispensed, and renal function. Clinic letters and discharge summaries were assessed if bone protection therapy was recommended or alternatively administered during an inpatient stay. All electronic dispensing data available within six months of FLS communication was reviewed as a surrogate of commencing treatment. Six months following FLS written recommendation was used as the end date for first prescription, as 50% of re-fractures occur in the first 6–8 months following initial fracture.[10]

Existing practice is for all patients who had a DXA performed to have an individualised letter outlining management recommendations. Where a DXA was deemed unnecessary because a patient had clinical features of osteoporosis (e.g., minimal trauma fracture in an elderly patient) or if they had a recent DXA demonstrating osteoporosis, generic advice to commence bone protection therapy would be completed.

The FLS coordinator aims to telephone all patients within six months of initial fracture. The purpose of this includes answering patient queries regarding osteoporosis and its management, assess if bone protection therapy was recommended, when it was commenced, and encourage adherence. If treatment recommendations were not instituted by their primary care provider, an additional telephone call is made to their GP.

Statistical analysis was performed by calculating mean and standard deviation for normally distributed data, and median and interquartile ranges otherwise. Comparisons were made by two-sampled T-tests, Chi-squared and Fisher's exact tests to assess for significance, defined as $p<0.05$.

Results

Two hundred and thirty-eight patients were reviewed by the FLS during this three-month study. Of these, 38 patients with a hip fracture were excluded. Of the remaining 200 patients, 31 were excluded due to 18 deaths (eight died during their hospital admission for fracture), nine were non-contactable, three declined FLS review, and one patient had two National Health Index (NHI) numbers, so was only included once). The final study consisted of 169 patients.

The mean age was 73.9 ± 11.3 years (range 50–99), with the majority being female (78.1%). Sixty-four point seven percent of patients identified as European (n=110), 15 identified as Pasifika, and 11 identified as Māori.

Vertebral fracture was the most common fragility fracture occurring in 36.1% of patients. The

next most common fractures were of the forearm (22.5%), lower limb (19.5%), humerus (8.9%) and pelvis (5.2%). Three patients had multiple fractures. Ten patients had their fracture classified as "other", including seven with a rib fracture, one with a clavicle fracture, and two patients with bisphosphonate related atypical femoral fractures.

One hundred and sixty-four of the patients referred had a height and weight recorded to calculate BMI, which ranged from 14.2–43.8kg/m^2. Four of the five patients who were underweight (BMI <18.5kg/m^2) were recommended bisphosphonate therapy. Bone protection therapy was recommended in 75.9% of patients with a normal BMI (18.5–25 kg/m^2), in 52.2% of those overweight (25.1–30kg/m^2), and in 44% of those with obesity (BMI >30kg/m^2).

Of the 127 patients who had DXA performed, average T score of the hip was -1.4 (±1.1SD) and at the spine was -0.97 (±1.6 SD). Fifty-two of the 127 patients referred for DXA were recommended osteoporosis prevention therapy. A 10-year FRAX score of the hip was reported in 51.2% (n=88) of patients, and 10.5% (n=18) also had their 10-year risk of major osteoporotic fracture reported.

Of the 169 patients, 21.9% (n=37) had a previous fragility fracture, with 13 not on any bone protection treatment following the sentinel fracture. Nine of these 13 patients who were not on therapy after a prior fracture had previously been reviewed by the CMDHB FLS. Of this, three had a previous neck of femur fracture (one patient received a single zoledronate infusion five years prior to their current fracture, without receiving further infusions as recommended), two patients had a previous wrist fracture, and four had a previous vertebral fracture. Of those already on treatment following a prior fracture, 13 were on oral bisphosphonates, nine had received zoledronate within 18 months of current fracture and two patients were on a drug holiday from bisphosphonate therapy.

Ninety-nine of the 169 patients were subsequently found to have osteoporosis (osteoporosis defined as a BMD score ≤2.5 standard deviations compared to a young adult mean of the same gender, or alternatively an elevated risk of fracture according to the FRAX algorithm[12]), and all were recommended pharmacological bone protection therapy. Of this, 89 were recommended bisphosphonate therapy, eight were recommended Teriparatide and two were recommended denosumab. All 10 patients who were recommended either teriparatide or denosumab had previously been on bisphosphonate therapy (majority in the form of alendronate, three had zoledronate intravenously). Two of the patients recommended teriparatide had atypical femoral fractures thought to be bisphosphonate related.

Of the 89 patients recommended a bisphosphonate, 31 patients (34.8%) did not have this dispensed at six months. Thirty of the 31 patients had acceptable renal function for intravenous bisphosphonate therapy if this was preferred. One patient with an incidentally detected vertebral fracture and no prior fracture history, was recommended bisphosphonate therapy, but had declining renal function that prohibited its use. Two patients were known to the palliative care service at time of their index fracture but were still alive six months following. Of the 31 patients who did not have their recommended bisphosphonate therapy prescribed, 13 had an earlier fragility fracture prior to the index fracture in this study, including three patients who were being assessed by the FLS service for the second time, and had been recommended treatment twice now. All patients who were recommended teriparatide or denosumab had this dispensed. Of the patients who received osteoporosis prevention medications, 55 of the 68 did so within a three-month period of FLS assessment.

A sub-analysis of the 99 patients recommended bone protection therapy was carried out comparing those who received this within six months of FLS communication to those who did not. Their baseline demographics showed no significant difference in age, gender, or ethnicity; nor was there a statistically significant difference between the two groups in terms of BMI, type of fracture, or previous fracture.

Discussion

The patients in this study were predominantly female and of NZ European ethnicity, which is the lead demographic population reviewed by other FLS centres nationally, as well as in the ANZHFR registry.[11,13] In this study, 14% of patients identified as Māori or Pasifika; in the same year 4.4% of those in the ANZHFR 2020 registry identified as Māori/Pasifika in New Zealand.[11] The increased prevalence of Pasifika patients in this cohort may reflect the demographics of the South Auckland population.

FLS assessment involves reviewing a patient's risk of future fracture, and in some patients a DXA is required to stratify risk. In this study, 127 patients were referred for updated DXA assessment, with 52 recommended osteoporosis prevention therapy. While low weight is a known risk

Table 1: Baseline patient characteristics in those recommended bone protection therapy according to medication dispensing status.

	Yes (n=68)	No (n=31)	Total (n=99)	P-value
Age; mean (SD)	77.7 (9.2)	78.6 (10.0)	78.0 (9.4)	0.66
Gender				
Female	57 (67.1%)	28 (32.9%)	85 (85.9%)	0.58
Male	11 (78.6%)	3 (21.4%)	14 (14.1%)	
Ethnicity				
European/NZE	48 (70.6%)	20 (30.3%)	68 (68.7%)	0.46*
Māori	4 (100%)	0 (0%)	4 (4.1%)	
Pacific	5 (71.4%)	2 (28.6%)	7 (7.2%)	
Asian	10 (55.6%)	8 (44.4%)	18 (18.6%)	
Other	1 (50%)	1 (50%)	2 (2.1%)	
BMI; mean (SD)	25.5 (4.6)	25.4 (5.5)	25.5 (4.9)	0.93
Type of fracture				
Vertebral	30 (68.2%)	14 (31.8%)	44 (44.4%)	0.21*
Lower limb	15 (83.3%)	3 (16.7%)	18 (18.2%)	
Forearm	8 (44.4%)	10 (55.6%)	18 (18.2%)	
Humerus	6 (75%)	2 (25%)	8 (8.1%)	
Pelvis	5 (100%)	0 (0%)	5 (5.1%)	
Other	3 (75%)	1 (25%)	4 (4%)	
Multiple sites	1 (50%)	1 (50%)	2 (2%)	
Previous fragility fracture				
Yes	25 (67.6%)	12 (32.4%)	37 (37.4%)	0.71*
No	40 (67.8%)	19 (32.2%)	59 (59.6%)	
Unknown	3 (100%)	0 (0%)	3 (3%)	

Chi-squared test or fisher exact test used (*), two sample t-test used for means.

factor for osteoporosis, a significant proportion of the overweight and obese patients had osteoporosis, at 52.5% and 44%, respectively, highlighting one cannot assume weight to be a protective factor in patients with a non-hip fracture.[14]

FRAX scores are used to characterise osteoporosis risk. This study found under-reporting of FRAX scores in the written correspondence (10-year FRAX score of the hip reported in only 51.2% of patients). This has been highlighted within the department and reporting of risk scores are encouraged to improve visibility of future fracture risk.

This study found one in five patients with a current fracture, had already experienced a previous fracture (n=37; 21.9%). Thirteen of these patients were not on bone protection treatment, despite nine of them having been reviewed and recommended bisphosphonate therapy from the CMDHB FLS following a prior fracture. This highlights a chasm between FLS recommendation and implementation in the community, with the current fragility fracture being a potentially preventable one. The cost of this is not insignificant when considering the patient's physical pain, disability/impairment to their activities of daily living, additional time off work, reduced quality of life, and the strain placed on dependent family members. A repeat fracture also comes at a financial cost to the DHB in terms of further hospital admission, treatment for the current fracture, and ongoing follow-up[15]. Unfortunately, this whole process has been repeated twice now for three patients in this study, whom after two virtual reviews by the CMDHB FLS, for two different fractures, still did not have their bone protection therapy dispensed at six months following their most recent FLS written recommendations.

The subgroup of patients recommended bone protection therapy was reviewed to better understand the care gap observed between treatment recommendation and initiation. With the exclusion of the two palliative patients who might have a reasonable explanation for lack of medication uptake and the single patient with deteriorating renal function limiting bisphosphonate treatment, only 71.6% of patients recommended pharmacological prevention therapy received this at the six-month follow-up. This is below the 90% target of those recommended treatment receiving this.[9] There was no statistically significant difference between those who did and did not have treatment dispensed based on gender, age, ethnicity, type of fracture, or previous fracture (Table 1). A key difference however was only those recommended bisphosphonate therapy had poor uptake. The current special-authority restrictions on denosumab prescription limits available options for those with first presentation fracture and reduced renal function, as affected 1 patient in this study.[16] On closer review, the patients who were prescribed teriparatide (n=8) or denosumab (n=2) had been on bisphosphonate therapy for a previous fracture. This signified a higher risk group and may explain the increased treatment uptake, as patients and clinicians may be more motivated (i.e., a form of treatment bias).

The lack of a specific patient-related factor for poor treatment uptake suggests the intervention implemented needs to be a global one. Ganda et al. proposed four ways of classifying FLS programs.[17] The CMDHB program is classified as Type B, where assessment and advice are provided by FLS, but the prescribing and treatment implementation is carried out by the primary care provider.[16] A Type A program would perform the whole process including prescription, but this would require additional costs for the DHB such as physician time to discuss recommendations with the patient, administrative support staff, and a physical clinic space.

The CMDHB FLS program was compared with its two neighbouring DHBs in the Auckland Region. At Auckland DHB, the FLS nurse reviews inpatients with fractures and compiles a list of patients with vertebral fracture from an electronic search of computerised tomography (CT) reports. If a specialist review is required, the patient has a DXA scan, endocrinologist assessment, and can have zoledronate administered on the same day, as a "one stop shop". At Waitematā DHB (WDHB), DXA is outsourced, and the virtual FLS assessment and treatment recommendation is sent via written communication to both patient and GP. If zoledronate is indicated, WDHB recommends this be administered in the GP setting, but does have the capacity to administer it at their outpatient day stay. On reviewing the FLS programs delivered within the greater Auckland Region compared to the funding received for the CMDHB FLS program, aiming for a Type A program is currently too costly to implement. The DHBs in New Zealand are also in the process of national restructuring and this may lead to further changes in FLS delivery. The most realistic intervention at present relies on one that assimilates into the current Type B program.

As a result of this study, a review of the FLS process at Middlemore was undertaken amongst all

members of the service. The agreed intervention was to bring forward the current follow-up phone call from the FLS coordinator to patients, from within six months to within a 16-week period, following fracture. This time frame was agreed based on most patients who filled in prescriptions, did so within the first three months of fracture (80.1%). This may improve motivation and uptake of preventive therapy as the effect of fracture are more recent and potentially more memorable. Earlier contact with the patient would allow queries regarding osteoporosis and its treatment to be answered, alongside the reminder phone call to the patient's GP to occur. The CMDHB FLS team have since recruited a second FLS coordinator to help manage the anticipated increased workload from implementing this intervention.

Limitations of this study include reliance on electronic medication dispensing records as a surrogate for prescription. In reality, other factors could play a role, including the patient not wanting to take medication (e.g., not understanding the secondary prevention role, concern of side effects, etc.) or simply not filling in a script that was provided. Reviewing the patient's socio-economic status and/or highest education attainment may help in understanding these factors; however, we did not have this level of detail available for all patients. Another limitation of this study was that hip fractures were excluded. We specifically wanted to assess non-hip fractures as this is the "second tier" in the Osteoporosis New Zealand Strategic Plan, but by doing so we have excluded a major osteoporotic fracture type[1]. The final limitation is that referral to a falls prevention clinic, a key part of FLS recommendations, was not audited.

In conclusion, pharmacological therapy to prevent further fracture was below the international gold standard guidelines for non-hip fracture patients at CMDHB. An early follow-up call from the FLS coordinator to the patient within 16 weeks of FLS written recommendation has been implemented. Within the department, reporting FRAX scores in all written communication sent to patients and their primary care providers has been recommended, which may lead to improved understanding of the concept of "fracture begets fracture", in this high-risk cohort. A repeat audit performed at a later stage to assess the success of the intervention is recommended.

COMPETING INTERESTS
Nil.

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Artificial intelligence improves adenoma detection rate during colonoscopy

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ABSTRACT

BACKGROUND: Artificial intelligence-assisted colonoscopy (AIAC) has gained attention as a tool to assist with polyp detection during colonoscopy. Uncertainty remains as to the clinical benefit, given limited publications using different modules.

METHOD: A single-centre retrospective study was performed at Waitematā Endoscopy, a private endoscopy centre in Auckland, New Zealand. An Olympus Endo-AID module was utilised for the first time by 13 experienced endoscopists. Outcomes from AIAC between 10 March 2021 to 23 April 2021 were compared to a subsequent non-AI conventional colonoscopy (CC) control group from 27/4/21 to 20/6/21.

RESULTS: A total of 213 AIACs were compared with 213 CCs. Baseline patient age, gender, indication for procedure, bowel preparation scores and specialty of proceduralist (gastroenterologist or surgeon) were well matched ($p>0.05$). The withdrawal time was significantly longer in the AIAC group compared to CC controls (15 vs 13 minutes; $p<0.001$). The adenoma detection rate (ADR) was significantly higher in the AIAC group compared to CC group (47.9% vs 38.5%; odds ratio 1.59; 95% CI [1.05–2.41]; $p=0.03$). The overall polyp detection rate (PDR) was similar between groups (70% vs 70%; $p=0.79$). Analysis by polyp size, location and other histology was not significant between groups.

CONCLUSION: AI-assisted colonoscopy significantly improved ADR compared with conventional colonoscopy. Further research is required to understand its utility and impact on long-term clinical outcomes.

In New Zealand and internationally, demand for colonoscopy has steadily increased over recent years.[1] A national bowel screening programme was introduced in 2018, and there has been significant expansion in studies performed for symptomatic indications.[1,2] This growing demand has placed pressure on providers to improve the scale and quality of these services, whilst maximising efficiency. Innovations which improve these metrics are therefore desired, considering the high local incidence of colorectal cancer (CRC).[3]

Computer-aided polyp detection tools (CADe) utilising artificial intelligence (AI) and deep-learning software have come to attention in recent years with several trials showing promise.[4,5] The primary role of these tools is the automated detection of polyps, indicating the presence and location of lesions in real time.[6] By drawing the endoscopist's attention to AI-recognised polyps, the software provides visual support and an additional mechanism that may help reduce the frequency of overlooked polyps. CADe software may also improve consistency and procedural efficiency across different colonoscopy providers, as it operates independently of endoscopists' experience level.[7]

The adenoma detection rate (ADR) is a key quality indicator in colonoscopy as it is inversely related to the incidence of post-colonoscopy interval CRC and CRC-related mortality.[8,9] Approximately 85% of interval cancers are thought to develop because of previously missed adenomas or incomplete polyp resection.[10] When comparing conventional colonoscopy (CC) with artificial intelligence-assisted colonoscopy (AIAC), seven randomised trials have been conducted to date with an overall suggestion of increased ADR.[11–17] To this end, AIAC has already been adopted into international guidelines.[18] Only one abstract from a single user has been published using the Olympus Endo-AID module,[19] which gained regulatory approval in Europe in 2020. No studies have been published from New Zealand, with few studies of AI utilisation in healthcare at all.[20] Due to the novelty of the technology, limited publications and short research periods clinical equipoise remains. We sought to study AIAC using Endo-AID to provide further perspective of this.

Method

A single-centre retrospective study was performed at Waitematā Endoscopy, a private endoscopy centre in Auckland. The Endo-AID (Olympus Corporation) module was introduced and utilised

for the first time by 13 experienced consultant endoscopists (four surgeons, nine gastroenterologists). These endoscopists with at least five years of independent endoscopy experience each perform at minimum 300 colonoscopies per year, with an average caecal intubation rate of 99.2%, polyp detection rate (PDR) of 73% and ADR of 42% over the preceding two years (2019 and 2020).[21]

The Endo-AID module is designed to process colonoscopy images in real time and superimpose a green box over suspected polyps on the endoscopy display (see Figure 1). Detection Type A preset (sensitive) was used.

The primary endpoint for assessment was the ADR (proportion of patients who had one or more adenomas resected) for consecutive patients attending over a six-week period between 10 March 2021 to 23 April 2021, compared to procedures without its use (control group) from 27 April 2021 to 20 June 2021. The secondary outcomes included polyp detection rate (PDR, proportion of patients who had one or more polyp of any histology removed), sessile serrated lesion detection rate (SSLDR, proportion of patients who had one or more SSL removed), assessment of differences in size, location and morphology. Total withdrawal time from caecum to completion of procedure and caecal intubation rate were compared.

All consecutive patients were included and only those with a history of previous colorectal resection were excluded. Patients were classified as having their procedure for surveillance (i.e., colonoscopy performed to further evaluate an asymptomatic patient with a previous history of polyps or increased risk of colorectal cancer) or symptoms (i.e., colonoscopy performed to investigate intestinal symptoms or signs). No screening patients were included in this study.

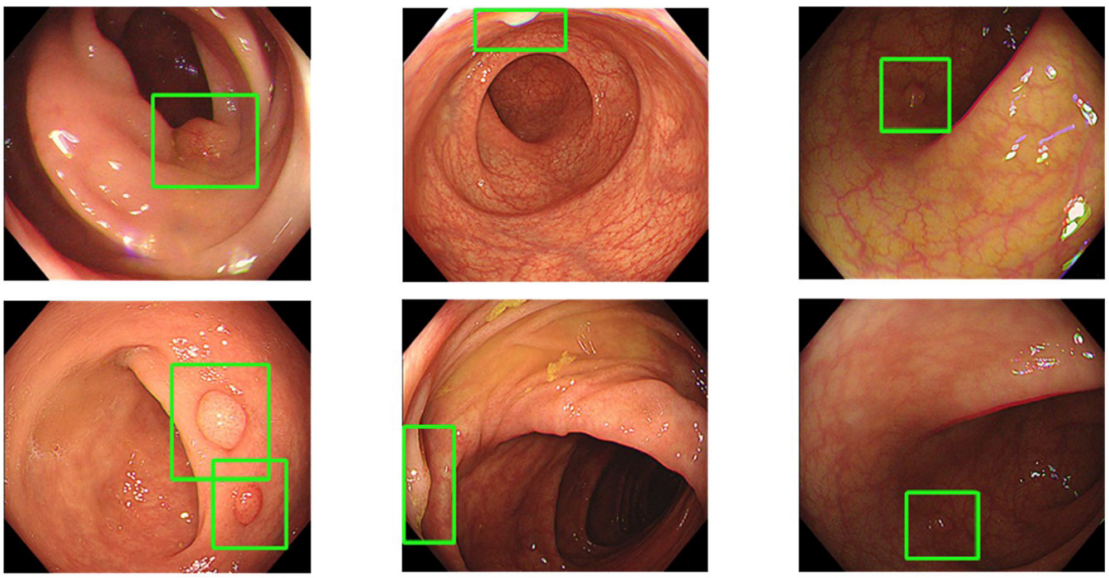
Endoscopists were able to toggle AI on-and-off at their discretion. Additional use of techniques to enhance polyp detection such as use of a distal cap, narrow band imaging, chemical chromoendoscopy, or anti-spasmodics remained at users' discretion.

All patients used split bowel preparation. Bowel preparation was evaluated and graded by the endoscopist performing the exam using the Boston Bowel Preparation Scale (BBPS).[22] All colonoscopies were performed using conscious sedation only (combination fentanyl and midazolam). Withdrawal time was measured by nursing staff from the time of caecal intubation to removal of the colonoscope from the colon. Polyps were classified by endoscopist estimation of size, location and morphology (polypoidal: Paris 0-Ip or non-polypoidal: Paris 0-IIa, Paris 0-IIb, Paris 0-Is).[23] Location was considered proximal if proximal to the splenic flexure. Final decision for polyp resection was at the discretion of the endoscopist.

All procedures were completed in the same endoscopy room with the same equipment, including high definition colonoscopes (HQ 190 with EVIS X1 video column; Olympus, Tokyo, Japan). Histopathology was assessed using standard methods at a single laboratory.

No funding was received. The Endo-AID equipment from Olympus was loaned free of charge. Standard written consent was gained from all patients prior to colonoscopy.

Figure 1: Endo-AID module with green boxes highlighting potential lesions.



Statistics

Sample size calculations for per patient multivariate logistic regression were conducted using the detection rate of tubular adenoma use as the primary outcome, and showed that a minimum of 150 patients were required for a model incorporating up to six predictor variables, with the adverse event rate being estimated to be approximately 40%, and the number of events per variable (EPV) value being 10.[24]

Statistical analysis was performed using IBM SPSS Statistics version 26.0 (New York, USA). Univariate comparisons of baseline parameters were conducted using the unpaired t-test, where normal distribution had been confirmed by the Kolmogorov–Smirnov test (p>0.05).

Non-normally distributed data were analysed using the Mann–Whitney U test, and categorical data using the Chi-squared or Fisher's exact test. Per patient multivariate logistic regression of detection rate by intervention group was performed with adjustment for confounding variables including age, sex, interventionist, colonoscopy indication, and the Boston Bowel Preparation Scale. All tests were two-tailed, and p<0.05 was considered statistically significant.

Results

A total of 213 consecutive AIACs were compared with 213 CCs (control arm). The mean age of patients was 56 years old in both cohorts, with 48% male (see Table 1). Indication for procedure, bowel preparation scores and performing specialist (gastroenterologist or surgeon) were well matched (p>0.05). The withdrawal time was longer in the AIAC group compared to controls (15 vs 13 minutes; p<0.001). Caecal intubation was achieved in all cases. No complications were reported for any of the procedures.

The adenoma detection rate (ADR) was significantly higher in the AIAC group compared to CC group (47.9% vs 38.5%; odds ratio (OR) 1.59; 95% confidence interval (CI) [1.05–2.41]; p=0.03). The polyp detection rates (PDR) were no different between groups (70% vs 70%; p=0.79). Sessile serrated lesion detection was also similar (20% vs 24%; p=0.56). Further analysis by polyp size, location, other histological features and morphology did not reveal any significant difference between the two groups (see Table 2).

Discussion

We demonstrate that the addition of Endo-AID artificial intelligence-assisted colonoscopy resulted in a 59% relative increase (9.4% absolute increase) in ADR compared to conventional colonoscopy. ADR is an established performance indicator in colonoscopy, validated as a predictor of cancer occurring after colonoscopy.[25] It is estimated that for every 1% increase in ADR, a patient's risk

Table 1: Characteristics of patients by intervention group. Data are presented as mean ± SD, median (IQR), or number of participants (% of participants).

Parameter	AIAC group (n=213)	Control group (n=213)	p-value
Age (years)	56 ±15	56±16	0.60
Male sex	103 (48.4%)	103 (48.4%)	>0.99
Interventionist			
Gastroenterologist	154 (72.3%)	169 (79.3%)	0.11
Surgeon	59 (27.7%)	44 (20.7%)	
Indication for colonoscopy			
Symptoms	122 (57.3%)	104 (48.8%)	0.19
Surveillance	79 (37.1%)	92 (43.2%)	
Symptoms and surveillance	12 (5.6%)	17 (8.0%)	
Boston Bowel Preparation Scale	8.3±1.3	8.3±1.3	0.91
Withdrawal time	15 (11–15)	13 (9–14)	<0.001
Total number of polyps	1(0–2)	1 (0–3)	0.19

Table 2: Detection rate according to intervention arm, as well as "per patient" multivariate logistic regression of detection rate by intervention group adjusted for confounding variables including age, sex, interventionist, colonoscopy indication, and the Boston Bowel Preparation Scale. Data are presented as number of patients (% of patients).

Parameter	AIAC group (n=213)	Control group (n=213)	Odds Ratio (95%CI)	p-value
All polyps	149 (70.0%)	149 (70.0%)	1.06 (0.69–1.64)	0.79
Size of polyp				
≤ 5mm	149 (70.0%)	136 (63.8%)	1.42 (0.92–2.18)	0.12
6-9 mm	33 (15.5%)	33 (15.5%)	1.03 (0.60–1.77)	0.91
≥ 10 mm	22 (10.3%)	26 (12.2%)	0.88 (0.48–1.63)	0.69
Location of polyp				
Proximal colon	123 (57.7%)	108 (50.7%)	1.46 (0.98–2.19)	0.07
Distal colon	109 (51.2%)	104 (48.8%)	1.14 (0.77–1.69)	0.51
Histology				
Tubular adenoma	102 (47.9%)	82 (38.5%)	1.59 (1.05–2.41)	0.03
Tubulovillous adenoma	7 (3.3%)	7 (3.3%)	0.95 (0.33–2.78)	0.93
Sessile serrated lesion	43 (20.2%)	51 (23.9%)	0.87 (0.55–1.39)	0.56
Hyperplastic polyp	63 (29.6%)	57 (26.8%)	1.21 (0.79–1.86)	0.39
High-grade dysplasia	0 (0.0%)	2 (0.9%)	-	-
Carcinoma	1 (0.5%)	2 (0.7%)	0.40 (0.03–4.62)	0.46
Morphology				
Polypoidal	9 (4.2%)	14 (6.6%)	0.59 (0.24–1.41)	0.23
Non-polypoidal	144 (67.6%)	146 (68.5%)	1.01 (0.65–1.55)	0.98

of developing colon cancer over the next year decreases by 3%.[8]

Several factors have been linked with variable ADRs including training related factors,[26–28] specialist scope of practice, and differing levels of endoscopy experience.[29] Additional techniques such as chromoendoscopy, water-aided colonoscopy and patient position change have improved rates in some studies, but are variably adhered to, inconsistent between users, require interpretation, and are challenging to maintain and implement.[30–33] Mechanical adjuncts such as distal attachments and Third Eye have been developed to overcome these challenges, with only mixed success to date.[33–36] AI is the latest attempt to improve this procedure uniformly and consistently, which is otherwise substantially operator dependent.

To date AIAC trials have been limited by methodological issues, including lack of blinding and incomplete relevant data. Six of the seven studies to date assessed AI where they were developed, with proprietary modules not commercially available. Studies corroborating these findings in other users and populations have therefore not been possible with no trials to compare different systems.

Our study joins the limited but growing number of trials demonstrating consistent benefits for this technology,[11–17] with an estimated 44% relative increase in ADR averaged across five randomised control trials.[5] This was found in a cohort with a relatively low control ADR of 22.9% and a mean PDR of 30.7%, considerably lower than our averages of 44% and 70%, respectively. Current recommended minimal thresholds for ADR in screening

colonoscopies are 25% overall, 30% in men and 20% in women aged over 50 years.[9] It is postulated that endoscopists with lower baseline ADRs might benefit most from AI assistance,[11] with a trial currently underway to investigate outcomes of using Endo-AID in trainees.[16] However, our study also supports the findings from one published abstract that even in "high detectors", AIAC can improve polyp detection, with gains in ADR demonstrated from 61% to 69%.[37]

Improving detection of SSLs remains a challenge due to their often subtle, non-polypoid appearance. SSLs may account for up to 30% of colorectal cancer[38] including interval cancers, particularly, in proximal locations.[39,40] SSLs are difficult to detect using conventional methods,[41] with unfortunately limited improvement with current studied AI modules. Our study likewise did not demonstrate any improvement in SSL detection, although our average detection rate of 23% is appreciably higher than those in other studies ranging from 4–6%.[11,13,16] Only one recent study utilising a novel AI module reported a reduced SSL miss rate, although overall detection rates were low.[17] Unlike ADR, no benchmark detection rate has been set. Ongoing work to improve AI in this important area is underway,[42] yet clearly reservations still exist with current technologies.[17]

Within our cohort, analysis of polyp-specific characteristics did not reveal any significant differences for polyps of different sizes or locations within the colon. This contrasts with both meta-analyses by Ashat and Hassan et al., which demonstrated superiority of AIAC over CC for polyps of all sizes, with greatest benefit shown for the smallest <5mm adenomas, and those in the proximal colon.[4,5] In our study controls, adenomas <5mm constituted 64% of the total polyps compared with a mean of 19% across the RCT controls.[4] Similarly, 50% of the total adenomas detected in our study were located in the proximal colon compared with 14.5% average in other controls.[4] In conjunction with the aforementioned high ADR and SSL detection rates, this may reflect the experienced cohort of endoscopists in this study, utilising all available techniques to expose mucosa and inspect carefully. Large population-based trials are required to establish whether these increased detections translate into improvements in important clinical outcomes for patients.

Withdrawal time has been extensively investigated in colonoscopy and is a critical quality factor with a strong relationship to ADR.[43] The mean withdrawal time increased by two minutes to a total of 15 minutes in our AI cohort. This is considerably longer compared to other trials with a grouped average of 6.9 minutes and 6.4 minutes in AI and control groups, respectively.[4] Prolongations in endoscope withdrawal may be a by-product of improved adenoma detection and time to resect these, increased vigilance, or increased time assessing activations from the AI module, including false positive signals. It is possible with more practice and experience using AI that withdrawal times become equivalent as in other trials, with endoscopists able to more quickly recognise, characterise and disregard non-neoplastic signals detected by AI.

Implications of AI for training endoscopists is considerable. There may be a risk that endoscopists become complacent, assuming AI to detect polyps, with a loss of conventional skills and reliance on these technologies. Within New Zealand, there has been discussion of AI within the medical field and implications with regard to negligence law.[44] Reassuringly, one study has compared colonoscopy outcomes using AI and noted PDR remained elevated two months after the module was intentionally switched off suggesting a learning effect.[37] It is likely that wider utilisation and addition of greater imaging inputs into deep learning algorithms will improve the accuracy and usefulness of AI with time as has been demonstrated in other health use cases.[45–47] It may be that our positive result, despite no prior experience or learning represents an underestimation of what is possible, even within a cohort with high pre-existing ADR.

The strength of this study is its real-world setting, with less risk of operator bias that may change practice within a trial setting.[48] However, we acknowledge that behavioural changes may occur with introduction of any new technology. It is further limited by its retrospective nature and the lack of randomisation. Nonetheless by enrolling consecutive patients we achieved well matched baseline variables. Only a single AI module, Olympus Endo-AID, was used which makes comparisons with other modules difficult. There was no prior experience or training provided for the software, which although intuitive, may change over time. The AI assistance mode could be toggled on and off generating an additional variable of "on time" for the intervention, which was not recorded. We did not perform a cost analysis which in the future must consider establishment costs, training, procedural times, and laboratory resources. The postulated up-front increases in cost must be weighed against potential reduced incidence of CRC in the long run.[49]

There is evidence that AI-assisted classification to aid interpretation of polyp histology may reduce colonoscopy-related costs by up to 7–20% with implementation of a resect and discard strategy.[50] Lastly, connection between longer-term outcomes of improved ADRs to important patient benefits, such as reduction in incidence of colorectal cancer, is not established here.

In conclusion, AI-assisted colonoscopy significantly improved ADR compared with conventional colonoscopy in a cohort of experienced endoscopists. Further research is required to understand its complete utility, including longitudinal changes with time, its application for endoscopists with lower baseline ADRs and, above all, the impact on long-term clinical outcomes.

COMPETING INTERESTS
Nil.

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Illness perceptions and diabetes self-care behaviours in Māori and New Zealand Europeans with type 2 diabetes mellitus: a cross-sectional study

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ABSTRACT

AIMS: This study investigated differences in illness perceptions and self-care behaviours between Māori and New Zealand (NZ) Europeans with type 2 diabetes mellitus (T2DM), and how these perceptions were related to clinical outcomes.

METHODS: Participants were 85 Māori and 85 NZ European adults, recruited from outpatient clinics, who completed a cross-sectional questionnaire on illness perceptions and self-care behaviours. Clinical data, including HbA1c, retinopathy, neuropathy and nephropathy, were collected from medical records.

RESULTS: Compared to NZ Europeans, Māori had higher HbA1c, lower adherence to medication and a healthy diet, and were more likely to smoke. Māori reported greater perceived consequences of diabetes on their lives, and more severe symptoms than NZ Europeans did. Māori were more likely to attribute T2DM to food and drink, whereas NZ Europeans were more likely to attribute T2DM to weight. Perceiving that treatment could help control diabetes was associated with lower HbA1c and higher medication adherence in Māori and NZ Europeans independently.

CONCLUSIONS: Māori experienced and perceived worse T2DM outcomes than NZ Europeans did. Research is needed to develop and test clinical interventions to address these inequities and improve outcomes, possibly by asking patients about their perceptions, providing tailored and culturally appropriate education, and discussing patients' concerns.

In Aotearoa New Zealand, the prevalence of diabetes mellitus in adults aged over 15 years is 5.5%.[1] Prevalence is less than 3% in adults younger than 45, but over 12% in those 65 years or older.[1] Importantly, Māori, the Indigenous people of New Zealand are 1.8 times more likely to have diabetes than non-Maori, and are more likely to experience co-morbidities and lower glycaemic control.[1,2] Epidemiological studies have demonstrated similar disparities in T2DM among many Indigenous populations worldwide.[3] Indigenous peoples also have higher rates of cardiometabolic risk factors, including smoking, obesity and hypertension[4]. A shared history of colonisation has contributed to these disparities, by undermining culture and language, with intergenerational effects on health, family relationships, and relationships to land.[4]

Diabetes management targets for Indigenous populations should be similar to those for the general population, and to achieve these targets health services need to be made more relevant to social and cultural contexts.[4] Environmental and social factors have been recognised as contributing to health outcomes, and there are calls to address social and economic inequalities in vulnerable and deprived populations in New Zealand.[5] Experiences of racism can also contribute to worse healthcare experiences, lower healthcare utilisation, and worse physical and mental health in New Zealand across a range of ethnic groups, with experiences of racism highest among Māori, Pasifika and Asian populations.[6] Eliciting and addressing patients' social and cultural factors allows patients' perspectives to be heard, and creates opportunities for management approaches to be more patient-centred.[4] Building mutual understanding can contribute to a stronger therapeutic relationship and facilitate engagement with self-care behaviours.[4]

Leventhal's Common Sense Model emphasises the importance of eliciting patients' perceptions and tailoring educational approaches to improve patient outcomes.[7] Patients are seen as active problem solvers who perceive illness in several domains: identity (name and symptoms of the illness); consequences (effects on their lives); timeline (how long the illness will continue); personal

control (how much they can control the illness); treatment control (how much treatment can control their illness); causes (what caused the illness); and emotional responses (how the illness affects them emotionally). Research using this model has demonstrated associations between patients' perceptions of diabetes, self-care behaviours, glycaemic control, and diabetes-related complications.[8–13] Furthermore, interventions to change illness perceptions have shown promise in improving perceptions and blood glucose control in patients with type 2 diabetes.[14] Such interventions may be useful to improve health outcomes in a New Zealand context. However, most of this research has been conducted with European samples, and therefore may not be generalisable to other ethnic groups. There is a paucity of research on illness perceptions in ethnically diverse samples with T2DM.[15–18]

Diabetes research in New Zealand has shown some cultural differences in illness perceptions. In 2004, Tongan patients held more acute and cyclical timeline perceptions than NZ Europeans did, and many Tongans believed that their T2DM could be healed by a "powerful other"; Tongans also had lower treatment adherence.[10] In 2007, Pasifika peoples reported more symptoms (higher identity perceptions), more consequences, and higher diabetes-related distress than did NZ Europeans and South Asians.[18] In addition, Pasifika peoples and South Asians reported significantly poorer self-care behaviours and medication adherence compared to NZ Europeans.[18] Among both NZ Europeans and Pasifika peoples, greater perceptions of personal control and lower concern about diabetes were associated with lower HbA1c, and there were inconsistent associations between illness perceptions and self-care behaviours.

To date, no research has specifically examined illness perceptions with Māori who have T2DM, and only limited research has examined illness perceptions among Māori with other conditions. In 2011, differences were found in the way Māori perceived gout, with greater perceived consequences, concern and emotional responses, compared to NZ Europeans and other ethnicites.[19] In work from 2007, Māori believed their schizophrenia would continue for significantly less time than NZ Europeans did.[20]

The main aims of this study were to examine differences in illness perceptions between Māori and NZ Europeans with T2DM, and how perceptions related to self-care behaviours and clinical outcomes. Based on the documented poorer health outcomes among Māori patients with T2DM and the past research, it was hypothesised that NZ Europeans would perceive less consequences, a longer timeline, lower identity perceptions and be less emotionally affected by T2DM than Māori. We also hypothesised that greater personal control perceptions and lower concern would be related to lower HbA1c in both groups, and that higher treatment control perceptions would be linked to higher adherence.

Methods

Participants and procedure

Approval to undertake this study was granted from the Auckland Health Research Ethics Committee, the Auckland District Health Board Research Review Committee and the Waitematā and Auckland District Health Boards Māori Research Committee.

A cross-sectional study design was employed. Outpatients were included if they identified as Māori or NZ European; were over the age of 16 years; spoke, read and wrote in fluent English; and had a confirmed diagnosis of T2DM. Participants were recruited at the Auckland Diabetes Centre clinic waiting rooms from 17 April 2018 to 29 August 2018. Approximately 32% of the clinic population were NZ European, and 13% were Māori. A consecutive sampling method was utilised whereby each patient who met the inclusion criteria was invited to take part in the study until the final sample size for each ethnic group was reached. When the sample size for NZ Europeans was reached, only Māori outpatients were invited to participate until the final sample size was reached.

Two hundred and three outpatients were assessed for eligibility; two outpatients were excluded as they did not speak fluent English (ethnicity not recorded) and 12 outpatients declined to participate (four Māori and eight NZ European). Of the 189 outpatients who agreed to participate, 14 did not return the questionnaire and five withdrew from the study, which constituted a 90% response rate. The final sample of 170 outpatients consisted of 85 Māori and 85 NZ European outpatients. Once written informed consent was obtained, participants could either complete the questionnaire while waiting for their appointment or take it away with them to return via prepaid post. If the questionnaire was not received within three weeks, the participant was contacted to ask if they were still interested in participating.

If yes, they were mailed another questionnaire with a prepaid postage envelope.

Power analysis. G*Power 3.1 was used to determine the sample size.[21] The study was expected to find effect sizes similar to Bean and colleagues (who found differences between Pasifika and NZ Europeans in identity, consequences, and emotional responses of d = 0.6, 0.4, and 0.8 respectively, and correlations between illness perceptions and self-care behaviours between 0.26 to 0.68).[18] To detect a correlation of 0.3 between illness perceptions, self-care behaviours, and blood glucose control, at power of 0.8 and a significance level of 0.05, it required 85 participants. Eighty-five Māori and 85 NZ European were recruited so that correlations could be examined in each ethnic group separately. This sample size allowed the detection of differences between groups with effect sizes of Cohen's d=0.43 or greater.

Survey tools

Illness perceptions. The Brief Illness Perception Questionnaire (BIPQ) has been used to assess illness perceptions in many conditions and the psychometric properties have been demonstrated in studies with patients with T2DM.[8,22] The BIPQ measures nine domains using nine single items: identity ("how much do you experience symptoms from your diabetes?"); consequences ("how much does diabetes affect your life?"); timeline ("how long do you think your diabetes will continue?"); personal control ("how much control do you feel you have over your diabetes?"); illness coherence ("how well do you feel you understand your diabetes?"); emotional response ("how much are you emotionally affected by your illness?"); concern ("how concerned are you about your diabetes?").[22] The treatment control item ("how much do you think your treatment can help control your illness?") was repeated three times with "treatment" replaced with "medication", "exercise" and "diet" respectively, similar to previous research.[13] These items were scored on a scale from 0 (lowest score) to 10 (highest score). The ninth item was an open-ended question ("please list in rank-order the three most important factors that you believe caused your diabetes"). The first factor listed was coded by two independent researchers into categories. In accordance with the BIPQ guidelines, the word "illness" was replaced with "diabetes".

Diabetes self-care behaviours. To reduce participant burden, a shortened version of the revised Summary of Diabetes Self-Care Activities scale (SDSCA) was administered.[23] Five of the 11 core items plus two of the additional items were used to assess self-care behaviours. Participants were asked to circle the number of days in the past week, from 0 (never) to 7 (every day), that each self-care activity was performed. The researchers consulted with a dietician and podiatrist at the Auckland Diabetes Centre to determine which items from the SDSCA were most relevant. One item from each of the following subscales was administered: diet, exercise, blood sugar testing, foot care, and smoking. Two questions on the number of days participants took their insulin and diabetes pills were used from the additional 14 SDSCA items, with scores from these two questions averaged if applicable. All seven questions utilised are shown in Appendix A.

Demographics. Standard demographic data was collected on age, sex, ethnicity, smoking ("do you currently smoke? yes or no"), employment status and education level.

Medical records

Glycaemic control. Each participant's most recent HbA1c result was extracted from the patient's medical record.

Retinopathy. The stage of retinopathy was extracted from the participant's most recent screening result. Stages ranged from no retinopathy, mild, moderate to severe.

Nephropathy. The chronic kidney disease (CKD) stage was determined from the participant's most recent estimated glomerular filtration rate (eGFR) as reported on their laboratory record. The New Zealand Ministry of Health[25] has set stages of CKD; stage 1 CKD (eGFR >90), stage 2 CKD (eGFR 60–90), stage 3 CKD (eGFR 59–30), stage 4 (eGFR 29–15), and stage 5 (eGFR <15).

Neuropathy was scored as present or absent from medical records.

Data analysis

Data were analysed using SPSS version 25. Demographic and clinical data were reported as percentages and means within each ethnic group. Independent samples t-tests and Chi-squared tests were employed to explore differences between Māori and NZ Europeans in demographic and clinical variables, illness perceptions and self-care behaviours. Any significant differences in demographic or clinical variables between the two groups were then controlled for using ANCOVAs to assess if the differences in illness perceptions remained when controlling for these variables. Chi-squared tests were used to compare

differences in causal perceptions between the two groups. Univariate analyses were conducted to assess correlations between illness perceptions, HbA1c, and self-reported medication adherence for Māori and NZ Europeans. Multiple regression analyses were conducted entering those variables found to be associated with HbA1c and self-reported medication in the previous analyses.

Results

Demographic and clinical characteristics

The demographic and clinical characteristics of the two ethnic groups are provided in Table 1. Significant differences between the two groups were found for age, employment status, education level, smoking status and HbA1c. NZ Europeans were significantly older than Māori, had higher education and lower HbA1c, were less likely to smoke, and less likely to be working.

Differences in illness perceptions

Māori perceived diabetes to have a larger effect on their lives (more consequences), reported experiencing more severe symptoms (higher identity), were more concerned about diabetes, and reported that diabetes affected them more emotionally than NZ Europeans did (Table 2). There were no significant group differences for perceived timeline, personal control, treatment control or illness coherence.

Adding the covariates of age, employment, education level, smoking and HbA1c, did not change the significance levels for consequences and illness identity (see Table 3). However, the differences in illness concern and emotional representations became non-significant. The difference between groups in illness coherence became significant, with the estimated marginal mean for Māori significantly higher than NZ Europeans when controlling for the co-variates, with a small effect size. Therefore, the demographic and clinical differences between Māori and NZ Europeans accounted for some of the differences in illness perceptions. Timeline, personal control, treatment control (diet), treatment control (exercise) and treatment control (medication) remained non-significant.

Causal perceptions were coded into six themes: (1) food and drink related (e.g., “sweet eating”, “beer”); (2) lifestyle (e.g., “no exercise”, “lifestyle”); (3) emotions and stressors (e.g., “stress”, “worries”); (4) genetics (e.g., “genes”, “hereditary”); (5) weight related (e.g., “obesity”, “weight can’t lose it”); (6) other (e.g., “a family curse”, “medication I am on”). More Māori perceived the cause of T2DM to be related to food and drink, whereas more NZ Europeans perceived the cause to be related to weight (see Table 4).

Differences in self-care

As shown in Table 5, significantly more NZ Europeans took part in a healthy eating plan than Māori, and reported that they took medications on more days than Māori. More Māori participants smoked (18/85; 21%) than did NZ Europeans (5/85; 6%), Pearson’s Chi-squared 8.50, p <0.01. (Note: these results slightly differ to Table 1 due to differences in the way the question was phrased – see Appendix). Among those who smoked, the mean number of cigarettes for Māori was 10.0 (SD 11.25), and for NZ Europeans was 9.8 (SD 7.25), t(21)=0.98. There were no significant differences in the other self-care behaviours.

For medication adherence, the estimated marginal mean for Māori (Mean=6.1; 95%CI [5.7, 6.5]) was no longer significantly different to NZ Europeans when controlling for the co-variates (Mean=6.5; 95%CI [6.1, 6.9]), F(1,147)=1.6, p=0.20, ηp2=0.0; indicating that the differences in medication adherence could be accounted for by the different demographic and clinical factors between the groups. The significance of the remaining analyses did not change.

Associations between illness perceptions, HbA1c, and medication adherence

The associations between illness perceptions, HbA1c and medication adherence for each ethnic group separately are shown in Table 6. Among demographic variables, older age was associated with lower HbA1c (r=-0.3; p<0.01) and higher medication adherence (r= 0.3; p= 0.03) in NZ Europeans, and those who were employed had higher adherence than unemployed or retired persons ($t(75) = 2.77$; p= 0.01). No demographic variables were associated with medication adherence or HbA1c for Māori.

Multivariate analyses. The first step of the regression for HbA1c in NZ Europeans was significant, $F_{(1,79)}$=7.9, p=0.01, R^2=0.1, adjusted R^2=0.1. Approximately 9% of the variance in HbA1c for NZ Europeans could be explained by age, with older age associated with lower HbA1c. The second step (with the inclusion of perceived consequences, treatment control [exercise], identity, illness concern, and emotional representations) explained a

Table 1: Summary of demographic and clinical characteristics in participants across ethnic groups.

Demographic variable	NZ European (n=85)	Māori (n=85)	p-value
Age in years, mean (SD)	65.0 (11.8)	55.9 (12.5)	<0.01a
Gender, n (%)			**0.63b**
Male	58 (68.2%)	55 (64.7%)	
Female	27 (31.8%)	30 (35.3%)	
Employment status, n (%)			**0.02b**
Employed	42 (49.4%)	58 (68.2%)	
Unemployed	5 (5.9%)	6 (7.1%)	
Retired	37 (43.5%)	20 (23.5%)	
Missing data, n	1	1	
Education level, n (%)			**<0.01b**
High School	56 (65.9%)	73 (85.9%)	
Tertiary	29 (34.1%)	10 (11.8%)	
Missing data, n	0	2	
Currently smoking, n (%)			**<0.01b**
Yes	4 (4.7%)	17 (20.0%)	
No	81 (95.3%)	68 (80.0%)	
HbA1c (mmol/mol), mean (SD)	66.2 (17.6)	75.0 (22.4)	<0.01a
Duration of diabetes (years), mean (SD)	11.5 (7.9)	10.9 (8.6)	0.59a
Retinopathy, n (%)			
None	60 (70.6%)	50 (58.8%)	0.27bc
Mild	18 (21.2%)	23 (27.1%)	
Moderate–Severe	6 (7.1%)	12 (14.1%)	
Missing data, n	1	0	
Nephropathy, n (%)			**0.42bc**
None	53 (62.3%)	54 (63.5%)	
Stage 2 CKD	14 (16.5%)	13 (15.3%)	
Stage 3 CKD	15 (17.6%)	10 (11.8%)	
Stage 4–5 CKD	3 (3.5%)	8 (9.4%)	
Neuropathy, n (%)			**0.16b**
Present	11	19	
Absent	70	63	
Not in medical record	4	3	

Note: % = percentage of participants in that category.
CKD = chronic kidney disease.
p value was calculated by independent samples T-Tests[a] and Chi-squared tests.[b]
Chi-squared tests[c] were also not significant when data coded as no vs yes.

Table 2: Differences between Māori and New Zealand Europeans in illness perceptions.

	Ethnic group				Mean difference	95%CI	t	df	p	d
	NZ European (n=85)		Māori (n=85)							
Illness perceptions	**Mean**	**SD**	**Mean**	**SD**						
Consequences	3.6	2.5	5.0	3.1	-1.5	[-2.3, -0.6]	-3.4	167	<0.01	0.5
Timeline	8.2	2.7	7.5	2.9	0.7	[-0.1, 1.5]	1.6	166	0.10	0.3
Personal control	6.8	2.5	6.1	2.5	0.7	[-0.1, 1.5]	1.7	167	0.08	0.3
Treatment control (diet)	8.6	1.9	8.8	1.8	-0.1	[-0.7, 0.4]	-0.4	167	0.69	0.3
Treatment control (exercise)	8.5	1.9	8.5	2.0	-	[-0.6, 0.6]	-0.0	167	0.98	0.0
Treatment control (medication)	7.7	2.4	7.4	2.6	0.3	[-0.4, 1.1]	0.9	162	0.37	0.1
Identity	2.6	2.6	4.8	2.7	-2.2	[-3.0, -1.4]	-5.4	164	<0.01	0.8
Illness concern	5.7	3.0	7.2	2.9	-1.5	[-2.3, -0.7]	-3.3	168	<0.01	0.5
Coherence	7.4	2.4	7.4	2.7	0.1	[-0.7, 0.8]	0.1	168	0.92	0.0
Emotional representations	3.3	3.1	5.0	3.3	-1.8	[-2.8, -0.7]	-3.6	166	<0.01	0.6

Table 3: Multivariate differences between Māori and NZ Europeans in illness perceptions controlling for age, employment status, education level, smoking and HbA1c.

	Ethnic group				**Mean difference**	**95%CI**	**F**	**df**	**p**	η_p^2
	NZ European (n=85)		**Māori (n=84)**							
Illness perceptions	**Adj. Mean**	**SE**	**Adj. Mean**	**SE**						
Consequences	3.7	0.3	4.9	0.3	-1.2	[-2.1, -0.2]	5.6	157	0.02	0.0
Timeline	7.9	0.3	7.7	0.3	0.1	[-0.9, 1.1]	0.1	156	0.78	0.0
Personal control	6.3	0.3	6.5	0.3	-0.2	[-1.0, 0.6]	0.2	157	0.64	0.0
Treatment control (diet)	8.6	0.2	8.8	0.2	-0.2	[-0.9, 0.4]	0.4	157	0.52	0.0
Treatment control (exercise)	8.5	0.2	8.5	0.2	0.0	[-0.6, 0.7]	0.0	157	0.92	0.0
Treatment control (medication)	7.6	0.3	7.6	0.3	0.1	[-0.8, 0.9]	0.0	152	0.92	0.0
Identity	2.8	0.3	4.6	0.3	-1.8	[-2.7, -0.9]	15.7	154	<0.01	0.1
Illness concern	5.9	0.3	6.9	0.4	-1.0	[-2.0, 0.0]	3.6	158	0.06	0.0
Coherence	7.0	0.3	7.9	0.3	-0.9	[-1.7, -0.1]	5.1	158	0.03	0.0
Emotional representations	3.8	0.4	4.4	0.4	-0.6	[-1.6, 0.5]	1.1	156	0.30	0.0

Table 4: Chi-squared tests showing differences between Māori and NZ Europeans in causal perceptions of diabetes (categorised).

	Ethnic group		χ^2	df	p	v
Causal categories	**NZ European (n=78)**	**Māori (n=18)**				
Food and drink related, n(%)	25 (32.1%)	45 (55.6%)	9.6	1	<0.01	0.2
Lifestyle, n(%)	6 (7.7%)	4 (4.9%)	0.4	1	0.50	0.1
Emotions and stressors, n(%)	7 (9.0%)	4 (4.9%)	0.9	1	0.34	0.1
Genetics, n(%)	16 (20.5%)	15 (18.5%)	0.1	1	0.81	0.0
Weight related, n(%)	17 (21.8%)	4 (4.9%)	9.4	1	<0.01	0.2
Other, n(%)	7 (9.0%)	9 (11.1%)	0.3	1	0.62	0.0

Table 5: Differences between Māori and NZ Europeans in self-care behaviours, measured from 0 (never) to 7 (every day).

	Ethnic group				Mean difference	95% CI	t	df	p	d
	NZ European (n=85)		Māori (n=85)							
Days per week	**Mean**	**SD**	**Mean**	**SD**						
Diet	5.1	1.9	4.0	2.4	1.1	[0.5, 1.8]	3.3	158	<0.01	0.5
Exercise	3.7	2.4	3.5	2.7	0.3	[-0.5, 1.1]	0.7	168	0.47	0.1
Blood sugar testing	4.1	3.2	3.6	3.2	0.5	[-0.5, 1.4]	0.9	168	0.35	0.1
Foot care	2.7	2.8	3.3	2.9	-0.6	[-1.5, 0.2]	-1.4	166	0.16	0.2
Medication	6.6	1.2	6.0	2.2	0.6	[0.1, 1.2]	2.2	155	0.03	0.3

Table 6: Correlations between illness perceptions, HbA1c, and medication adherence in NZ Europeans (n=85) and Māori (n=85).

	HbA1c		**Medication adherence**	
	NZ European	**Māori**	**NZ European**	**Māori**
Consequences	**0.2**	0.1	-0.1	0.1
Timeline	0.1	-0.1	0.2	0.1
Personal control	-0.1	**-0.3**	0.0	0.2
Treatment control (diet)	0.1	-0.1	0.1	0.1
Treatment control (exercise)	**0.3**	0.0	0.0	0.1
Treatment control (medication)	0.2	-0.2	**0.3**	**0.3**
Identity	**0.3**	0.2	0.0	0.1
Illness concern	**0.3**	-0.1	0.1	**0.3**
Coherence	0.1	-0.1	0.1	0.1
Emotional representations	**0.4**	0.1	0.0	0.0

Note: Bolded *p* value indicates significance at the $p < 0.05$ level.

further 20% of variance in HbA1c, $F_{(6,74)}=5.0$, $p<0.01$, $R^2=0.3$, adjusted $R^2=0.2$. Higher perceived treatment control (exercise) $p=0.01$ explained a significant proportion of the variance in higher HbA1c levels.

The first step of the regression for medication adherence in NZ Europeans was significant, $F_{(2,72)}=4.2$, $p=0.02$, $R^2=0.1$, adjusted $R^2=0.1$. Approximately 10% of the variance in medication use for NZ Europeans could be explained by age and employment. The second step significantly explained a further 7% of variance, $F_{(3,71)}=4.9$, $p<0.01$, $R^2=0.2$, adjusted $R^2=0.1$. Higher perceived treatment control about medication was significantly associated with higher medication adherence.

The simple regression for medication adherence in Māori was significant, $F_{(2,75)}=4.88$, $p=0.01$, $R^2=0.12$, adjusted $R^2=0.09$. Approximately 12% of the variance in medication adherence for Māori could be explained by the model, with higher perceived treatment control and higher illness concern associated with better medication adherence.

Discussion

The major findings show that among patients attending outpatient clinics for T2DM, Māori were affected at a younger age than NZ Europeans, less likely to have tertiary education, more likely

to smoke and have an unhealthy diet, poorer adherence, and less optimal blood glucose control. Māori accurately perceived more symptoms and worse consequences than did NZ Europeans. These findings align with previous research showing poorer health outcomes in Māori in New Zealand.[1,2] It is therefore important that steps are taken to try to reduce these inequities.

The finding that the study sample of Māori were younger than NZ Europeans is consistent with epidemiological research showing Indigenous peoples are diagnosed with diabetes at a younger age.[24] The increased proportion of Māori with diabetes who were working poses greater barriers for Māori to attend centrally located appointments, especially if work is a long way from clinics, and pay may be docked for hours off. This is an example of unintentional institutionalised racism, whereby there is differential access to care. Consideration could be given as to how clinics could be organised at other times and locations to reduce these barriers, with virtual telehealth a possible option to reduce duration of time off work.

Given that Māori attending diabetes clinics have greater risk factors and poorer glycaemic control, it is not surprising that Māori reported greater consequences of diabetes on their lives, and of being more emotionally affected than NZ Europeans. These findings reflect earlier results, showing Pasifika peoples had poorer metabolic control, perceived T2DM to have significantly more consequences and were more distressed than both NZ Europeans and South Asians.[18] Further research is required to explore what of kind of support Māori and Pasifika need to improve risk factors, and reduce distress.

The way the data were categorised, more Māori believed food and drink were important causes of T2DM, whereas more NZ Europeans perceived weight as important. These are distinct but associated causes, since food and drink can influence weight, alongside other factors. Fortunately, both these perceived causes are modifiable and efforts to improve them should be incorporated into culturally specific diabetes management. Research in New Zealand has shown that clinicians do provide education about the importance lifestyle management, but often don't take into account patients' pre-existing knowledge or social context.[25] It is important for healthcare providers to take wider environmental and socio-cultural influences on behaviours into account.

For NZ Europeans, perceiving exercise as more effective and being more emotionally affected were both significantly associated with higher HbA1c. Being more emotionally affected was also associated with higher HbA1c in Europeans and South Asians in earlier work.[18] However, it is unclear why higher perceptions that exercise can control diabetes would be linked to higher HbA1c; it is possible that some NZ Europeans attribute their poor control to their lack of exercise. More research is needed to replicate this survey and investigate the directionality of this association. Feeling less able to control diabetes was associated with higher HbA1c for Māori, which aligns with findings from a previous older study in NZ Europeans, Pasifika peoples and South Asians.[18] It is surprising that this association was not found for NZ Europeans in this study, although the correlation was in the expected direction. As expected, stronger perceptions that treatment could control diabetes were associated with better adherence for both Māori and NZ Europeans; this was found in previous work in Pasifika patients.[18]

Together, these findings suggest that emphasis should be placed on addressing personal and treatment control perceptions in clinical consultations and in the development of psychoeducational interventions. Further research is needed to investigate how changes to clinical management could affect risk factors and clinical outcomes. Interventions based on Leventhal's Common Sense Model have been shown to be effective in increasing perceptions of both treatment and personal control with some preliminary evidence for effects on glycaemic control.[14] These interventions typically target patients with poor glycaemic control, and involve asking about and responding to patients' and family members' perceptions of diabetes, addressing specific concerns with tailored psycho-education, discussing barriers to the adoption of behaviour change, and co-developing an action plan with patients and family. Visual information about health may be especially beneficial for people with low health literacy.[26] Furthermore visual-based interventions have been shown to increase adherence to medication in HIV in a largely non-white African population.[27] A recent feasibility study found that a short diabetes visual animation was well received by patients in New Zealand, and future research could further develop this.[28] For Māori, interventions should include establishing trust, connection (whanaungatanga) and respect (manaakitanga) with the patient, as well as fostering empowerment (rangatiratanga). The presence of cultural support and/or family (whānau) in consultations with Māori patients is also important. Previous research has recommended that healthcare systems are engaged in working towards cultural safety.[29]

Overall, the results support an argument that assessing illness perceptions in outpatients with T2DM could be an important addition to their treatment plan. It is important for healthcare providers to consider cultural differences when providing information and treatment advice. The current study identified significant differences in self-care behaviours between Māori and NZ Europeans, providing a valuable avenue for health practitioners to discuss Māori patients' concerns about the barriers they face in adhering to dietary and medication regimes. These barriers may be broad factors such as institutionalised racism, or structural factors, such as socio-economic status.

A strength of this study is specifically investigating illness perceptions and how these are associated with self-care behaviours in Māori with diabetes, which is novel. Māori were oversampled in order to reach the required sample size, and to have sufficient power to detect differences between groups, and we had good response rates. Limitations include the cross-sectional design which does not allow causality and directionality to be determined. The sample is only representative of outpatients who attended their scheduled appointments; patients who do not attend appointments may have different levels of adherence, risk factors, and perceptions, so the findings should be interpreted with caution. Nevertheless, the sample was representative of diabetes outpatients, with typically more risk factors and complications. Future research could recruit from hospitals and the community to try to capture a wider range of patients. A further limitation was the use of a shortened version of the self-care questionnaire, which may affect its reliability, and we did not assess blood pressure or lipids since these were not the main focus of the study. Although the self-report measures have previously been used with Māori patients, they have yet to be specifically validated in Māori populations.

Conclusion

This study corroborates previous findings showing disparities in diabetes risk factors (smoking, unhealthy diet), younger age of onset, and poorer blood glucose control for Māori compared to NZ Europeans, in a sample of attendees at diabetes outpatient clinics. Māori accurately perceived more severe symptoms and consequences of their diabetes than NZ Europeans, and that food and drink were important causes of diabetes. Perceptions of greater treatment effectiveness were associated with higher medication adherence. Future research needs to develop and test psychological interventions for diabetes outpatients in a New Zealand context to see effects on perceptions, risk factors, engagement in self-care behaviours, glycaemic control, and complications. Asking patients about their perceptions of diabetes may allow patients' views to be acknowledged, allow clinical education to be better tailored and interactive, increase mutual understanding and enhance engagement in self-care, with subsequent benefits for risk factors and blood glucose control. This research lends further support for incorporating psychological and cultural factors into clinical strategies and treatment to improve health outcomes, particularly for Indigenous groups.

COMPETING INTERESTS
Nil.

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Appendix

Appendix 1: Items used from the SDSCA.[23]

1. How many of the last SEVEN DAYS have you followed a healthy eating plan?
2. On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of continuous activity, including walking.)
3. On how many of the last SEVEN DAYS did you test your blood sugar?
4. On how many of the last SEVEN DAYS did you check your feet?
5. Have you smoked a cigarette—even one puff—during the past SEVEN DAYS?
6. If yes, how many cigarettes did you smoke on an average day?
7. On how many of the last SEVEN DAYS did you take your recommended insulin injections?*
8. On how many of the last SEVEN DAYS did you take your recommended number of diabetes pills?*

*Note: a "not applicable" option was provided for these items.

An evaluation of a New Zealand "vape to quit smoking" programme

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ABSTRACT

AIM: To compare the use of smoking cessation aids across different ethnic groups and age groups within a large New Zealand cohort and to assess the uptake and effectiveness of e-cigarettes for smoking cessation via a "vape to quit" initiative.

METHODS: Retrospective analysis of Te Hā – Waitaha smoking cessation service, including a telephone interview of a subgroup, who opted into the "vape to quit" programme. The uptake of different smoking cessation aids, including the use of medications and other products, was evaluated and the self-reported quit rate in a "vape to quit" cohort was evaluated.

RESULTS: The final dataset analysed consisted of 1,118 participants: 66.6% NZ European; 28.1% Māori; 3.1% Pacific; and 2.2% Asian. Māori participants were younger on average and had increasing vaping use. Māori were less likely to receive varenicline to assist with smoking cessation. Vaping use increased over time in all groups. Nicotine containing e-cigarettes were the most common smoking cessation products used, with >65% of each ethnic cohort utilising these products. Of the 100 participants in the "vape to quit" cohort 16% were smokefree and vapefree, 31% were smokefree and vaping, 31% were smoking and not vaping, and 22% were smoking and vaping.

CONCLUSIONS: The Te Hā – Waitaha service was successful in engaging Māori in their smoking cessation programme. Nicotine containing e-cigarette products were popular in all cohorts. Nicotine containing e-cigarettes are showing potential in smoking cessation programmes in support of the Smokefree Aotearoa 2025; however, 22% of those in the "vape to quit" programme became dual users.

Worldwide, about 1.1 billion people smoke, and more than 8 million people die per year as a result of tobacco use.[1] While the incidence of smoking is declining a significant proportion of the population continue to smoke. The World Health Organization's (WHO) target for a reduction of tobacco use by 30% between 2010 and 2025 remains off-track.[1,2] New Zealand has set the goal of a Smokefree Aotearoa 2025.[3] This goal aims to reduce the smoking prevalence to 5% or less by 2025. Smoking rates more than halved over the last 25 years, dropping from 25% in 1996/97 to a current rate of 10.9% (9.4% classed as daily smokers). However, Māori, the Indigenous people of New Zealand, continue to have a substantially higher smoking rate of 25.7% (daily smoking rate 22.3%).[4] E-cigarette use is on the rise, with 6.2% of adults being categorised as daily e-cigarette users. Data shows that e-cigarette use was highest in young people aged 18–24 (15.3%) and Māori (12.5%).[4] Various tobacco control laws and regulations have been introduced in New Zealand, such as taxation, bans on smoking in public spaces, cessation initiatives, marketing restrictions and campaigns on the negative health effects of smoking,[5] in line with the WHO's Framework Convention on Tobacco Control (WHO FCTC).[6] New Zealand's initiatives aim is to address three core areas: affordability, access, and appeal. These areas are being tackled by increasing tobacco excise tax and establishing a minimum retail price both increasing the cost and making tobacco products less affordable. Access to tobacco products is being made more challenging by removing tobacco retail displays and introducing plain packaging, reducing the number of tobacco retailers, banning the sale of tobacco products in alcohol on-licensed locations, and the introduction of a "tobacco-free generation" policy—effectively banning the younger generations from being able to legally purchase tobacco products. Finally, New Zealand is moving towards the use of tobacco products that are less appealing and less addictive by restricting additives and reducing nicotine levels. The timeline for these objectives is still on-going.[3]

Most smokers want or intend to quit; however, support is needed to do so, and cessation support more than doubles the chances of successful quitting.[1] Typical smoking cessation support includes pharmacotherapies (nicotine replacement therapy, varenicline and bupropion), behavioural support, alternative therapies and, more recently, e-cigarettes.[7] The role of e-cigarettes, a type of electronic nicotine delivery system (ENDS), in

smoking cessation is not fully established. Some trials have shown modest improvements in smoking cessation with the use of e-cigarettes in combination with existing approaches (nicotine replacement therapy, NRT,[8] or when accompanied with behavioural support[9]).[8–10] However, the current evidence is insufficient to assess the effectiveness of e-cigarettes as a smoking cessation aid, and regulatory responses around the world differ.[11] Uncertainty around long-term health effects has led to differences in regulation and incentivisation of e-cigarettes around the world. Countries fall within a range from focussing on health protection on one end, to harm reduction at the other. Analysis by Campus et al. compared variation across 97 countries.[12] They found regulation options including prohibition, component ban, and regulation as medicinal products, poisons, tobacco products, consumer products, and/or unique products. Incentivisation options ranged from taxation, subsidisation, and provision of a financial reward. To consider a few countries of note, New Zealand and the UK take a similar stance (in terms of position and policy statements) and largely consider e-cigarettes as a harm reduction tool. Australia on the other hand, take a health protection approach whereby concerns about the use of e-cigarettes by non-smoking youth, a lack of clear evidence of safety and efficacy and the potential to undermine tobacco control progress.[13]

There remains to be debate over the role of ENDS in terms of harm/harm reduction, with those opposed focusing on the risk to young people and the unknown long-term effects. In contrast, supporters emphasise harm reduction for smokers switching to ENDS products.[14] These disparate opinions are exemplified by Public Health England on the one hand, publicising the assumption that e-cigarettes are 95% safer than conventional cigarettes[15] (a quantification that is in fact unfounded and currently unknown[16]) and supporting the use of e-cigarettes for harm reduction. On the other hand, the 2021 WHO report suggests to strictly regulate ENDS for maximum protection of public health.[17] The large respiratory societies, including the Thoracic Society of Australia and New Zealand [18] and the European Respiratory Society,[19] do not endorse the "risk reduction" strategies, with the bottom line that "lungs are created to breathe clean air, not reduced levels of toxins and carcinogens".[19]

New Zealand is focussing on a harm reduction approach in addressing the role of e-cigarette products on its smokefree journey.[13] The Wellbeing Index for the Canterbury Region in New Zealand showed that 15.2% of people older than 15 years smoked. By ethnicity, 39.4% of Māori, 36.5% of Pacific people, and 7.7% of Asians were regular smokers.[20] Te Hā – Waitaha, the smoking cessation service in Canterbury, New Zealand has been designed as pro-equity. Te Hā – Waitaha was formed in 2017 under one public health umbrella embracing Māori values to engage the Māori population. It prioritises recruitment of Māori, Pacific and pregnant woman into the programme, and offers a number of quitting strategies including "vape to quit". The "vape to quit" programme entails the use of an e-cigarette (with or without nicotine) as a smoking cessation aid. This article audits data collected from Te Hā – Waitaha and provides a six-month update of a subgroup of the "vape to quit" participants. We hypothesised that the use of e-cigarettes to support smoking cessation is increasing, but that even with the use of vaping as a tool to quit smoking cessation is not guaranteed. This study consisted of two main aims: (1) to assess the uptake of various smoking cessation tools and analyse the preference of these tools as a function of age and ethnicity, plus to assess whether this has changed over a two-year period; and (2) to assess the uptake and effectiveness of the "vape to quit" programme utilised by Te Hā – Waitaha. Our study was designed to recruit a high proportion of Māori, by both utilising a database with a high proportion of Māori and increasing the proportion of Māori participants followed up through the "vape to quit" programme.

Methods

This study consisted of two main parts. The first was an analysis of smoking cessation aids used by all participants enrolled at Te Hā – Waitaha over a period of just over two years. The second part consisted of a telephone interview using a subset of 100 participants who selected the "vape to quit" strategy for smoking cessation.

Data sources

Te Hā – Waitaha is the smoking cessation service for about 500,000 people in Canterbury, New Zealand. Free support is offered, including an individualised service with the Stop Smoking Practitioners Programme based across Canterbury. One-on-one or group counselling, phone support and smoking cessation aids are avail-

able. Te Hā – Waitaha offers a "vape to quit" strategy using e-cigarettes to promote smoking cessation. Referrals are received from primary care, hospital, lead maternity care, pharmacy, or self-referral. Clients are enrolled, are provided with support, and are set a quit date. All participants in the telephone interview provided informed consent before taking part in this study. Ethics approvals were obtained for the use of data within this database for the research presented here through the University of Otago Human Research Ethics Committee (HD19/032, H19/088).

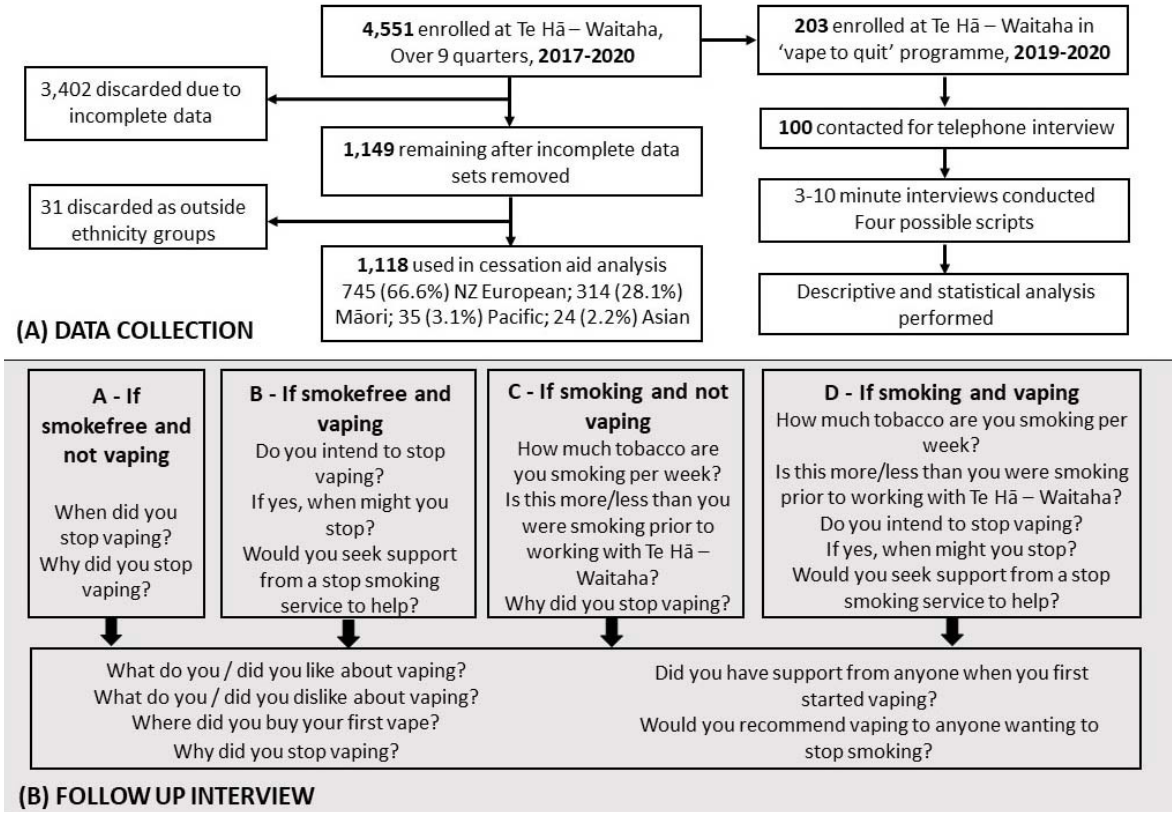
Anonymised data were accessed over the period of enrolment consisting of nine quarters from 2017 to 2019 (a period of two and one quarter years; Figure 1). Of the 4,551 initial records, all incomplete datasets were removed (3,300). Ethnicity and age were analysed for the final 1,118 participants for smoking cessation aid analysis and the 100 participants who were contacted for the "vape to quit" programme.

Data measures and analysis of smoking cessation aids

The following variables were recorded in data collection: referral date, date enrolled in Te Hā – Waitaha, gender, age at time of enrolment, ethnicity, medicines and/or other products used for smoking cessation plan, set quit date, and smoking history. Pivot tables were used to manipulate and assess the data. "Other ethnic groups" were excluded in the data (25 participants) to focus on the main New Zealand ethnicity populations (Māori, NZ European, Pacific, and Asian).

The smoking cessation aids were classed either as prescribed medicines—including varenicline, bupropion, nortripyline; and NRT, as patches, nicotine gum, and nicotine lozenges—or over the counter products—including nicotine spray, nicotine inhalator, non-nicotine-containing e-cigarette, and nicotine e-cigarettes. These were analysed as a function of age and ethnicity.

Figure 1: (a) Flow chart of data collection and processing; (b) interview questions used to follow-up the "vape to quit" participants.



The interview: "vape to quit" follow-up

We aimed to interview a total of 100 participants who had used the "vape to quit" programme between 6–12 months prior to the sampling time. A total of 203 participants were found to have engaged with Te Hā – Waitaha between 6–12 months prior, had used vape to quit, and had consented to participate in this follow-up study. Priority was given to record the responses of Māori participants, so these participants were contacted first in the list of 203 potential candidates. To reach the total of 100 participants, a total of 125 participants were contacted, with 25 either stating they did not want to participate or with the recorded phone number no longer being active. Short, structured telephone interviews of 3–10 minutes were conducted in November and December 2019.

The interview consisted of primary questions about current smoking/vaping status and whether the participant would recommend vaping as a way to stop smoking. Depending on these answers, the interview had one of four possible scripts for the following criteria (Figure 1b). Qualtrics (Qualtrics, Provo, UT) was used to record responses and themes related to why participants liked, or disliked vaping were collected. Information on whether the participants were smokefree and vapefree, or still using one or both products, was also collected.

Results

A total of 4,551 clients engaged with Te Hā – Waitaha for smoking cessation over the assessment period of nine quarters (2017–2019). The final dataset for analysis of smoking cessation aids was 1,118 clients. These participants identified their ethnicity as NZ European (745, 66.6%), Māori (314, 28.1%), from a Pacific nation (35, 3.1%), and from an Asian nation (24, 2.2%). In this sample, 28% of the clients of Te Hā – Waitaha were Māori.

Table 1 displays the distribution of age in the participants enrolled in Te Hā – Waitaha within each ethnicity (including all 1,118 participants). It reveals a greater proportion of younger clients (<30 years) in the Māori and Pacific cohorts. Table 2 displays the age and ethnicity information for those who used nicotine containing e-cigarettes as a smoking cessation aid.

Exclusion of participants

Of the original 4,551 clients, 75% were excluded. The main reason for this was due to incomplete datasets. Table 3 provides a breakdown of the proportions of participant data that was discarded for each reason. In addition to these reasons, some participants changed their mind and continued smoking, were not contactable by the service for follow-up, or attempted to quit smoking without Te Hā – Waitaha support. In these instances, quit data could not be entered, which was needed to ensure completeness of the data. The breakdown of ethnicities in the discarded data was NZ European 60.7%, Māori 29.1%, Pacific 4.2%, and Asian 2.4%. The remaining 3.6% participants fell under other ethnic categories. These proportions were similar to those of the cohort as a whole. For the large proportion of clients that were excluded due to unknown product use, the medicines used were: bupropion 0.8%; nortriptyline 0.2%; NRT – combination 57.8%; NRT – single product 24.2%; varenicline 7.4%; other 0.1%; none 6.4%; blank 3%; and unknown 0.3%.

Ethnic and age-specific choices in smoking cessation aids used

Participants who enrolled in the Te Hā – Waitaha programme could choose medicine or products to assist with smoking cessation. Medicines included varenicline, bupropion, nortripyline, and NRT—as patches, nicotine gum and nicotine lozenges. The products available to aid smoking cessation were nicotine spray, nicotine inhalators, non-nicotine-containing e-cigarettes, and nicotine-containing e-cigarettes.

Māori were less likely to receive medications to assist their smoking cessation (10.5%, 33 out of 313). It is not known whether Māori were less likely to be offered medication or were less likely to choose and use them. All medications and products offered on this programme were fully funded. Pacific peoples were more likely to use NRT combination to assist smoking cessation (64.9%, 24 out of 37). NZ Europeans were less likely to use NRT combination with just over 43.4% (322 out of 742) but more likely to use varenicline medication 2.7% (21 out of 786) (see Table 4).

The most common product used by all groups were e-cigarettes containing nicotine with at least 65% uptake across all ethnic groups (Table 5). Māori had the lowest percentage using e-cigarettes containing nicotine and were more likely to use nicotine sprays (25%, 79 out of 313). The uptake of e-cigarettes across ethnic groups largely mirrored the age distribution across the cohort as a whole. The greatest uptake of e-cigarettes amongst Māori and Pacific were the 19–29-year-olds; in the Asian group it was the 30–39-year-

Table 1: Distribution of participants by ethnicity and age in total cohort (total 1,118) attempting to quit smoking through Te Hā – Waitaha. Percent (%) values are based on number in the age bracket over total in the cohort of that ethnicity.

Ethnicity	<19 years old		19–29 years old		30–39 years old		40–49 years old		50–59 years old		>60 years old	
	N	%	N	%	N	%	N	%	N	%	N	%
NZ European	12	1.6	190	25.5	159	21.3	137	18.4	152	20.4	95	12.8
Māori	19	6.1	106	33.8	78	24.8	47	15.0	47	15.0	17	5.4
Pacific	2	5.7	14	40.0	6	17.1	5	14.3	6	17.1	2	5.7
Asian	0	0.0	2	8.3	12	50.0	8	33.3	1	4.2	1	4.2
Total	33	3.0	312	27.9	255	22.8	197	17.6	206	18.4	115	10.3

Table 2: Distribution of participants by ethnicity and age for those (total 841) using e-cigarettes containing nicotine to aid their smoking cessation. Percent (%) values are based on number in the age bracket over total in the cohort of that ethnicity.

Ethnicity	<19 years old		19–29 years old		30–39 years old		40–49 years old		50–59 years old		>60 years old	
	N	%	N	%	N	%	N	%	N	%	N	%
NZ European	10	1.7	112	19.3	115	19.9	121	20.9	134	23.1	87	15.0
Māori	7	3.3	69	32.4	52	24.4	35	16.4	36	16.9	14	6.6
Pacific	2	7.4	10	37.0	5	18.5	3	11.1	5	18.5	2	7.4
Asian	0	0.0	2	9.1	10	45.5	8	36.4	1	4.5	1	4.5
Total	19	2.3	193	22.9	182	21.6	167	19.9	176	20.9	104	12.4

Table 3: Breakdown of reasons for and ethnicities excluded in final analysed dataset.

	Reason for excluding participants	No. of participants
(i)	Excluded due to unknown or "blank" incomplete datasets in "products used".	3349
(ii)	Excluded due to unknown or "blank" incomplete data for "medicines used".	53
(iii)	Excluded due to being categorised as "Other" ethnicity.	31

NB: Participants could occur in more than one of the three categories above.

Table 4: Medicines used across ethnic groups (2017–2019).

Ethnicity	Bupropion		None		NRT – combination		NRT – single product		Other		Varenicline	
	N	%	N	%	N	%	N	%	N	%	N	%
NZ European	3	0.4	53	7.1	323	43.4	280	37.6	65	8.7	21	2.8
Māori	1	0.3	33	10.5	133	42.4	124	39.5	21	6.7	2	0.6
Pacific	0	0.0	3	8.6	24	68.6	7	20.0	1	2.9	0	0.0
Asian	0	0.0	0	0.0	14	58.3	9	37.5	1	4.2	0	0.0
Total	4	0.4	89	8.0	494	44.2	420	37.6	87	7.8	23	2.1

NB/ Total (%) values are % of total cohort within each medicine category.

Table 5: Products used across ethnic groups (2017–2019).

Ethnicity	E-cigarette (nicotine)		E-cigarette (non-nicotine)		Inhalator		None		Other		Spray	
	N	%	N	%	N	%	N	%	N	%	N	%
NZ European	546	73.3	27	3.6	12	1.6	14	1.9	21	2.8	125	16.8
Māori	208	66.2	11	3.5	2	0.6	11	3.5	3	1.0	79	25.2
Pacific	27	77.1	0	0.0	0	0.0	1	2.9	0	0.0	7	20.0
Asian	22	91.7	0	0.0	0	0.0	0	0.0	0	0.0	2	8.3
Total	803	71.8	38	3.4	14	1.3	26	2.3	24	2.1	213	19.1

NB/ Total (%) values are % of total cohort within each product category. Note, "other" includes alternative forms of therapy, such as acupuncture.

Figure 2: Products used by all ethnic groups over a period of nine quarters from 2017–2019. This shows a large increase in the number of people using e-cigarettes containing nicotine over time.

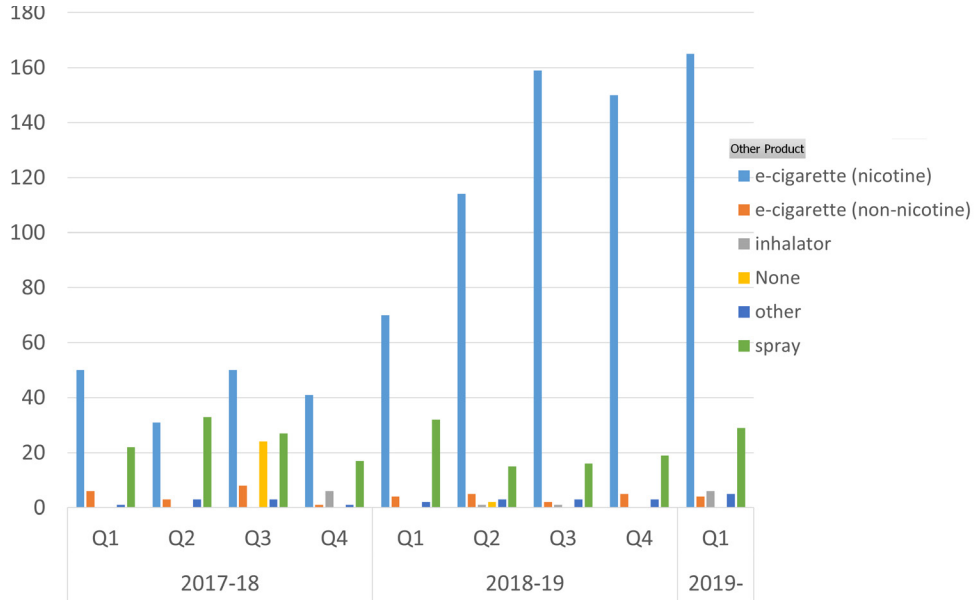


Table 6: Reasons why people did or did not like vaping.

I like vaping because…	%	I don't like vaping because…	%
Calming	1	Know it's still bad for you	3
Accessibility	1	Fiddly	5
Alleviates respiratory symptoms	3	Exacerbation of respiratory symptoms	7
Can use in public	3	Uncertainty around media	8
Less toxins	4	Need to recharge device	12
Cleaner for the environment	4	Swapping one habit for another	15
Good substitute over NRT	5	Nothing to dislike	24
Satisfying with nicotine	7	Not satisfying enough	25
Flavours	12		
Fragrance	13		
Keeps mouth occupied	14		
Assisted in smoking cessation	15		
Improved finances	18		

olds and 40–49-year-olds. For NZ Europeans, the highest e-cigarette uptake was observed in the 50–59-year-olds (Table 2).

Over the last two years the use of inhalators, nicotine and non-nicotine e-cigarettes has significantly increased across all ethnic groups (see Figure 2). This trend is particularly prominent in the last quarter of data.

"Vape to quit" follow-up

Of the 100 participants contacted 35% (n=35) identified as Māori, and 65% (n=65) as NZ European. At the time of follow-up, 16% (n=16) were smokefree and not vaping, 31% (n=31) were smokefree and vaping, 31% (n=31) were smoking and not vaping and 22% (n=22) were smoking and vaping. Of those who were vaping (n=53), 88.6% used vape products containing nicotine. Of the 53 vaping participants, 20 said that they intended to stop vaping, 10 said they did not intend to stop vaping, and the remainder were uncertain.

Of our cohort, 56% recommended that vaping should be used as an aid for smoking cessation compared to 44% who did not support this. Those who were vaping were more likely to recommend its use as a smoking cessation aid, with 84% of those smokefree and vaping recommending it, and 68% of those smoking and vaping recommending it. This contrasted with levels of 50% and 22.5% in the groups "smokefree and not vaping" and "smoking and not vaping", respectively. Table 6 summarises the key themes in response to the questions "What do you/did you like about vaping?" and "What do you/did you dislike about vaping?". The most popular reasons for liking vaping were around improvement of finances and to support smoking cessation. The greatest reason around dislike was that vaping was not satisfying enough.

The most common places that this vape to quit cohort were purchasing vaping products were vape stores (64%), outlet stores (10%), cannot recall (9%), petrol stations (7%) and convenience stores (5%). There were several reasons why people eventually stopped vaping, shown here in order of frequency: "went back to tobacco smoking", "not satisfying enough", "media advertising that it [vaping] is bad", "exacerbations of respiratory symptoms", "gave up altogether", "swapping one habit for another", "the vape broke", and finally, "pregnancy", which was reported as a reason for giving up vaping.

Discussion

This study has quantified the use of various smoking cessation aids in a large New Zealand cohort via Te Hā – Waitaha in Canterbury. The use of e-cigarettes as a smoking cessation aid was shown to increase substantially and to have become the most popular smoking cessation aid over the period assessed (2017–2019). A subset of 100 participants using e-cigarettes in their smoking cessation journey were followed up 6–12 months post quit attempt. Of these, 16% presented as smokefree and vapefree; 31% as smokefree and vaping; 31% were smoking and not vaping; and 22% were smoking and vaping. Overall, 47% were smokefree; however, 22% of this follow-up cohort became dual users (smoking and vaping).

Our research identified that the Te Hā – Waitaha service was successful in the active recruitment of Māori participants, at about three times the rate of the general population. A total of 9% of Canterbury's population identify as Māori; however, 28% of the people who engaged Te Hā – Waitaha identified as Māori. The proportion of Pacific people recruited was lower than expected, with recruitment around 3.1% compared to constituting ~5% of Canterbury's population.[21] A typical report presenting the national smoking rate, does not necessarily apply for all ethnic groups within a country. For example, although the smoking rate in New Zealand for all adults was 10.9% in 2020–2021, it was more than double that in Māori at a rate of 25.7%.[4] Māori participants enrolling in the Te Hā – Waitaha were younger than non-Māori participants. This may be due to how Māori smokers are the youngest group to start smoking, at just over 14 years of age.[4] However, the fact that Māori have been found to, on average, start smoking at a younger age, does not necessarily mean that more would want to quit while young. Therefore, it is encouraging that quit attempts are being established while these smokers are still young.

Analysis of smoking cessation aids over time

The data collected over nine quarters demonstrated an increase in the update of the use of nicotine containing e-cigarettes over time. This is in line with the general population information as demonstrated in the New Zealand Health Survey data. This data also showed an increase in the usage of e-cigarettes with a rate of 6.2% of adults being daily e-cigarette users in 2020–2021, up from 3.5% in 2019–2020 and 0.9% in 2015–2016.[4] The increasing use of e-cigarettes in smoking cessation is consistent with that seen overseas in countries that support their use, for example in the UK e-cigarettes are the most popular aid used by people trying to quit smoking. In 2020, 27.2% of people used a vaping product in a quit attempt in the previous 12 months. This compares with 15.5% who used NRT over the counter or on prescription (2.7%), and 4.4% who used varenicline.[22]

The sampling period was from 2017–2019. In 2018, the prior ban on the sale of nicotine-containing e-cigarettes was lifted after a successful court case of Philip Morris.[23] The fact that at this time point, e-cigarettes (containing nicotine, which are the most popular) were much easier to purchase is likely linked to the increase in uptake we have seen over this time.[24] In addition, the Government and, consequently, smoking cessation support services began to support the use of e-cigarettes for smoking cessation.[25]

Effectiveness of the "vape to quit" strategy for smoking cessation

The "vape to quit" strategy achieved a self-reported smoking cessation rate in almost half (47%) of the participants. A total of 16 of those were both smokefree and vapefree >6 months after their quit date. It also created 53 new vapers, of which 22 were engaging in both vaping and smoking (dual users). This has been demonstrated both within New Zealand[26,27] and internationally.[28,29] Dual use may increase tobacco harm by exposing individuals to a broader range of inhaled chemicals. Dual use has been shown to be associated with a higher risk of cardiovascular risk factors.[30,31] More work is needed to fully understand the impacts of dual use or e-cigarette use alone. People who vape continue to be exposed to carcinogenic and toxic substances albeit at lower levels than tobacco smoking. The evidence of damage to the airways is ever increasing, for example see Tsai et al.[32] From a public health perspective, it would be preferable that e-cigarettes are used as an interim measure to an eventual smokefree/vapefree state.[17] Of the 53 vaping participants in the follow-up cohort, 20 (38%) stated that their intention was to stop vaping eventually, the remainder either planned to continue vaping (19%) or were undecided (43%).

Strengths and limitations of the dataset

The strength of this study is that our data provide insight into the breadth of the Smokefree services provided, and they also dig deeper into the outcomes of participants at least six months fol-

lowing a "vape to quit" approach. Data was analysed from a large diverse population, including a high proportion of Māori participants. One limitation in extrapolating this analysis is that these data are from a single geographic region in New Zealand and cannot necessarily be extrapolated to New Zealand as a whole.

The exclusion of a large subgroup with incomplete data may have introduced bias. A total of 75% of clients, and their data, were excluded from the final analysis due to a lack of completeness. Table 3 shows that the main reasons were unknown or "blank" entries in the categories of "products used" and "medicines used". This was frequently due to incomplete data entered into the system by external health services. It was unclear whether incomplete or "blank" entries represented that nothing was used by the client in these cases or that this detail had not been manually entered. Therefore, it was deemed more accurate to remove these entries from the analysis. Many entries for products and medicines did contain "none" where nothing was used, if this was the case the data were included. Analysis of the breakdown of ethnicities in the excluded data showed a similar distribution to the cohort as a whole and the final dataset used. The largest proportion of data was removed due to unknown product(s) used. However, the medicines used by these clients was found to be distributed in a similar way with NRT – combination being the highest used medicine followed by NRT – single product. The excluded participants showed an elevated proportion using varenicline (7.4% compared to 2.1% in the remaining dataset, Table 4). There is no reason to believe that the excluded data would show different trends to those presented here; however, this is unknown and is a limitation of the study. One bias this may potentially have introduced is an under-representation of people either not using any medicines or any products, because if these entries were blank (and did not contain the clear definition of "none") the client's information was excluded. Future care of data collection will enable improved analysis in moving forward.

Other limitations related to the follow up interviews were that the follow-up data were not long enough to support a "vape to quit" programme as yet; however, it provides some real life information on the impact of such a programme. In addition, only self-reported smokefree rates were used, these were not confirmed by any other method. "Smoking" and "vaping" of the individual was defined based on their verbal response with no accounting or exploration of potential lapses.

Conclusion

Over the period of 2017–2019, the use of e-cigarettes as smoking cessation aids increased rapidly. Based on our data the use of e-cigarettes in a "vape to quit" strategy is attractive to smokers, based on the high uptake of their selected use as a smoking cessation aid (75%). In total, 16% of those in the follow up "vape to quit" cohort were both smokefree and vapefree. More long-term research into the effectiveness of e-cigarettes as part of smoking cessation strategies and its long-term outcomes is needed.

COMPETING INTERESTS
The authors have no commercial, financial, or non-financial associations related to this work.

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Whakarongorau abdominal pain review

Matt Wright, Fiona Pienaar

ABSTRACT

AIMS: The purpose of this study was to compare the frequency and profile of abdominal pain calls to Healthline with that from other national healthcare providers; to evaluate the outcomes for this symptom against international telehealth providers; and to explore any inter-clinician variation in the response to abdominal pain that could be part of a quality improvement cycle.

METHODS: Data routinely collected about abdominal pain calls to Healthline from 2017 to 2019 were extracted, analysed; and compared to the literature, hospital, and ambulance data and international telehealth providers. A specialist group was convened to review the profile of Healthline callers and outcome data. Variation in outcome changes and acuity grouping was evaluated at an individual level.

RESULTS: Approximately 50,000 abdominal pain calls to Healthline over three years were analysed, with three-quarters from women, mostly of childbearing age. The majority call afterhours, with NZ European and, to a lesser extent, Māori, and callers from smaller geographical areas are over-represented. One quarter of patients had a hospital outcome (including 4% receiving an ambulance), which was found to be less acute than comparable health systems. Whakarongorau's Clinical Governance Committee and the Specialist Group both supported the relative distribution of outcomes given by Healthline for abdominal pain. There was found to be variation in the outcomes given to abdominal pain callers at an individual clinician level. This was both in their changes to the disposition given by the Odyssey decision support tool and in their overall outcome distribution.

CONCLUSION: Healthline should be considered a key part of New Zealand's healthcare system, as illustrated by the volume of calls that it receives and the fact that presentation types are similar to general practice and emergency departments. Given that abdominal pain is a difficult symptom to accurately address without in-person examination and investigation, the findings support Healthline's outcomes as appropriate with hospitalisation rates lower than comparable healthcare systems. Whakarongorau's (the organisation which runs Healthline) ability to identify individual clinician behaviours gives it a unique opportunity to improve care through decreasing variation.

Abdominal pain is a common emergency department (ED)[1–3] and primary care[4] presentation, and is recognised as one of the most common reasons for a New Zealander to require services from any healthcare organisation. Abdominal pain is a challenging symptom due to the large number of possible causes.[5,6]

Healthline is a 24-hour phone line service provided by Whakarongorau Aotearoa to enable all New Zealanders access to free healthcare advice from registered nurses or paramedics, with some medical support. Healthline is delivered as part of New Zealand's National Telehealth Services (NTS), alongside other phone triage lines/services such as GP (general practitioner) Out of Hours service, Ambulance secondary triage and PlunketLine. As with most other services, abdominal pain is the number one presenting symptom to Healthline with over 5% of all calls to the service being focused on this issue. On average, there are 4,300 calls per quarter (around 44 per day) with this symptom. Nurses and paramedics triage utilising "Odyssey", an internationally validated clinical decision support tool.

The Odyssey decision support tool offers up to 20 questions to be answered for each presenting issue. Questions are prioritised by urgency and the combined response of the answers then provides an outcome. The Odyssey triaging tool for abdominal pain includes the standard SOCRATES questions on pain, associated symptoms, any indication of an injury or toxin causing the pain, relevant past medical history, and medications. Of note, the abdominal pain question set did not screen for psychological conditions causing or contributing to this symptoms presentation when it was first reviewed.

At the end of the consult, the nurse or paramedic can accept the outcome from Odyssey or change it, upgrading to a heightened acuity or downgrading to a less acute outcome, and if the latter, they record the reason. Clinicians are encouraged to use their experience to change the disposition in some situations if the patient's history suggests they need a different outcome, but to use the outcome recommended by Odyssey most of the time. Based on the timeframe identified that the patient be seen in (e.g., within six hours), the clinician then works with the patient on deciding which facility they should present to, and their mode of transport.

The purpose of this study was to compare the frequency and profile of abdominal pain calls to Healthline with that from other national healthcare providers; to evaluate the outcomes for this

symptom against international telehealth providers; and to explore any inter-clinician variation in the response to abdominal pain that could be part of a quality improvement cycle.

Methods

We reviewed all consecutive calls from 2017 to 2019 that were one of 33 different patient phrases that trigger a triage of abdominal pain. We identified demographics of callers, the time and day of the calls and the clinicians involved, as well as the outcome that each caller was given. We specifically identified whether the final disposition was changed from the initial disposition given by the decision support tool, Odyssey. Although the triage lines consist of Healthline, GP Out of Hours, Plunketline and Ambulance secondary triage, only Healthline calls were examined for the purposes of this study.

We also identified the patients who called frequently with abdominal pain, and their profile and pattern of utilisation of Healthline for abdominal pain. We requested data from a national emergency department and from similar international telehealth providers, to understand their call flows and outcomes for abdominal pain.

Synergia, a Healthcare consulting company, completed a literature review of telehealth for abdominal pain.

Oversight of this project was provided by the Whakarongorau Clinical Governance Committee (CGC), and a specialist group with representatives from gastroenterology, general surgery, emergency medicine, gynaecology, psychiatry, and paediatrics.

It is noted that the time period of this work was before the first and subsequent COVID-19 outbreaks in New Zealand, so the results and discussion are most relevant to the work done before 2020.

Results

Demographics, frequency and timing of calls

Abdominal pain is the most common primary symptom to Healthline and accounted for 5.1% of the 1,000,000 calls to this triage line from November 2017 to 2019. There tends to be no seasonal variation for abdominal pain, being a common symptom over the entire year.

Almost three quarters of patients calling Healthline with abdominal pain were aged between 13 and 64, the majority (75%) were female and in the child-bearing age bracket.

Compared with all symptoms, abdominal pain callers are more likely to be NZ European (10% greater) or Māori (2% greater). NZ European made up 60%; Māori 20%; Pacific peoples 6%; and 4% were of Asian descent (the four main ethnic groups).

Only 25% of abdominal pain calls are during normal business hours, with the remainder after 5pm on weekdays and over weekends (so-called "after hours").

Those with abdominal pain who were calling from less populated geographical areas seemed to be over-represented in Healthline calls, with seven of the nine highest proportion of calls about abdominal pain being from those living in small to medium sized DHBs. There was no ability to easily understand whether callers from these DHBs lived in the cities or the more semi-urban and rural areas.

There were 274 patients who called with abdominal pain more than three times—for a total of 1,297 calls. In one particular month, 83 (35%) of these patients called, accounting for 25% of all abdominal pain calls in that time period. Thirty-nine percent of these patients that frequently called about abdominal pain were 20–29 years of age, with a further 16% being 30–39 and 8% for each of the age brackets 13–19 and 40–44, combining to give a total of 71% in the 13–44 age bracket. The proportion in this age distribution for frequent callers was similar for all callers with abdominal pain, again with a female predominance.

Similar data to that which is available at Whakarongorau Aotearoa (demographics, presenting complaint and outcome) were available from one New Zealand hospital. This was used as a proxy for emergency department use by patients with abdominal pain, noting that populations in the DHBs in New Zealand use emergency departments in different ways and so robust conclusions cannot be drawn.

For this hospital, those presenting to the emergency department with abdominal pain had a similar female predominance, of which the majority were of childbearing age and, if anything, a little younger than those calling Healthline. However, for this hospital, there was also a higher elderly cohort presenting with abdominal pain than ring Healthline.

Those presenting to this ED with abdominal pain were more likely to be Māori or Pasifika, especially if they were of childbearing age. The majority were triage 3 and the rest triage 4, and only one third had a length of stay less than six hours. Forty-one percent were admitted for 24 hours or longer, as

Figure 1: Abdominal pain calls by broad age brackets; % of total over three years.

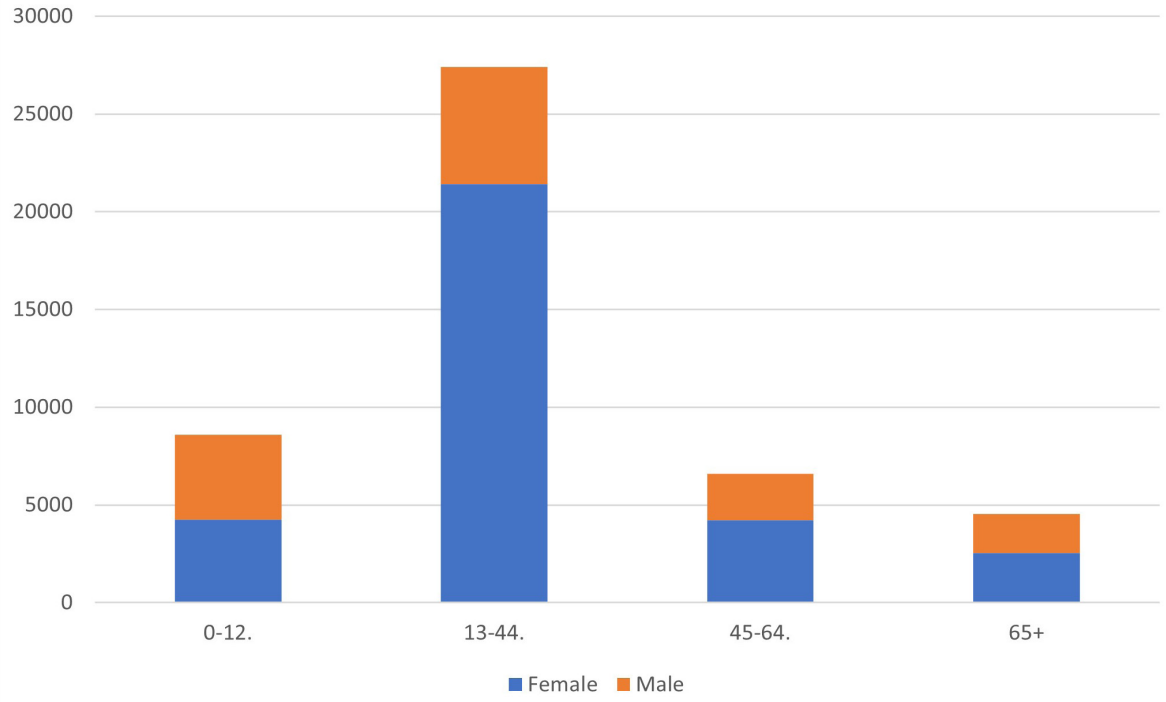
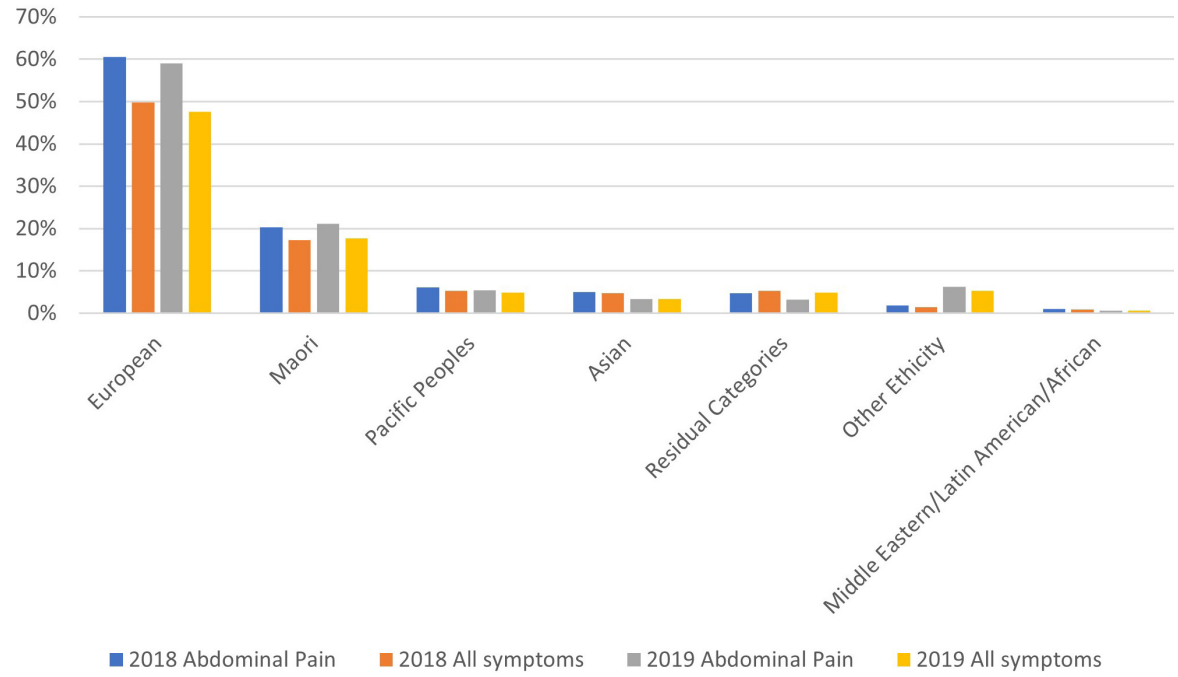


Figure 2: Abdominal pain callers compared to all symptoms, by ethnicity (2018 and 2019).



were the older patients, where the outcome was more likely admission—true of four out of five over 80-year-olds. Interestingly, specifically for females 18–45, abdominal pain presentations to this ED increased by 30% per year over a similar three-year period.

Outcomes

Over the three-year period before COVID-19, Healthline triaged 4% of abdominal pain to receive an ambulance, 20% were directed to the ED (via their own transport) and 30% were advised of an outcome of either an urgent care clinic (UCC) or GP on call (GPOC). This combines to give a total emergency department (Ambulance and ED) outcome of 24% and a total urgent outcome (addition of UCC/GPOC) as 54%.

At the other end of acuity scale, 32% of callers with abdominal pain were given the outcome of GP, and a further 9% were advised to self-care. This meant that the primary care percentage (urgent care and GP) was 62%, and the non-urgent percentage was 41%.

Half of those over 85 received an ambulance, and half of the elderly (over 65) were directed to the ED. In contrast, less than 15% of patients with abdominal pain who were under the age of six received this advice. There was little difference between the proportion of ED outcome for patients in the two young and middle age brackets, 13–29 (30%) and 30–54 (35%).

Whakarongorau has a close relationship with the ambulance service and a data sharing agreement in place. This allows understanding of further information for those that receive an ambulance through Healthline. Abdominal pain calls transferred to St John Ambulance across New Zealand are mostly requested as Orange (urgent or potentially serious), receive Priority Status 3 (stable but likely to change) on assessment by a paramedic, and the majority (93%) are subsequently transported to hospital.

International comparison

During 2019, one of Whakarongorau's clinical leads met virtually with various international providers, to understand their call flows and compare their approaches to abdominal pain. It was found that Australia, Wales and Canada all had very similar patient demographics to Healthline for those calling with this symptom, and all also had a nurse-led triage service, supported by a (different) decision support tool. Scotland and England; however, used medical practitioners to deal with undifferentiated abdominal pain (i.e., not obvious urinary tract infection or gastroenteritis), due to the varying descriptions on presentation, and the potential significant conditions which cause it. Therefore, these NHS providers are felt to be less comparable for abdominal pain, but overall outcomes are still comparable for all triages.

In 2019, 24% of Whakarongorau Aotearoa service users presenting with abdominal pain were referred to the ED, compared to 31–39% for Australia, Wales and Canada. The two NHS services (Scotland and England) had <5% ED use, primarily because, as described above, they use GPs to assess most people calling with this complaint.

Canada had 20% more calls with abdominal pain having an ED disposition than its average. Australia had 16% more ED use for those calling with abdominal pain, while Wales and New Zealand's Healthline had a smaller increase of 8%. The NHS lines for England and Scotland decreased the number sent to ED by 17% and 7%, respectively, by using the model of GP-led triage for this symptom.

Clinicians

There were 121 individual clinicians who each took more than 100 abdominal pain calls over the time period examined. Their call outcomes were grouped into three acuity bands: "emergency care" refers to ambulance and emergency department outcomes; "urgent care" is urgent care clinic and GP On Call outcomes; and "routine care" is GP, self-care, and information outcomes. The descriptive statistics for these clinicians are shown for each acuity band in Table 2.

For all acuity bands, there was significant variation at the maximum and minimum levels, with specific individual clinicians having both very high, and very low, proportions in each of the three bands. The majority of clinicians had outcomes for abdominal pain in the following order: routine care (43%), urgent care (30%) and emergency care (27%).

There were 18 clinicians who had emergency care outcome proportions more than one standard deviation from the mean, and eight of these were greater than two standard deviations.

For these latter individuals, they sent an ambulance or directed the patient to self-transport to the ED over two thirds of the time. In comparison there were six clinicians who only sent one in fourteen callers with abdominal pain to hospital, and there were no clinicians less than one standard deviation from the mean in this acuity

Table 1: National emergency department and international telehealth providers data, comparing population treated and outcomes given for abdominal pain.

	Country (Area)	NZ	Australia	Wales	Scotland	England	Canada
Outcomes overall	ED	**16**	**23**	**22**	**12**	**22**	**19**
	Primary care	**63**	**51**	**26**	**38**	**56**	**35**
	Self-care	**20**	**15**	**9**	**48**	4	**46**
	Total	99	89	57	98	82	100
Abdominal pain	ED	**24**	**39**	**31**	5	5	**39**
	Primary care	**67**	**53**	**45**	**40**	**94**	**41**
	Self-care	**9**	**6**	**10**	**50**	1	10
	Total	100	98	86	95	100	90
Difference between abdominal pain and overall	ED	**8**	**16**	**9**	-7	-17	**20**
	Primary care	**4**	**2**	**19**	**2**	**38**	**6**
	Self-care	-11	-9	**1**	**2**	-3	-36

Table 2: Maximum, minimum, average and interquartile range.

	Emergency care	Urgent care	Routine care
Maximum	86%	65%	86%
Upper quartile	35%	40%	56%
Average	27%	30%	43%
Lower quartile	12%	20%	29%
Minimum	2%	1%	5%

Table 3: Clinician outcome proportion deviations.

	Emergency	Urgent	Routine
2 SDs above	8	2	3
1 SD above	10	18	16
Between 1 SD either side	97	77	80
1 SD below	6	22	20
2 SDs below	0	2	2

Table 4: Abdominal pain upgrades and downgrades.

	Upgrade	Downgrade
Maximum	67%	35%
Upper quartile	24%	12%
Average	16%	4%
Lower quartile	8%	0%
Minimum	0%	0%

Table 5: Individual upgrade and downgrade proportions.

	Up	Down
2 SDs above	3	4
1 SD above	11	14
Between 1 SD either side	70	77
1 SD below	11	0
2 SDs below	0	0

bracket. The majority (80%) of clinicians were within one standard deviation of the mean in the emergency outcome group.

There were around 20 clinicians who both advised a routine outcome more and less frequently, statistically, than the mean (greater than one standard deviation different), with only two thirds of the clinicians within one standard deviation above. Five clinicians were two standard deviations different in the proportion of routine care they advised.

Individual clinicians were also evaluated on how frequently they upgraded (increased the acuity) or downgraded (decreased the acuity). The descriptors for upgrades and downgrades for abdominal pain by individual clinicians are shown in Table 4.

Around one in six abdominal pain questions have their acuity heightened (an upgrade) with only 4% "downgraded" to a less acute outcome. In total around one in five outcomes from the decision support tool, Odyssey, are changed.

However, there are individuals who both upgrade and downgrade far more than the average, four times and eight times at maximum, respectively.

There were 14 clinicians who had upgrade proportions more than one standard deviation from the mean, and three of these were greater than two standard deviations. For these latter individuals they upgraded over 40% of the time. In comparison there were eleven clinicians who infrequently upgraded—less than one in twenty-five callers with abdominal pain.

There were 18 clinicians who had a downgrade proportion more than one standard deviation from the mean, and four of these more than two standard deviations. This meant that for this latter group, one in four calls were downgraded.

There were no clinicians more than two standard deviations below the mean for either their upgrade or downgrade proportions. Seventy-two percent and 80%, respectively, of clinicians were similar to the mean for upgrades and downgrades.

It is known from previous work that, in relation to upgrades and downgrades for abdominal pain, those patients that are upgraded to ambulance are 8% more likely to be transported, those that are upgraded to ED are 20% more likely to be admitted, and those that are downgraded to self-care and GP are 5% more likely not to present anywhere within the next week. Hence, changes often result in more consistent outcomes.

Discussion

Healthline's callers with abdominal pain were found to be similar to in-person provision at EDs, where patients with abdominal pain was found

to be a frequent presentation, as is found in primary care. The profile of the patient calling most often with abdominal pain—a young to middle aged female, is also similar to that presenting to the ED. It would make sense that calls would more commonly be from women given the prevalence of gynaecology conditions that cause abdominal pain and the potential underlying social factors, which might mean that a free phone call is easier than a trip to the hospital or GP, less time consuming than the former and cheaper than the latter. The time-of-day analysis supports this—with most calls coming afterhours, and from patients based in less populated regions, where there may also be distance barriers to accessing traditional in-person care. Healthline's free service and large volume of calls seems to be increasing access to healthcare for New Zealanders.

The literature review reminds us that a lot of abdominal pain has a psychological component, and that a patient's presentation of depression or anxiety can be recurrent abdominal pain. There were less than 300 individuals calling Healthline who fell into this category but, even so, in some months that contributed to a large proportion of the total abdominal pain calls. Recognising this and leveraging the fact that Whakarongorau has a mental health and addiction arm to the organisation, there has been an additional question set added in Odyssey to screen frequent callers for depression and anxiety. The patient management system flags if someone has called multiple times over three or more months, and prompts the clinician to screen them, and provide feedback to the GP if the screen is positive.

Despite the wide range in causes of abdominal pain, the majority of callers do not receive an ambulance nor are directed to hospital. Just under half of all abdominal pain callers to Healthline are reassured they do not need to see a doctor that day—the literature would support this, confirming that most abdominal pain is benign. The specialist group recognised that for abdominal pain it can be difficult, even in person, to identify pathological causes, let alone in a phone consult (without an examination). The formation of the group helped Whakarongorau in two ways; by using the specialists experience to optimise the abdominal pain question set and also giving them an understanding of how Healthline works to take back to their own organisations.

The cautious approach that Healthline takes for abdominal pain, in that there is a higher ED use than for general symptoms, is felt to be appropriate. When Healthline is examined against comparable healthcare systems which also have abdominal pain as their most common symptom to be triaged, less patients in New Zealand are sent to ED than those countries with similar workflows. The specialists supported that Healthline has less hospital outcomes than these other countries because it mitigates risk by increasing the outcome of semi-urgent primary care.

The nurses and paramedics on Healthline come from a wide range of backgrounds and experience, and many will not have dealt with a lot of abdominal pain in their previous roles, nor had to be the decision-making clinician for patients with this complaint. Therefore, it is not surprising that many naturally err on the side of caution, sending more to hospital than is considered normal. These risk adverse nurses and paramedics often add to this by upgrading more frequently and seldom downgrading. However, this review found that there were a few clinicians who are more confident in their triage and have a distribution of outcomes that are "higher risk", both offering less ambulances and ED attendances, and also having more "self-care" than routine GP. The calls from these clinicians have been listened to, and their proportion of outcomes monitored over time, as these are the individuals most likely to have a worrying outcome.

Because the data at Whakarongorau are at clinician level and organised by team, there is a natural structure to disseminate information for quality improvement. The team leaders will be supported to evaluate and coach those in their team who are markedly different from the average, so that this information is given in a constructive manner, as it is recognised that poor feedback can cause more harm than good.

Conclusion

This article supports the notion that Healthline is a significant contributor to the healthcare system, with ~50,000 abdominal pain calls fielded from 2017–2019, which is only 5% of the total volume of the service. The types of patients calling can be similar to those presenting to any general practice or ED, but without the luxury of examination, observation time and investigations. Despite these barriers, the New Zealand specialists (who frequently deal with abdominal pain) supported the distribution of outcomes given to patients by Whakarongorau over that from the countries that have

the most similar call flows, Australia and Canada.

Through these findings and actions, Whakarongorau is hopefully demonstrating that it is investing in clinical excellence and in identifying and reducing variation in a structured way. Abdominal pain is the place where this has started, but this approach can readily be applied to all other common symptoms and the findings for abdominal pain are likely to positively influence outcomes for all presenting complaints.

With abdominal pain being such a frequent complaint, optimising the care of this is likely to have a substantial benefit for the New Zealand healthcare system.

COMPETING INTERESTS
Nil.

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Epidemiology of carbapenem resistant *Acinetobacter baumannii* in New Zealand

Matthew R Blakiston, Mark B Schultz, Indira Basu, Susan A Ballard, Deborah Williamson, Sally Roberts

ABSTRACT

AIM: Carbapenem resistant *Acinetobacter baumannii* have limited treatment options and a propensity to cause hospital outbreaks. In recent years an increase in their detection has been observed in New Zealand. This study aimed to describe the molecular epidemiology of these isolates.

METHOD: This study utilised carbapenem resistant *A. baumannii* complex isolates identified across New Zealand between January 2010 to April 2018. Whole genome sequence analysis and associated demographic information was used to contextualise local isolates within the global epidemiology and establish the relationship between isolates.

RESULTS: Thirty-three carbapenem resistant *A. baumannii* complex isolates (31 *A. baumannii* sensu stricto) were identified. Twenty-four (73%) were from January 2015 onwards. Twenty-four (73%) had an identifiable epidemiological link to overseas hospitalisation. Twenty-three (74%) of 31 *A. baumannii* sensu stricto were sequence type (ST) 2 (Pasteur scheme). Phylogenetic analysis identified three ST2 clusters. The largest cluster, of 12 isolates, was from 2015 onwards; with nine (75%) associated with recent hospitalisation in Fiji or Samoa.

CONCLUSION: Increasing numbers of carbapenem resistant *A. baumannii* are being identified in New Zealand. Our data show that this is in large part associated with transnational spread of a single *A. baumannii* sensu stricto ST 2 strain between Fiji, Samoa and New Zealand.

Acinetobacter baumannii is a gram-negative coccobacillus that has emerged as a multi-drug resistant (MDR) cause of hospital acquired infection in many locations worldwide.[1,2] Infections primarily affect vulnerable patients in the intensive care setting and are associated with high crude mortality.[1] The emergence of MDR *A. baumannii* has occurred in association with regional and international spread of hospital adapted clones.[3–5] Carbapenem antimicrobials were the primary treatment option for MDR *A. baumannii* strains. However, the emergence of carbapenem resistance in these global lineages, mediated primarily by acquired OXA carbapenemases, has severely restricted treatment options.[3,6]

In the Pacific/Oceania regions, carbapenem resistant *A. baumannii* have been reported from French Polynesia, New Caledonia and Australia since the early- to mid-2000s.[7–9] In 2015–2017 an outbreak occurred in a Fijian neonatal intensive care unit, with invasive infection associated with a crude mortality of 86%.[10] MDR *A. baumannii* is not endemic in New Zealand hospitals, with sporadic cases identified primarily in individuals with a history of overseas hospitalisation. A single outbreak has been reported in New Zealand, with an MDR, but carbapenem sensitive, strain that affected an Auckland hospital in 1998–1999.[11] However, in recent times we have experienced an increase in their detection, associated with prior hospitalisation in neighbouring Pacific Island countries and territories (PICT).

The limited antimicrobial treatment options and propensity of carbapenem resistant *A. baumannii* to cause hospital outbreaks poses a threat to healthcare in New Zealand and other PICT. Enhancing our understanding of the local epidemiology of carbapenem resistant *A. baumannii* may assist with mitigation strategies. Utilising the high discriminatory capacity of whole genome sequence (WGS) molecular epidemiology we aim to contextualise local New Zealand isolates within the global epidemiology, establish the local relationship between isolates, considering especially those with links to PICT, and explore potential routes of dissemination in the Pacific regions.

Methods

This was a retrospective descriptive study. We identified carbapenem resistant *A. baumannii* complex isolates with putative acquired OXA

carbapenemase genes from laboratory records at Auckland District Health Board (ADHB) and the Antimicrobial Resistance (AMR) Reference Laboratory at the Institute of Environmental Science and Research (ESR) from January 2010 to April 2018. This is believed to have captured the majority of cases in New Zealand over this period as all laboratories were encouraged to send carbapenem resistant *A. baumannii* isolates to ESR for further characterisation. Basic demographic information (age, gender, ethnicity) and epidemiological metadata, such as a documented history of overseas hospitalisation, were retrieved from clinical records where possible. Study approval was obtained from the New Zealand Health and Disability Commission ethics committee (reference number 18/NTB/24). Funding was provided by the A+ Trust Microbiology Education and Research Fund.

Isolates were grown on sheep blood agar and identified to species-complex by MALDI-ToF MS (BioMerieux). Susceptibility to meropenem, piperacillin-tazobactam and colistin, was determined using Sensititre (ThermoFisher Scientific) microbroth dilution method. Meropenem and colistin mean inhibitory concentrations (MICs) were interpreted as per EUCAST *Acinetobacter* breakpoints; and piperacillin-tazobactam MICs were interpreted as per CLSI *Acinetobacter* breakpoints (EUCAST breakpoints not being available for *Acinetobacter* versus piperacillin-tazobactam).[12,13] Susceptibility to ciprofloxacin, cotrimoxazole, gentamicin, and amikacin were determined using disc diffusion as per EUCAST.[12] Ceftazidime susceptibility was determined by disc diffusion as per CLSI (EUCAST breakpoints not being available for *Acinetobacter* versus ceftazidime).[13]

DNA was extracted from each isolate utilising the QIAamp DNA mini-Kit (QIAGEN). Unique dual indexed libraries were prepared using the Nextera XT DNA sample preparation kit (Illumina). Libraries were sequenced on the Illumina NextSeq 500 with 150-cycle paired end chemistry as described by the manufacturer's protocols. Bioinformatic analysis was performed using the Nullarbor[14] v2 pipeline. Briefly, Trimmomatic[15] v0.36 was used to remove adaptors and low-quality bases and reads. Kraken[16] v1.0 was used to perform *in silico* species detection and assess the paired-end read-sets for contamination. Short-reads were assembled *de novo* using SPAdes[17] v3.12.0 and the resultant contigs were annotated using Prokka[18] v1.14. Multi-locus sequence type (MLST) was determined using MLST[19] v2.11 with the *A. baumannii* Pasteur scheme[20] (*cpn60, fusA, gltA, pyrG, recA, rplB, rpoB*) downloaded in July 2018. OXA carbapenemase genes were identified using the Resfinder[21] database in Abricate[22] v0.8.2. Mash[23] v2.1 was used to create a distance matrix from k-mer hashes, and QuickTree[24] v2.3 was used to construct a neighbour joining tree for exploratory analysis of the relationship among isolates. A core-genome (defined as sequences found in ≥99% of isolates) maximum likelihood tree was then inferred for MLST ST2 isolates with IQ-TREE[25] v1.6.5, using the *A. baumannii* reference genome under NCBI accession NC_021729, with core-genome SNPs identified using Snippy[26] v4.0, and probable recombinant sites removed using Gubbins[27] v2.3.1. Reads for each sequenced isolate (AB1-20, AB22-34) have been deposited in NCBI under Bioproject accession PRJNA855258.

Results

Thirty-three distinct carbapenem resistant *A. baumannii* complex isolates were identified from 32 persons (cases) between January 2010 and April 2018. Twenty-four of 33 (73%) isolates were identified since January 2015 (Figure 1), and 23 (70%) were identified in the Auckland region (Figure 1A). Eighteen of the 26 (69%) isolates with available data were identified in clinical specimens, while eight (31%) were identified in MDR organism screens alone. Cases had a median age of 56 years (range <1 to 77) and 18 of 32 (56%) were female. Eight of 30 (27%) cases, with available ethnicity data, were reported as Pākehā/NZ European; four (13%) as Māori; four (13%) as Fijian; four (13%) as Samoan; three (10%) as Indian; three (10%) as other European; two (7%) as Fijian Indian; one as Chinese (3%); and one (3%) as other Asian. Twenty-one of 32 (66%) cases had an identifiable history of "recent" overseas hospitalisation; 14 were direct hospital to hospital transfers, five were hospitalised overseas in the preceding four weeks, and in two cases the exact timeframe could not be identified. Ten of these 21 (48%) persons had been hospitalised in Fiji, four (19%) in Samoa, and one (5%) in each of French Polynesia, China, India, Korea, Thailand, Greece and Romania. One of these persons carried two distinct strains. Two further cases had a strong epidemiological link (hospitalised in same ward in New Zealand) to imported cases (Fiji and French Polynesia respectively); giving 24 (73%) of 33 isolates an identifiable link to overseas hospitalisation (Figure 1B).

Thirty-one (94%) of the 33 *A. baumannii* complex isolates were identified (from sequence data)

Figure 1: Carbapenem resistant *Acinetobacter baumannii* complex New Zealand 2010–2018: (A) by location of isolation; (B) link to overseas hospitalisation; and (C) phylogenetically clustered versus non-clustered isolates (refer to Figure 2).

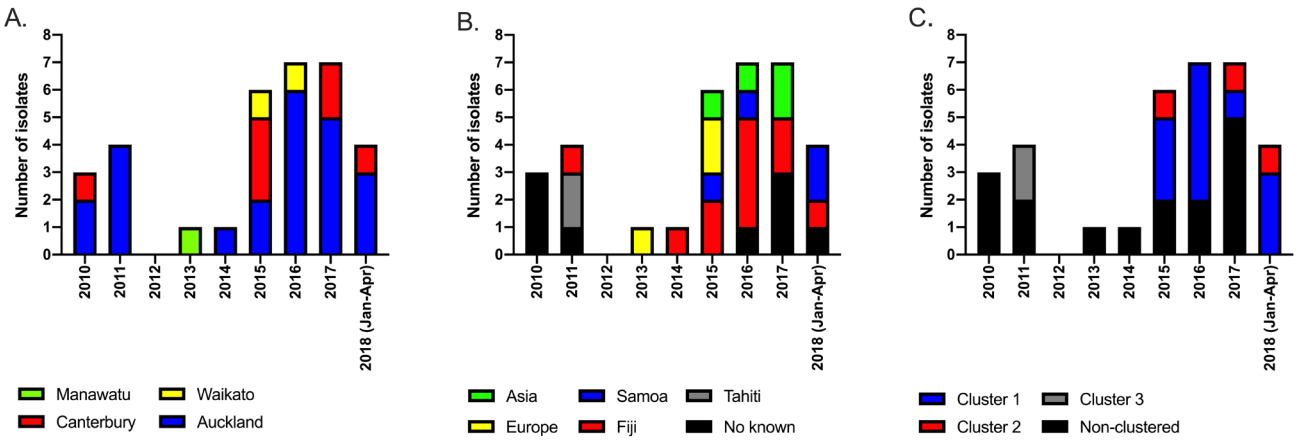
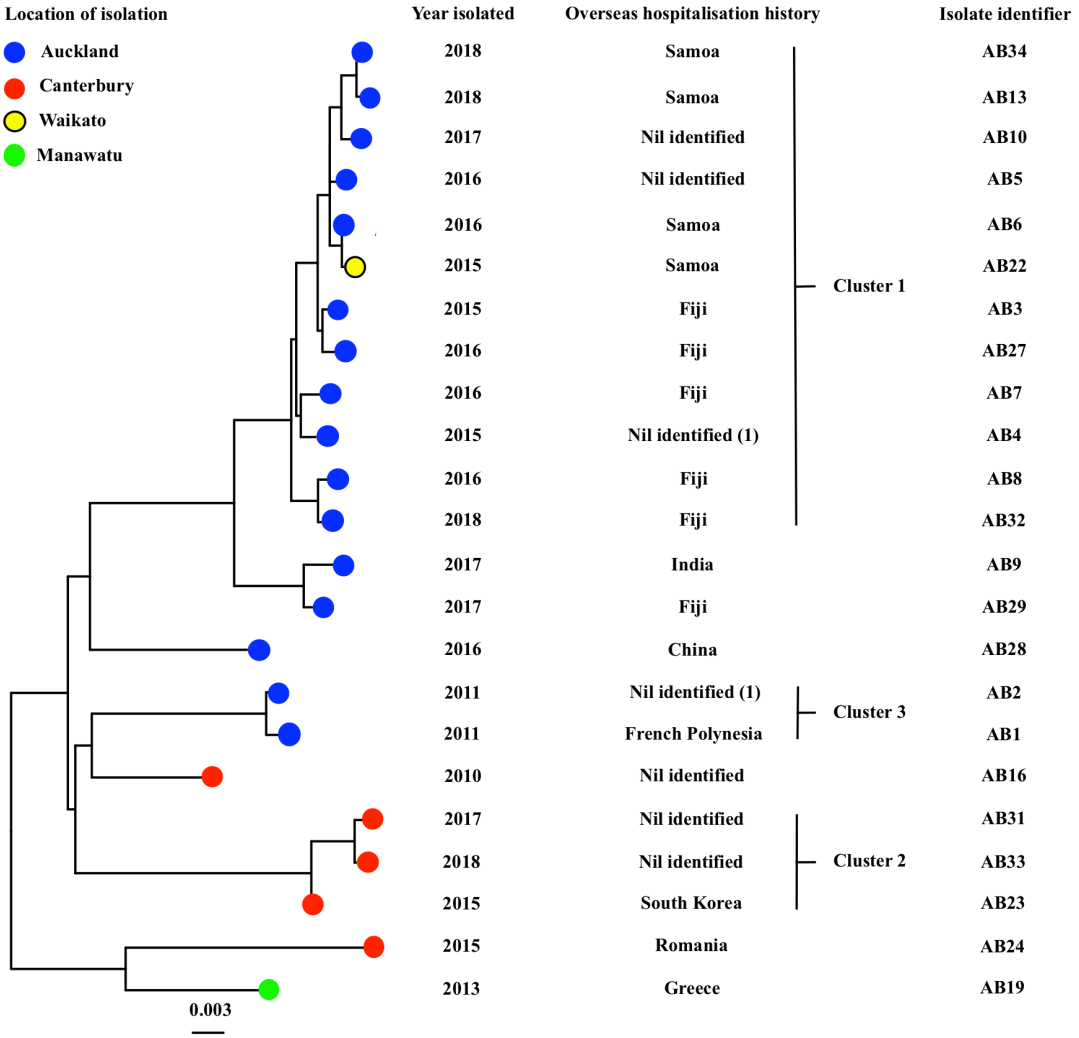


Figure 2: maximum likelihood phylogenetic tree of ST2 *Acinetobacter baumannii* sensu stricto in NZ 2010–2018**.** Scale, substitutions per site. 1) Epidemiologically linked (hospitalised in same ward in New Zealand) to imported cases.



as *A. baumannii* sensu stricto (AB1-16, 18–20, 22–25, 27–34) and two (6%) as *A. pittii* (AB26, 17). Twenty-three (74%) of the 31 *A. baumannii* sensu stricto were ST 2 (AB1-10, 13, 16, 19, 22–24, 27–29, 31–34), three (10%) were ST 25 (AB11, 12, 14), two (6%) were ST 1 (AB18, 25), and there was one (3%) each of ST 103 (AB15), ST 107 (AB20), and ST 164 (AB30). None of the 31 *A. baumannii* sensu stricto were susceptible to meropenem (as per selection criteria); three (10%) were susceptible to ceftazidime; none were susceptible piperacillin-tazobactam; one (3%) was susceptible to gentamicin; five (16%) were susceptible to amikacin; three (10%) were susceptible to cotrimoxazole; three (10%) were susceptible to ciprofloxacin; and 29 (94%) were suspectable to colistin. None of the *A. pitti* were susceptible to meropenem or piperacillin-tazobactam but were susceptible to all other antimicrobials tested. Twenty-nine (94%) of the 31 *A. baumannii* sensu stricto carried a $bla_{\text{OXA-23}}$ gene and two (6%) carried $bla_{\text{OXA-40-like}}$ genes. Both *A. pittii* isolates carried a $bla_{\text{OXA-40-like}}$ gene.

The maximum likelihood phylogenetic tree (based on analysis of 281,823 SNPs) of the 23 ST 2 *A. baumannii* sensu stricto is shown in Figure 2. There were three genomic clusters of closely related isolates separated by ≤15 single nucleotide polymorphisms (SNPs) on pairwise analysis; in contrast to thousands of SNPs between each respective cluster and other ST 2 strains; These clusters included, 1) 12 isolates identified predominantly in the Auckland Region between 2015 and 2018; 2) three isolates identified in Canterbury between 2015 and 2018; and 3) two isolates from Auckland in 2011. Clusters 1, 2, and 3 accounted for 36%, 9%, and 6% of the 33 carbapenem resistant *A. baumannii* complex isolates in this study (Figure 1C).

Discussion

This study describes the epidemiology of carbapenem resistant *A. baumannii* in New Zealand from 2010 to 2018. The majority of cases were identified in the Auckland city region, reflecting perhaps a relatively larger population size, regional differences in population demographics, receipt of medical repatriations, and/or provision of tertiary services to other PICT. The majority of cases also had an identifiable history of recent overseas hospitalisation; in particular, hospitalisation in Fiji or Samoa. An increase in cases associated with these countries has occurred since 2015 in temporal association with an outbreak in Fiji.[10] This association contrasts with other MDR Gram-negative bacilli in New Zealand, such as carbapenemase producing *Enterobacterales*, which are typically associated with healthcare contact or travel in South and South-East Asia.[28]

A. baumannii ST 2 was the most common ST identified. ST 2 is a globally distributed hospital adapted clone that is commonly associated with outbreaks, including in Fiji.[3,10] Using WGS based molecular epidemiology we identified three clusters of closely related isolates among the 23 ST 2. Cluster 1 consisted of 12 isolates that were identified at three different laboratories in the Auckland Region and one laboratory in the Waikato between 2015 and 2018. Nine (75%) of the cases had a history of recent hospitalisation in either Fiji (5) or Samoa (4). Of the remaining three cases, one is presumed to represent transmission in the New Zealand hospital setting, another was of Samoan ethnicity, while the final case had no demographic or epidemiological data available. Cluster 1 isolates were resistant to all antimicrobials tested except colistin and all carried the carbapenemase gene $bla_{\text{OXA-23}}$. The close epidemiological, phylogenetic, and temporal relationship of the Cluster 1 isolates indicate recent trans-national spread of a single strain between healthcare facilities in Fiji, Samoa and New Zealand. We hypothesise Cluster 1 to be the same strain responsible for the 2015–2017 outbreak in Fiji but did not have isolates available to allow testing of this hypothesis.[10] Cluster 2 consisted of three ST 2 isolates identified in Canterbury between 2015 and 2018. The earliest case had a history of hospitalisation in South Korea. Their close phylogenetic relationship and common location suggests local transmission. Cluster 3 consisted of two isolates identified in an Auckland hospital in 2011. One case had a history of hospitalisation in French Polynesia with the second case strongly linked by epidemiological and now genomic data to in-hospital transmission in New Zealand.

In addition to the isolates described in Cluster 1, a further five unrelated cases were associated with recent hospitalisation in Fiji. These included four *A. baumannii* sensu stricto isolates: one ST 1 from 2011, one ST 107 from 2014, one non-clustered ST 2 from 2017, and one ST 25 from 2017; as well as a single *A. pittii* from 2016. This suggests there have been multiple strains of carbapenem resistant *Acinetobacter* introduced into Fijian hospitals and/or circulation of the transposons bearing carbapenem resistance genes over the past decade, the latter which could be the subject of a future study. In contrast, all four isolates associated with hospitalisation in Samoa were part of

ST 2 cluster 1. The ST 2 strain associated with hospitalisation in French Polynesia from 2011 was not closely related to any isolates associated with Fiji or Samoa suggesting a separate introduction into the Pacific. The acquired $bla_{\text{OXA-23}}$ gene was the most common carbapenemase gene identified. The clonal nature of a significant proportion of the isolates in this study narrows bla_{OXA} diversity; however, the predominance of $bla_{\text{OXA-23}}$ is consistent with reports from the Asia-Oceania regions.[29]

Increasing numbers of carbapenem resistant *A. baumannii* have been identified in New Zealand since 2015. This has occurred in association with the transnational spread of a ST 2 strain between Fiji, Samoa and New Zealand.

With a known propensity to cause hospital outbreaks and limited antimicrobial treatment options, carbapenem resistant *A. baumannii* poses a potentially escalating threat to safe healthcare delivery in New Zealand and other PICT. The major risk factor for carbapenem resistant *A. baumannii* infection/colonisation in the New Zealand setting is recent hospitalisation overseas; including in PICT that historically have been considered low risk for MDR gram-negative organisms. Hospitals require systematic processes to identify high risk individuals at presentation so appropriate microbiological screening can be performed and transmission-based infection control precautions implemented.

COMPETING INTERESTS
Nil.

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A service evaluation to explore Māori experiences of direct-acting antiviral hepatitis C treatment in Aotearoa New Zealand

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ABSTRACT

AIMS: Hepatitis C, and its associated life-limiting sequalae, disproportionately affect Māori. Despite availability of fully funded effective and well-tolerated oral direct-acting anti-viral agents (DAA), many in New Zealand remain untreated. This service evaluation aimed to explore the experiences of Māori who have received DAA treatment for hepatitis C, and their ideas for service improvement.

METHODS: This qualitative service evaluation recruited eligible participants (Māori, 18 years+, DAA treatment since February 2019) through health care providers. Semi-structured interviews were undertaken over the telephone with consenting participants. General inductive analysis was used to generate themes contextualising findings within cultural contexts for Māori, as aligned with Māori methodological research practices.

RESULTS: Twelve participants were interviewed. The physical and mental impact hepatitis C can have, and that treatment with DAA leads to improvement in these domains, were highlighted. Proactivity by health professionals was valued, including the benefit of wrap-around services to keep people connected throughout the treatment journey, with participants articulating the ability to self-advocate when needs were not met by other services.

CONCLUSION: Findings can be used to enhance the development of further hepatitis C treatment services, based on Māori experiences of treatment and self-identified solutions for improvement in hepatitis C care.

Hepatitis C is a blood-borne virus affecting approximately 50,000 New Zealanders, with up to 40% of these people unaware of their hepatitis C positive status.[1] Three-quarters of those that are infected with hepatitis C will go on to be chronic carriers of the virus which, untreated, leads to liver cirrhosis occurring in up to 25% of these people. In those with cirrhosis, two to five percent develop liver failure or liver cancer annually.[1] In 2016, the Ministry of Health in New Zealand[2] formally adopted the World Health Organization's goal to eliminate hepatitis C by 2030.[3] This goal is deemed achievable thanks to the introduction of new, well tolerated, pangenotypic direct-acting antiviral (DAA) treatments, which have at least 95% cure rates of hepatitis C.[4] In New Zealand, the main funded DAA treatment is Maviret® (glecaprevir/pibrentasvir). From previous data match work within the Northern Region of New Zealand (top of the North Island, estimated population of 1.9 million, 14% Māori[5]) it is estimated that there may be approximately 2,000 people who have hepatitis C but for whom a treatment record was not found.[6]

The historical and ongoing contemporary effects of colonisation have contributed to inequitable access to the determinants of health for Māori.[7] Colonisation also affects Māori access to other social systems in New Zealand with reduced access to education, employment, housing, and over-representation in the judicial and penal systems. These inequities all contribute to the fact Māori are more likely than non-Māori to use injectable drugs or be incarcerated,[8] two of the most common risk factors for hepatitis C transmission. Māori bear a disproportionate burden of hepatitis C infection compared with non-Māori,[6] and therefore, are at increased risk of liver failure and liver cancer.

Te Tiriti o Waitangi guarantees Māori the right to culturally safe mainstream health services and the option of kaupapa Māori health services.[7] To develop culturally safe services, Māori governance and partnership is required throughout the development process[7,9] which includes the inclusion of Māori with lived experience. Regional

work is being undertaken to develop a centralised treatment service to identify, contact, and offer treatment to people previously diagnosed with hepatitis C but who remain untreated. Understanding patients' experiences of healthcare services is important in evaluating current services, as well as improving future services and is central to a kaupapa Māori approach to service development.[10] This service evaluation aimed to explore the experiences of Māori in the Northern Region of New Zealand, who have received Maviret® treatment for hepatitis C, and their ideas for service improvement.

Method

This qualitative service evaluation used semi-structured interviews to explore positive and negative aspects of hepatitis C treatment experiences, and to identify aspects of hepatitis C treatment that are important for developing a culturally safe service. District Health Board (DHB) research authorities provided approval (#2021-58; RM RM15005). The Consolidated Criteria for Reporting Qualitative Research (COREQ)[11] was used to structure service evaluation reporting.

Eligibility

Participants had to be Māori, 18 years or older, have received Maviret® treatment in the Northern Region since February 2019, have the capacity to consent and be able to undertake an interview for up to 30 minutes. Those unable to provide informed consent were excluded.

Recruitment

Pharmacies that had dispensed Maviret® to Māori patients were identified through dispensing data available to DHB analysts. The pharmacies with the highest number of Maviret® dispensing to Māori were invited by email to support recruitment for the interviews. Pharmacies were provided with a brief evaluation outline and asked to contact potential participants to gauge their interest in participation and seek permission to pass on details to the interviewers. Pharmacies were asked to recruit up to five participants each (purposive sampling) and documented the patients' consent to pass on details. A pragmatic approach to sample size was utilised, based on resource and time constraints and it was intended to recruit 15–20 participants. A DHB hepatitis nurse specialist and a nurse from the Auckland Drug Information Outreach (Needle Exchange) were also approached and contacted potential participants using the same method as pharmacies.

Consent and data collection

Once provided with details, interviewers contacted potential participants via phone to provide further information about the service evaluation (purpose, process and how results would be used), ask for consent to participate and organise an interview time and method (i.e., phone, video conferencing or in-person). The interviews were conducted by engagement coordinators (female Māori [n=1], female Samoan [n=1]), experienced in strengths-based consumer engagement, who underwent semi-structured interview training (theory and role playing) prior to contacting participants. Participants could have support people present during their interviews and choose if they participated in English or te reo Māori. After consent was gained, interviewers had a general conversation with participants to establish rapport. A question guide (see supplementary material) supported the interview process which had been developed by the service evaluation team and piloted within the team. Interviewers were encouraged to use prompts when needed. Participants were offered the opportunity to receive a summary of findings at the end of the service evaluation and were provided with a $40 supermarket voucher. Repeat interviews were not conducted but each participant was contacted at least two weeks after their interview to check they had received the voucher and whether they had anything further they would like to add. Interviews were audio recorded and transcribed by a contracted transcriptionist. Transcripts were checked for correctness by the interviewers.

Data analysis

Transcripts were read for familiarisation and then coded in NVivo qualitative data analysis software (QSR International Pty Ltd. Version 12, 2018A) with codes then grouped to generate themes by the lead author, a Māori pharmacist and researcher with experience in qualitative and Māori research methods.[12] Initial codes and themes were reviewed by the service evaluation team in the context of data from interview transcripts before themes were finalised. A general inductive approach was used to analyse data, with privileging of participant voices and contextualising findings within social, historical, political and cultural contexts for Māori, as aligned with Māori methodological research practices.[12] Participant quotes are inserted verbatim and are identified by participant number. No further demographic detail is linked to individual participants to support the maintenance of anonymity.

Results

All twelve participants were Māori and were interviewed between August 2021 and January 2022. The median age of participants was 52.5 years (34–64 years), 67% were male (n=8), and mean interview time was 14 minutes (6–27 minutes). Length of time between diagnosis and treatment ranged from one month to 20 years, with half of participants being treated within 12 months of diagnosis. All participated in English via telephone. Two participants did not have access to telephones and instead a time was arranged with the recruiting pharmacy, interviewer and participant to undertake interviews in a private space at the pharmacy, using the pharmacy phone. The full recruitment pathway is shown in Figure 1.

Experiences of DAA treatment for hepatitis C

This section discusses the experiences of participants along their hepatitis C treatment journey. In general, participants talked of very positive experiences, usually in the context of being cured, and discussed that the process was generally simple and straight forward. The proactiveness of health professionals was valued. Some participants also talked about their own proactiveness in getting tested for hepatitis C, and in seeking solutions that worked for them.

Physical and mental impacts of hepatitis C diagnosis and treatment

Hepatitis C impacted on the physical health of some participants making them feel lethargic and generally unwell, and they reported the positive difference in their physical health when they received treatment. Many discussed that it was not until they were treated for hepatitis C that they realised how unwell they had felt.

> *"You feel the difference, you go from being tired, lethargic…" P1*

> *"You don't realise [until] you get rid of it as [to] how much it has affected you in the past" P12*

Receiving a diagnosis of hepatitis C impacted on participants' mental health. Various reasons for this included the potential impact on family if they became unwell and could no longer support others, the risk of passing on the infection, and not knowing whether hepatitis C was curable. Part of the burden was related to the perceived stigma with the diagnosis of hepatitis C, and to risk behaviours commonly associated with disease transmission.

> *"And I was embarrassed to tell anyone, that was a bit traumatic for me, I thought, oh, oh my God" P2*

The reasons for starting treatment were varied, and included: not wanting to have the disease; wanting to be there to support family; wanting to improve acute and chronic health and prognosis; and wanting it to be the right time in their life, and with not so many competing priorities. Two participants also discussed that they had not wanted treatment during periods where they were actively injecting drugs, as they had less regard for the consequences of hepatitis C at that time. Starting treatment reduced the mental burden and this was further eased when positive treatment results, the fact that hepatitis C had been cured, were received.

> *"Once I started the medication it put my mind at ease." P12*

> *"Yes, it relaxed me so much mentally, that I'm able to sort of not… I don't have to care anymore it's great." P1*

The importance of proactivity in the treatment pathway

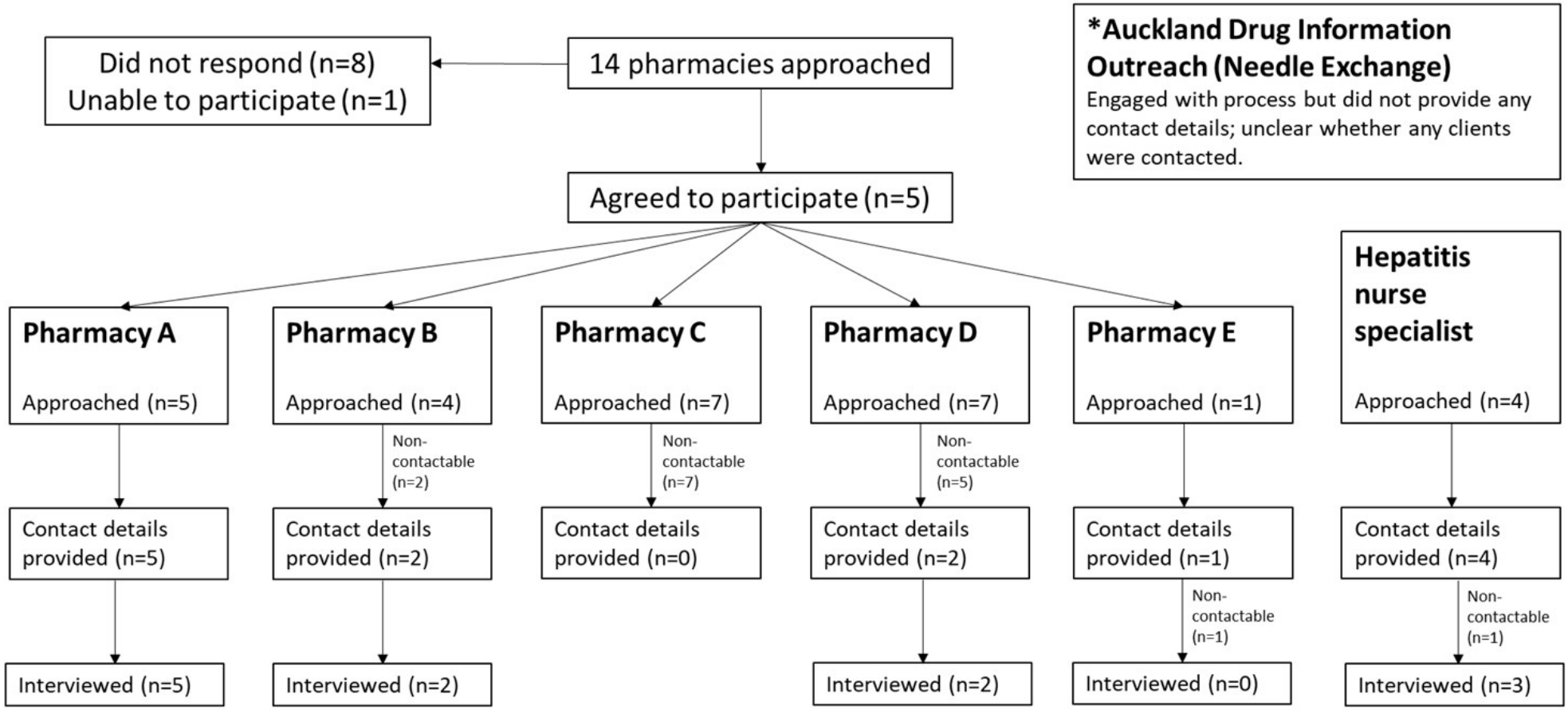
Proactivity by all those involved in the hepatitis C treatment pathway seen as important to participants. Some participants discussed that support from others, including family and health professionals, to get tested and/or treated influenced their likelihood of doing so.

> ***Interviewer:*** *"Was there anyone in particular who made you think of getting treated?"*

> ***P9:*** *"Ummm, well my daughter, yeah my daughter was with me for that…Yeah and we agreed that I should have the treatment."*

Proactivity by the treating health professionals and related service was valued. The ideal situation for participants was when health professionals provided information and follow-up, without prompting. This was important at all stages of the

Figure 1: Participant recruitment pathway.



All but two participants had less than a six-month gap between diagnosis and treatment. Nine participants reported they had been cured, two reported having had post-treatment tests but were unaware of the results and one participant was still completing treatment.

treatment pathway from initial testing, to conveying diagnosis, starting treatment, and receiving dispensed medicines right through to communication of treatment effectiveness. Many participants found benefit to having this proactive approach maintained throughout the treatment pathway and follow-up period and reported negative experience when this did not occur.

> *"[The doctor] rung me twice before I started it, just to make sure he asked me a few questions and he said it was typical of Hep C. Ah, but he said curable and the nurse was more than helpful, everybody has been good with it. The service, I can't knock it one little bit…Even, even like at the chemist when I missed [picking up the tablets] they were ringing me" P12*

The benefits of proactivity by health professionals were supported when health professionals were perceived as "knowledge experts", and when a good relationship had been developed. Good relationships were not always those that had developed over time, and sometimes rapport could be developed over a short time, again supported by perceived expertise in subject matter and approach.

Touch points through the treatment journey, including telephone calls, were perceived as moments which showed they were cared about, and several participants commented that phone calls from prescribers or the pharmacy which dispensed their medicines would have been appreciated.

> *"I thought the whole thing was quite positive. Because everyone was trying to get me better." P9*

Participants were asked about their preferences for a wrap-around service, such as provision of support services, and many felt they had not needed extra support. Those that felt it would be useful had not asked for any extra services but expressed that they may have accessed extra support if it had been offered. In the absence of support services, many participants expressed the ability to proactively self-advocate.

> *"Well, that's, that's the part they could fix better they could have people actually ring you… if I hadn't had gone in myself nothing would've been done… it just wouldn't have been done, it wouldn't have even been screened… Again, it took for me to go in and see my doctor and for me to actually ask my doctor specifically for me to actually get told that, that it was no longer coming up as positive in my blood tests. Basically, there was no contact there was no 'hey are you alright?', 'hey have you had any side effects?' there's no none of that there's just go home and take the tablets and basically don't hear anything back unless you go in and chase it up." P1*

> *"I was like saying to them well hang on… the doctor said I was having this with food and I read it in the brochure thing too you know. You don't need to have it with food, but I suppose it just it works better I don't know the story is behind it but… and, yeah" P5*

Despite the clear articulation of self-advocacy by many participants, when participants were asked specifically about whether they had felt in control during their treatment journey, participants were often unsure how to answer this. The most direct responses came from those who had been treated in prison, one who said, *"I went to jail, and they put you on it*" (P3). This participant went on to discuss that they did not receive medicines at the correct times from prison staff, which affected adherence when they tried to exert control over the situation.

> *"So, I refused [the Maviret®] till they started playing my game" P3*

In addition to how participants found it difficult to answer direct questions regarding their feeling of control within the treatment process, when participants were asked how the service could better support the needs of Māori, there was limited response to this question, although participants' focus was generally on supportive care.

Accessibility of treatment-related care

Treatment accessibility was regarded as important by participants, many of whom discussed that the prescriber and dispensing pharmacy needed to be conveniently located. The hepatitis C treatment pathway was generally regarded as simple and straightforward by most.

> *"Well [the treatment process] was pretty straightforward. It was so easy, it was ridiculous." P10*

"As far as pharmacies go, it's just a pharmacy, you know. I… I only go there because it's my local and it was just handy that they happen to be one of the places where you could get the medication sent to." P1

A range of barriers to treatment access were discussed. Several participants commented on complexities moving between dispensing pharmacies with extra steps having to be undertaken. Many participants found the large tablets difficult to swallow, which felt like a daily barrier to access, some psyching themselves up each day to take them, although none reported that they stopped taking it for this reason.

"They were bloody huge; they were horse tablets…You'd have to sit there for half an hour and try and get that one down before you could take the next one." P1

Some perceived that the focus of initial discussions were on how they had got hepatitis C rather than the treatment.

"The answers just weren't there and there was… and they'd say where did I get it from, blah, blah, blah, and not even I knew that…" P6

Many participants talked about the difficulty of incorporating regular medicine-taking into their daily routine, and how they developed mechanisms and routines to support adherence.

"It was a bit annoying, I set me alarm clock to 6 o'clock everyday so that if I - otherwise I would of forgotten - so every time the alarm clock went off I knew what it was for. So, I took my pills you know… The 1st week was the tricky, I nearly forget once. After the first couple of weeks, it just becomes like everyday things. I just remember the moment my alarm goes off within an hour I make sure I take it… if I wasn't home and the alarm went off, I make sure I took them when I walk in the door. Now and again, I would take a pack of 3 with me." P12

This quote provides an example of how perceived barriers prior to treatment, or actual barriers early in care, could be overcome by participants during the course of DAA treatment.

Words of wisdom

Participants were asked to suggest approaches that they felt would support the treatment journey for others. They were also asked specifically what their "words of wisdom" were to those who were hepatitis C positive but had yet to begin their treatment journey. The support of treatment was overwhelming, with all participants encouraging others to have treatment.

"I'd just say go for it grab it with both hands, it's awesome" P10

"Even though I was embarrassed of [the diagnosis] in the beginning, do you know what I mean, and it seems like a process but when I spoke and I said, 'can this kill you?' And they said, 'yes it can'… So, once you know… it's a very simple process to get rid of it." P2

Participants discussed that the new treatment options, and the fact that hepatitis C is curable, need to be better communicated, and several discussed the value of these messages being delivered by those with lived experience of hepatitis C and its treatment. Four participants had received earlier types of hepatitis C treatment (e.g., interferon and ribavirin) and all discussed the contrast between older treatments and Maviret®. Other treatment courses were longer with challenging adverse effect profiles, whereas the participants in this evaluation reported either very mild effects like minor tiredness and nausea, or no adverse effects at all, which provided further drive to support treatment with Maviret®. Some participants also discussed that it felt like they would need to commit to a long course of therapy but, the treatment period went by very quickly.

"[Initially the treatment period] it just felt like forever; at this point weeks have just flown past me." P5

As discussed above, the improvement in health was seen as something that could motivate people to be treated with one participant expressing that this alone should be enough incentive to undertake treatment.

"You know, my incentive was having my health back. And that's, that's all I needed… Who doesn't think their health is important enough already?" P1

"At first, I was a bit sceptical, um once it started to work how can anyone be sceptical. Now it's gone so that's the biggest gift to me, that it's gone." P12

Discussion

This is the first known evaluation to explore Māori experiences of DAA hepatitis C treatment. This evaluation highlighted the physical and mental impact hepatitis C diagnosis can have, and that treatment with Maviret® leads to improvement in these domains, and proactivity by health professionals throughout the treatment journey was valued and that participants had the ability to self-advocate when needs were not met by other services. The rich qualitative data enabled the identification of various themes consistently, and the resultant recommendations (Box 1) are able to be incorporated into future hepatitis C treatment services in New Zealand.

Proactivity by health professionals was valued, including the benefit of wrap-around services to keep people connected throughout the treatment journey. Far from being reproachful that they might be being "nagged" or "hounded" by health services, they embraced the contact, and some were in fact suggesting there should be more of this. Those with hepatitis C who disengage from health services are often hard to reach by phone and may lack transportation.[13] Healthcare providers need to have various persistent strategies to find, contact and engage with these patients in order to address individual and structural barriers to engaging with hepatitis C related healthcare, the effectiveness of which could be supported by robust information technology solutions. Our evaluation showed the value of having responsive patient–provider relationship as well as convenient locations of treatment sites enhancing access hepatitis C treatment.

New Zealand academic literature shows that hepatitis C treatment reduces disease burden,[14] and that DAA treatment is safe and efficacious.[15] However, the value of treating hepatitis C seemed to be a revelation for most participants in this evaluation. This signals that greater communication and awareness building needs to be undertaken amongst Māori at risk from hepatitis C (and their whānau) to ensure the availability of free access to curative treatment is known. Whilst studies have shown that comprehensive hepatitis C knowledge motivates screening by primary care providers,[16] there is a paucity of such data from a "patient's viewpoint" and none that is specifically applicable for Māori in New Zealand. There

Box 1: Important aspects for inclusion in hepatitis C treatment pathways.

Recommendations

Use these findings to support public health testing and treatment campaigns.

Ensure those involves in hepatitis C service delivery are very knowledgeable and supportive. Knowlege of all aspects of hepatitis C management from mechanisms of infection, diagnosis through to treatment pathways, and appropriate follow-up is important, and that this knowledge is conveyed in a caring and supportive manner.

Ensure health professionals and communities are aware that DAA treatment is available to those who continue to inject drugs.

Develop a co-ordinated treatment service that provides options for where and how to access care. This includes kaupapa Māori services, conveniently placed test and treat facilities (e.g., local pharmacies) as well as co-location of treatment with intravenous drug use and opiate clinics, and options that better support anonymity, such as telehealth.

Persistent attempts to contact people should be made using a variety of methods, with the implementation of robust information technology solutions to support this.

Offer a wrap-around service, which includes multiple conatct points, throughout the treatment journey. Whānau should also be invited to engage, where appropriate.

Proactive offers of treatment, health information and wrap-around services should be made.

Set clear expectations of when results to determine cure will be available, and ensure these are followed through.

Develop methods for Māori and other marginalised grops to be able to choose to actively engage in service development, to utilise lived experiences in the support of treatment of others. This could include positive news stories, public health campaigns, peer-to-peer testing, and information sharing.

is poor knowledge of hepatitis C and its treatment among the public and health professionals[17,18] and this evaluation further highlights that more activities are needed to socialise this, including utilising those with lived experiences to share their stories.

Stigma associated with a hepatitis C diagnosis, identified in this evaluation, may be another barrier for accessing curative treatment. Previous research identified that this stigma presents as fear of contracting a contagious, chronic illness, assumptions regarding "socially unacceptable" behaviours relating to hepatitis C infection, as well as societal attitudes towards traditionally marginalised populations.[19] The authors of this work postulate that these manifestations negatively affect people's perception of being "deserving" of treatment[19] which, for Māori, could be further compounded by experiences of institutional and internalised racism. Managing risk relating to potential exposure mechanisms is important to reduce the potential for re-infection during or post-treatment; however, there is the potential that these discussions at the point of diagnosis may affect both patient–provider relationships and a person's willingness to accept treatment. It is important to note that people who continue to inject drugs are eligible to receive treatment in New Zealand. DAA treatment for hepatitis C is as effective in those who inject drugs as those who do not;[20] and treatment offers benefit at the individual, whānau, and population level.

Adherence to DAA therapy is important for treatment success with those with lower adherence less likely to have a sustained virological response (i.e., be cured) post treatment.[21] Participants in the current evaluation discussed the importance of incorporating DAA tablet taking into their daily routine to help with taking the medicine as prescribed. Setting up daily electronic reminders were also useful and health professionals could have a role in supporting this. The delivery of supportive care and education by clinicians using telehealth has also been shown to improve adherence with hepatitis C treatment compared to "usual care".[22] Previous research has shown that those most likely to benefit from increased adherence support are those that experience multiple marginalisation (for example ethnic marginalisation and incarceration),[23] which speaks to the need to address service and structural issues as well as medicines adherence to best increase the likelihood of treatment success.

The positive impact of treatment on physical and mental health is supported by New Zealand and Australian research where patients self-reported significant, positive impacts on their lives post curative hepatitis C treatment, particularly in alleviating anxiety and a fear of infecting others.[14,24] In people that are hepatitis C positive and who inject drugs, hepatitis C cure may be just one aspect of change that people are seeking in their lives, within the context of a more holistic approach to their wellbeing. Other changes may include improving social relationships and personal identity, improving mental health, and managing future risk.[25] It is therefore important that these benefits are proactively communicated to promote uptake of treatment, and that the health service providing care incorporates wraparound services to ensure the wider concept of wellbeing is managed. This approach is in line with a Whānau Ora approach where outcomes beyond individual, physical benefits, are articulated and valued.[26]

The right for Māori to have care options, including culturally safe mainstream services and kaupapa Māori services, as well as the right for Māori to be involved in all levels of health service development are set out in Te Tiriti o Waitangi.[7] None of the participants gave examples of services that upheld kaupapa Māori practices or principles of care and, similar to when asked about levels of control in the treatment journey, participants did not articulate how services can better support Māori specifically. There is the potential that those that are marginalised, and unaccustomed to having power in the health care setting,[27] may be less likely to identify control and self-determined care as important, and care needs to be taken in the methods to strengthen participants' ability to contribute.[28] Despite this, participants offered many ideas for positive improvement to services and therefore this evaluation is even more important as it both presents their voices and seeks to incorporate this into future care options.

Further research is recommended to include those at risk of hepatitis C but not tested, or who have been diagnosed but not treated, to understand the barriers to diagnosis and treatment.

Strengths and limitations

This is the first known evaluation that focuses on Māori experiences of DAA treatment, and it provides up-to-date insight given all received treatment within the last three years. Care was taken to privilege the voice of participants in this evaluation. Some interviews were short, limiting the richness of the data. There is potential that

responses could have been further contextualised in longer interviews and with more follow-up questions; however, length was driven by participants, and interviewers had been guided to allow for this to ensure the interview process was not regarded negatively by participants rather than necessarily pushing for expansion of responses. Reasons for short interviews, postulated by the research team, included communication style (brief participant responses that were not expanded on during prompting); interviewer experience (very experienced interviewers may have been able to elicit extended responses while maintain good rapport); and interviewers fitting in with participant schedules (some participants contacted researchers during short work breaks to participate and were not open to moving the times). Reluctance to be interviewed did not appear to be an issue. In-person interviews may have increased the ability to build rapport and the extent of data provided although restrictions relating to COVID-19 impacted on this approach. In contrast, perceived anonymity over the phone may have increased disclosure. Those that volunteered to be involved in this research may be more likely to feel able to self-advocate and, therefore, this theme may not come through as strongly in a different cohort. Additionally, all participants had positive treatment outcomes and there is the potential that participants with variable or negative treatment outcomes may have told more critical stories of service provision. The number of participants was lower than the target due to recruitment difficulties impacted both by the COVID-19 pandemic and lack of up-to-date contact details for potential participants. This evaluation involved 12 participants in the Northern Region of New Zealand, and it is not intended that it be representative of, or generalisable to, all Māori experiences of hepatitis C treatment. Findings will be used to enhance the development of new hepatitis C treatment services, based on Māori experiences of treatment and self-identified solutions for improvement in hepatitis C care.

COMPETING INTERESTS
NG is Programme Manager for hepatitis C at the Northern Regional Alliance. All authors have been involved in the "lookback and treat service" for people previously diagnosed but potentially untreated hepatitis C in the Northern Region. This project was funded by the Northern Regional Alliance hepatitis C programme fund.

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Audit of cervical excision depth of large loop excision of the transformation zone procedures at Counties Manukau District Health Board

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ABSTRACT

AIMS: Cervical cancer is the fourth most common malignancy in females worldwide. Large loop excision of the transformation zone (LLETZ) procedures remain the preferred surgical technique to remove squamous cervical intraepithelial neoplasia (CIN) lesions globally. This study aimed to assess whether the depth of LLETZ procedures at Counties Manukau District Health Board (CMDHB) met established standards of care.

METHODS: Hospital records were reviewed for all LLETZ procedures performed at CMDHB between 1 June 2020 to 3 May 2021, and these were compared to Public Health England's (PHE) 2020 Colposcopy Guidelines.

RESULTS: One hundred and eighty-four cases were identified. Forty-eight percent of all LLETZ procedures were the correct excision depth relative to PHE's ≥95% threshold, primarily due to excisions being too shallow, particularly in patients with type 2 and 3 transformation zones (TZ), 48% and 86%, respectively. Māori and Pasifika patients represented only 16% and 13% of all LLETZ procedures in this study, respectively.

CONCLUSIONS: This study identified significant oversampling of LLETZ excisions in patients with type 1 TZs, and significant undersampling in patients with types 2 and 3 TZs. Ultimately, these findings highlight the need for additional quality improvement processes and emphasise the importance of auditing LLETZ procedures nationwide.

Cervical cancer is the fourth most common malignancy in females worldwide, affecting 5.7 per 100,000 women in New Zealand, with higher rates in Māori compared to non-Māori (8.1 vs 4.4, per 100,000 women, respectively).[1-3] Despite Australia and New Zealand both having some of the lowest rates of cervical cancer in the world,[4] cervical cancer remains an important and preventable cause of morbidity and mortality.[5,6] Squamous cervical intraepithelial (CIN) lesions are the precursor lesions to the majority of cervical cancers. These lesions are clinically detectable for many years prior to the development of cancer, through cervical cytology screening.[7] Due to the long latency period of cervical cancer, the identification and removal of precancerous cervical lesions is highly effective in preventing the development of invasive disease.[3,6] In New Zealand, the National Cervical Screening Programme and the human papillomavirus vaccine have both significantly reduced the incidence of abnormal cervical cytology and cervical cancer over the past 40 years.[8,9]

The majority of CIN lesions occur in the cervical transformation zone (TZ), due to the ability of simple columnar epithelium within this site to transform into stratified squamous epithelium via metaplasia.[10] TZ location varies between patients, with younger patients typically having a distal TZ along the cervical canal, which is more exposed and thus more susceptible to infection.[11] HPV infection of these specialised TZ cells is associated with a high risk of cancer progression.[10] Correct identification of TZ type is therefore critical when determining the appropriate depth of excision within the cervical canal.[10–12]

Large loop excision of the transformation zone (LLETZ) procedure remain the preferred method for removal of squamous cervical intraepithelial neoplasia (CIN) lesions worldwide.[13] Excisional techniques enable histological analysis of CIN lesions and identification of resection margins; two important prognostic indicators of residual disease or recurrence.[12,13] The recommended depth of LLETZ excision is dependent on TZ type, alongside other patient and obstetric variables.[14,15] Inadequate excision depth and positive excisional margins increase the risk of residual precancerous cells, and hence are both associated with a significant risk of treatment failure.[16] In contrast, mul-

tiple excisions and increasing excision depths are both associated with an increased risk of cervical incompetence and preterm birth, which is of particular importance in patients of reproductive age.[14,17,18]

In 2020, Public Health England (PHE) updated their colposcopy management guidelines, on which New Zealand's standards of care for LLETZ procedures are based.[15] The PHE standards are derived from large clinical studies and meta-analyses that guide the minimum depth to avoid treatment failure and the depth at which preterm birth rates significantly increase.[19,20] Given the risks associated with under- and over-sampling of LLETZ excisions, this study aimed to audit the depth of cervical tissue excised in LLETZ procedures performed at Counties Manukau District Health Board (CMDHB), relative to PHE's standards of care.

Methods

Ethics statement

Ethics approval was obtained for this study from the University of Auckland Human Participants Ethics Committee on 19 November 2018 (Ethics number: 021825).

Study procedures

NHIs of patients undergoing LLETZ procedures at CMDHB between 1 June 2020 to 30 May 2021 were obtained by the healthAlliance health analysts. Hospital records were reviewed to determine eligibility. Patients who did not undergo LLETZ procedures, or had inadequate or missing surgical or histological data, were excluded. Demographic, clinical, and laboratory variables were collected following a review of clinic letters, surgical or examination notes, and laboratory records using the Regional Clinical Portal and the CMDHB Colposcopy Database. Demographic variables included age at the time of procedure, ethnicity, and menopausal status (where menopausal status was not clearly documented, patients ≤45 years old were assumed to be pre-menopausal). Treatment variables included excision depth as reported by the pathologist (where multiple passes were taken, the depth of all passes and the location of each pass i.e., central or peripheral were recorded), reported transformation zone classification as per operating surgeon (types 1–3), primary operator (Registered Medical Officer (RMO) or Consultant Senior Medical Officer (SMO)), type of anaesthesia (local vs general anaesthesia), indication for treatment, and the number of passes performed. Outcome data included completeness of TZ excision (as recorded "complete" by the pathologist on the histopathology report) and margin status of the excised tissue (as recorded "clear" by the pathologist on the histopathology report). Where the histopathology report described the completeness of excision margins or TZ as being unclear, the excision/TZ was considered incomplete.

Audit standards

All standards used were based on the PHE guidelines which is in line with current practice in New Zealand.[15]

- Depth of excision:
  - Type 1 TZ—excision should remove a depth of more than 7mm; target ≥95% of cases.
    - In individuals of reproductive age, the excision should be no greater than 10mm.
  - Type 2 TZ—excisions should remove a depth of 10–15mm; target ≥95% of cases.
  - Type 3 TZ—excisions should remove a depth of 15–25mm; target ≥95% of cases.
- Number of passes: at least 80% of cases should have the specimen removed as a single sample.
- Local anaesthesia: the proportion of individuals managed as outpatients with local anaesthesia should be at least 85%.

When considering whether cases met the standard of care, pre-menopausal patients with a type 1 TZ were only deemed to meet the standard if the excised depth was between 7–10 mm. For procedures where more than one pass was performed, passes that were central (i.e., an anterior lip pass and a posterior lip pass) both had to meet the required depth in order to meet PHE's standard. However, additional peripheral passes that did not meet the required depth did not influence whether a procedure met the standard or not.

Chi-squared test, or Fisher's exact test (for comparisons where there were low frequency cells) were used to determine if there were statistically significant differences in meeting PHE's standards. Where data were missing or unknown, this is reported but not included in the analysis. Comparisons were made by TZ type, primary operator, type of anaesthetic, menopausal status or ethnicity. Comparisons were also made between

groups, based on adequacy of excision depth, to determine if adequate versus a depth that was too shallow or too deep was associated with positive margins on histopathology report. A *p*-value <0.05 was regarded as statistically significant. All statistical analyses were performed using GraphPad Prism software (version 9.0).

Results

A total of 214 patients were identified using the outlined sampling strategy, eight of which were excluded due to having inaccessible data (Figure 1). Of the remaining 206 auditable records, 22 patients were excluded with a recorded reason. The main indications for exclusion included no recorded excision depth or no LLETZ procedure taking place. Subsequently, 184 LLETZ procedures were analysed.

Demographic characteristics

The majority of patients were between 31–40 years of age, were pre-menopausal (Table 1) and had type 1 TZs (Table 2). The majority of patients were of NZ European ethnicity (40%), followed by Asian (19%), Māori (16%) and Pasifika peoples (13%). The demographic characteristics of the audit population are summarised in Table 1.

Audit standards

Of the 184 LLETZ procedures performed during the study period, the majority of patients had a type 1 TZ (72%), followed by type 2 TZ (24%) and type 3 (4%). Only 48% of all LLETZ procedures performed during this study were of appropriate excision depth, relative to PHE's ≥95% threshold. Rates of successful LLETZ excision depths were similar for patients with type 1 and type 2 TZs; however, 86% of type 3 TZ excisions did not meet the standard of care. The main reason for procedures not meeting the standard of care was a suboptimal excision depth, particularly in patients with type 2 and type 3 TZs (43% and 86%, respectively) (Table 2).

Treatment characteristics

The majority of procedures were performed by an SMO (87%) and under local anaesthesia (67%). The majority of LLETZ excisions were performed using a single pass (69%), followed by two passes (25%) and three passes (5%). Only 36% of all LLETZ excisions had clear margins, with the lowest proportion of clear margins in patients with type 1 TZ (35% in type 1, 39% in type 2 and 43% in type 3). Overall, 18% of TZs were determined to be completely excised, with low rates seen across all TZ types (18.0% in type 1; 18% in type 2; and 14% in type 3). The treatment characteristics of the audit population are summarised in Table 3.

There were no significant differences in the proportion of patients meeting the standard of care by anaesthetic type (local vs other), primary operator (SMO vs RMO), TZ type (1, 2 or 3), menopausal status (pre or post) or ethnicity (Appendix 1). Finally, we observed that when the PHE standard was met, margins were most likely to be clear (47% clear margins), compared with excisions that were either too shallow (30% clear margins) and too deep (20% clear margins) (p=0.03).

Discussion

Cervical cancer remains a significant cause of morbidity and mortality in New Zealand. LLETZ excisions of precancerous CIN lesions can be highly effective in preventing the development of invasive cervical disease. However, under- and over-sampling of LLETZ procedures are both associated with complications, including an increased risk of disease progression,[13] and preterm birth in women of child-bearing age,[11,14,15,19] respectively. Equitable access to LLETZ procedures nationwide is crucial, especially in light of the high rates of cervical cancer in Māori and Pasifika in New Zealand.[20]

Herein we report the findings of our audit of LLETZ procedures at CMDHB, which shows that only 48% of LLETZ procedures were of an appropriate excision depth, relative to PHE's recommended threshold of ≥95%.[12] Inadequate excision depth was the primary reason for not meeting the standard of care for all three TZ types, particularly in patients with type 2 or type 3 TZs (43% and 86%, respectively).[15] Despite the depth of excision at LLETZ being a well-defined, internationally recognised standard, there is a deficit of published audited data worldwide. Only two conference poster abstracts were available from the United Kingdom and identified an adequate depth of excision in 95.5% (n=83),[21] and 69% (n=224)[22] of patients undergoing LLETZ procedures. The only comparable report from Australasia was a locally presented audit of 104 patients undergoing LLETZ procedures in Auckland District Health Board (ADHB) between 1 June to 31 December 2020 (online via The University of Auckland intranet, available on request). This report identified an insufficient depth of excision in 15% of type 1 TZ, 38% of type 2 TZ and 73% of type 3 TZ excisions.[15] The variation in meeting the standard between these three reports highlights the importance of regular audits within centres.

We observed that LLETZ excisions that were

Figure 1: Flow diagram of study methods.

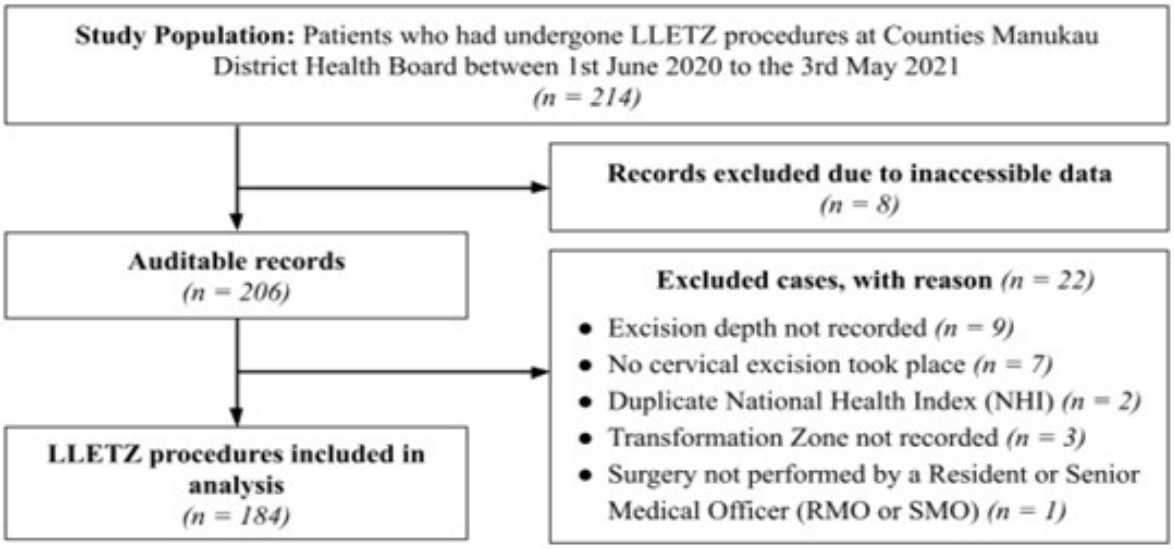


Table 1: Demographic characteristics of patients undergoing large loop excision of the transformation zone (LLETZ) procedures.

Demographic characteristics		Total number of patients (n=184) (%)
Age group	≤30	42 (23)
	31–40	80 (43)
	41–50	35 (19)
	51–60	20 (11)
	≥61	7 (4)
Ethnicity	European	73 (40)
	Asian	35 (19)
	Māori	30 (16)
	Pasifika peoples	24 (13)
	Indian	14 (8)
	Other	8 (4)
Menopausal status	Pre-menopausal	144 (78)
	Post-menopausal	25 (14)
	Unknown	15 (8)
Indication for LLETZ	CIN II on punch biopsy	65 (35)
	CIN III on punch biopsy	79 (43)
	Discordant histology	23 (13)
	Other	17 (9)

Abbreviations: LLETZ = large loop excision of the transformation zone; CIN = cervical intraepithelial neoplasia.

Table 2: Adequacy of the depth of cervical excision by TZ as audited against PHE guidelines in patients undergoing large loop excision of the transformation zone (LLETZ) procedures.

Transformation zone classification			**Total number of patients (n=184) (%)**
Type 1			133 (72)
Type 2			44 (24)
Type 3			7 (4)
Audit of excision depth by TZ type			
Overall	Correct excision depth	Total	89 (48)
	Incorrect excision depth	Total	95 (52)
		Excision too shallow	63 (34)
		Excision too deep	32 (17)
Type 1 TZ	Correct excision depth	Total	65 (49)
	Incorrect excision depth	Total	68 (51)
		Excision too shallow	38 (29)
		Excision too deep	30 (22)
Type 2 TZ	Correct excision depth	Total	23 (52)
	Incorrect excision depth	Total	21 (48)
		Excision too shallow	19 (43)
		Excision too deep	2 (5)
Type 3 TZ	Correct excision depth	Total	1 (14)
	Incorrect excision depth	Total	6 (86)
		Excision too shallow	6 (86)
		Excision too deep	0 (0)

Abbreviations: TZ = transformation zone.

Table 3: Treatment characteristics of patients undergoing large loop excision of the transformation zone (LLETZ) procedures.

Demographic and surgical variables		Total number of patients (n=184) (%)
Primary operator	SMO	160 (87)
	RMO	24 (13)
Mode of anaesthesia	Local	124 (67)
	General	56 (31)
	Spinal	2 (1)
	Local + sedation	2 (1)
Number of passes	1	127 (69)
	2	46 (25)
	3	9 (5)
	≥4	2 (1)
Clear excisional margins	Overall	66 (36)
	Type 1 (n=133)	46 (35)
	Type 2 (n=44)	17 (39)
	Type 3 (n=7)	3 (43)
TZ completely excised	Overall	33 (18)
	Type 1 (n=133)	24 (18)
	Type 2 (n=44)	8 (18)
	Type 3 (n=7)	1 (14)

Abbreviations: SMO = senior medical officer; RMO = resident medical officer; TZ = transformation zone; CI = confidence interval.

too shallow and too deep were both associated with positive margins. Unfortunately, data were not collected on which margins were reported positive, as endocervical margins that are positive are the most strongly associated with disease persistence.[16] Therefore, collecting data on location of positive margins is an important consideration of future audits. Under-sampling in all three TZ classification groups may reflect a lack of knowledge of excision depths specific to TZ type, or fears over the consequences of excessive depth in an overall young population in CMDHB.[14,17] National guidelines outline that individuals who have had a previous LLETZ of ≥10mm are at high risk of spontaneous preterm birth and second-trimester loss, and should receive cervical length screening during pregnancy.[23] Knowledge of these guidelines likely contributes to colposcopists' tendency to remain conservative with their LLETZ excision depths. It may also reflect technical difficulties or lack of access to appropriate loops in achieving the required depths, as highlighted in the Ishikawa cause and effect diagram (Figure 2).

This study also identified an excessive depth of excision in 22% of patients with type 1 TZs. No published reports on the rates of deep LLETZ excisions relative to PHE's recommendations were available in the literature. However, similar findings were reported in the ADHB audit (33% of type 1 TZs excisions were of excessive depth), suggesting our centre is not unique. This finding is clinically significant, given that 94% of type 1

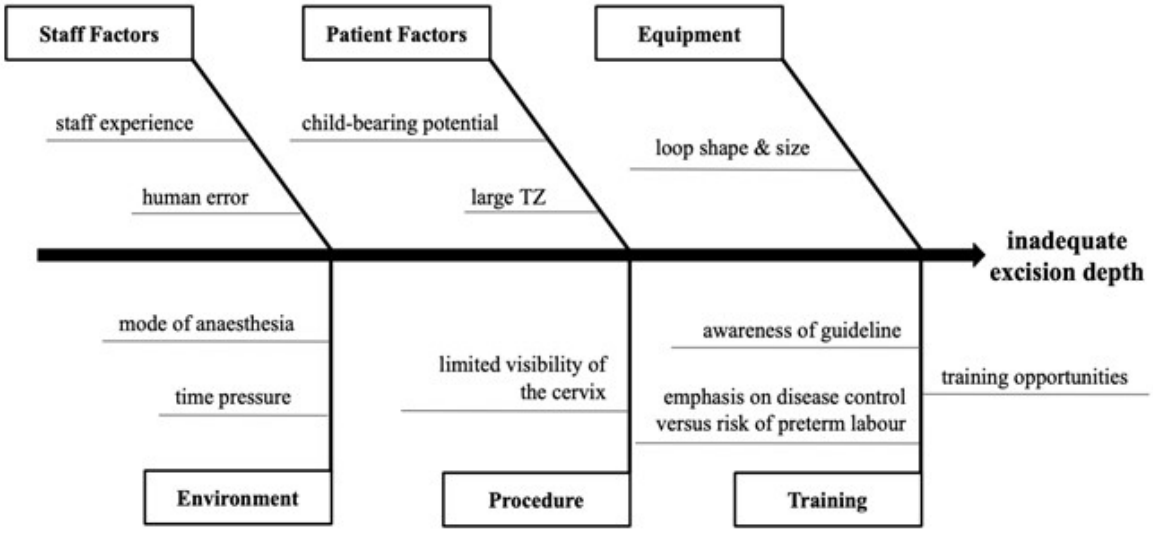
TZ patients in this study (and 92% in the ADHB cohort) were pre-menopausal, thus increasing these patients' risks of preterm labour in future pregnancies.[14,17] However, the PHE colposcopy guidelines only allow for a small margin of error for LLETZ excisions (3mm in type 1 TZ patients), adding to the difficulty of achieving the correct depth in this group of patients.[15] Greater training in how to achieve the desired depth of excision across all TZ types may be beneficial in increasing the accuracy of excision. One study reported that auditing of consecutive LLETZ excisions resulted in significant improvement in the accuracy of colposcopists' presumed and actual depth of excision.[24] Increased guideline exposure in theatre and clinic, in addition to increased auditing of colposcopists' excision depths, may increase the efficacy of LLETZ procedures.

Only 69% of LLETZ procedures were performed using a single pass and 67% under local anaesthesia, relative to PHE's standard of ≤80% and ≤85%, respectively.[15] It is known that multiple tissue fragments can impact the accuracy of the histopathologic assessment. However, given the elevated rates of obesity in CMDHB (16% of adults in CMDHB are obese, and 19% morbidly obese), performing a LLETZ procedure using a single pass or under local anaesthesia may compromise the surgeon's ability to obtain an adequate sample.[25] Thus, the use of multiple passes or general anaesthetic are likely prioritised in patients with difficult access, in order to optimise the adequacy of excision. Theoretically, analysis of multiple passes may underestimate the average depth of excision, as the minimum recorded depth for each segment was used for analysis. However, when two passes are performed, this is more likely to represent a separate anterior and posterior pass, rather than superimposed passes of the same area, and thus, should not impact the results. Inclusion of cases with three or more passes are more likely to underestimate depth; however, these only represented a small proportion (6%) of the sample and are therefore also unlikely to have influenced the overall result.

Although not the primary outcome of this study, we observed that non-Māori and non-Pasifika patients were more likely to have LLETZ procedures than Māori and Pasifika patients. This is despite the over-representation of Māori and Pasifika peoples in cervical cancer rates in New Zealand.[3,20] These findings are consistent with the reduced rates of cervical screening in Māori and Pasifika peoples seen nationwide, and the subsequent disparities in disease burden and stage at diagnosis.[8,20,26,27] These findings highlight the urgent need for future work focused on ensuring that the health service is able to provide equitable cervical screening throughout Aotearoa New Zealand.

There were several limitations to this study. Firstly, patients undergoing cone biopsies were not included in this analysis, due to only a small proportion of patients undergoing this procedure. This may limit interpretations of the management of type 3 TZ patients, given that only one surgical management option was included in this analysis. Secondly, formalin fixation is known to result in minor cervical tissue speci-

Figure 2: Ishikawa cause and effect diagram illustrating potential contributors to inadequate or excessive cervical excision depths.



men shrinkage of around 2.7% in the longitudinal dimensions.[28] Consistent with other studies, this shrinkage was deemed clinically insignificant and thus no changes were made to the excision depth measurements in our analysis.[24,28] Diathermy ball fulguration to the base of the LLETZ excision is also routinely used to help achieve haemostasis following resection and may have additional benefits in terms of treating residual CIN, the impact of which was not investigated in this audit.[29] Finally, although this study was sufficiently powered overall, subgroup analysis had smaller patient populations, and thus was not always sufficiently powered. This may have implications on the study's ability to identify robust differences between audit standard outcomes according to clinical subgroups. Future studies would benefit from including a larger patient cohort in order to mitigate this effect.

Ultimately, these findings highlight the need for additional quality improvement processes to address barriers to meeting standard excision depth. Suggestions include having picture descriptions of the different transformation zone types alongside PHE's colposcopy management guidelines in colposcopy rooms, in order to increase intraoperative awareness of the recommended excision depths. Secondly, increased access to a wider range of LLETZ loops may help facilitate excision of the correct cervical depth with only one pass. Finally, increased access to training opportunities, such as simulation-based teaching, may foster greater skill in excising the correct tissue depths.

Conclusion

This is the first study to audit and analyse the outcomes of patients undergoing LLETZ procedures at CMDHB, relative to established colposcopy guidelines and standards of care. Differences in the excision depths were identified relative to PHE's established thresholds, with a large proportion of excisions being too shallow, particularly in patients with type 2 and type 3 TZs. These findings highlight the importance of considering the associated risks of LLETZ procedures in individual patients and the need to adapt the surgical approach and equipment used accordingly. Importantly, this study has also identified reduced rates of LLETZ procedures in Māori and Pasifika patients, emphasising the need for improved screening in these high-risk communities going forward. Finally, this study has highlighted the need to audit LLETZ procedures in other DHBs in New Zealand to identify issues and optimise the quality of care for CIN provided nationwide.

COMPETING INTERESTS

Nil.

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Appendices

Appendix 1: Differences in the proportion of patients meeting PHE's standards of care for adequate depth of specimen when undergoing large loop excision of the transformation zone (LLETZ) procedures. Comparisons were made using Chi-squared tests or Fisher's exact tests as appropriate, with p <0.05 considered statistically significant.

		Audit standard for depth met (n=89) (%)	**Audit standard for depth not met (n=95) (%)**	***p* value**
Mode of anaesthesia	Local	60 (67)	59 (62)	0.5
	Other	29 (33)	36 (38)	
Primary operator	SMO	78 (88)	80 (84)	0.5
	RMO	10 (11)	14 (15)	
	*Unknown**	1 (1)	1 (1)	
Transformation zone	Type 1	65 (73)	68 (72)	0.7
	Type 2	23 (26)	21 (22)	
	Type 3**	1 (1)	6 (6)	
Menopausal status	Pre-menopausal	63 (71)	68 (71)	0.6
	Post-menopausal	14 (16)	11 (12)	
	*Unknown**	12 (13)	16 (17)	
Ethnicity	European	39 (44)	34 (36)	0.3
	Asian	11 (12)	24 (25)	
	Māori	15 (17)	15 (16)	
	Pasifika peoples	13 (15)	11 (12)	
	Indian	7 (8)	7 (7)	
	Other	4 (4)	4 (4)	

Abbreviations: SMO = Senior Medical Officer; RMO = Resident Medical Officer.
*Rows with *unknown* values not included in comparison analysis
**Type 3 TZ not included in analysis due to low count
For mode of anaesthesia, *other* consisted of general anaesthesia, local anaesthesia with sedation or spinal anaesthesia.

E-cigarette use patterns, brand preference and knowledge about vaping among teenagers (13–16 years) and parents of children attending Christchurch Hospital

Andreas Nicolaou, Amy Moore, Ben Wamamili, Tony Walls, Philip Pattemore

ABSTRACT

AIM: Parents attending hospital with children in New Zealand are routinely asked about tobacco use, but information about vaping is lacking. We assessed e-cigarette use, brand preferences, and knowledge during paediatric outpatient attendance at Christchurch Hospital.

METHOD: We undertook an anonymous online survey of teenagers and parents attending paediatric outpatient clinic in December 2021 to February 2022. The sample (n=95) were 16% Māori and 8.4% currently smoked (4.8% teenagers, 11.3% parents). We used descriptive and contingency table analysis.

RESULTS: Ever vaping was reported in 33.3% of teenagers and 30.8% of parents, and current use in 7.1% vs 15.1%, respectively. Most teenagers selected "curiosity/just wanted to try them" as their reason for vaping, whereas parents selected vaping to quit or reduce/avoid smoking. More teenagers than parents used nicotine-containing e-cigarettes (100% vs 86.7%) and more parents vaped indoors (in home or car) when other people were present.

The most important reasons for choosing particular e-cigarette brands among teenagers were price and flavours, with fruit flavours preferred. No teenagers obtained their e-cigarettes from vape shops versus 40% of parents. The primary source of information for teenagers and parents about vaping was friends/peers.

CONCLUSION: Vaping was common among teenagers and parents; teenagers vaped for curiosity and flavours and obtained vape products from sources other than vape shops.

E-cigarette use (vaping) has been increasing rapidly both among adults and teenagers in New Zealand. A 2019 study which investigated smoking and vaping in high school students (n=7,721) found 10% of students vaped at least monthly and 6% vaped weekly or more often.[1] The ASH year 10 Snapshot Survey in 2021[2] found that vaping had increased since 2019, and daily vaping was 9.6% overall and up to 19% among Māori teenagers. Unlike adults who often vape as a means to reduce tobacco use or quit smoking,[3] most teenagers are attracted to e-cigarettes because of simple curiosity,[4] flavours, friends, and ability to use vape products discreetly.[5–7]

There is general consensus among the scientific community that vaping is less harmful than smoking conventional cigarettes, but not harmless.[8] However, there remains disagreement among policymakers internationally on the role of vaping in tobacco control, owing to limited evidence.[9] Concerns about e-cigarette use have been raised by the major international respiratory societies.[10–13] These include known and unknown long-term health risks, and the potential for vaping to serve as a gateway to smoking, especially among adolescents and young adults. Several studies have shown an association between e-cigarette use and subsequent onset of smoking among teenagers,[13,14] while one study reported an association between vaping and attempted smoking cessation although the success rate was only 13.5%.[15]

Currently in New Zealand, patients are asked about whether they smoke on admission to hospital, but information is lacking whether vaping is also asked. Understanding the e-cigarette use habits and knowledge of patients about vaping presenting to hospital can enable clinicians to provide relevant information to help patients make informed decisions. We sought to explore these areas in a pilot study to test the validity and acceptability of research tools before deployment to a wider study of vaping knowledge and brand preference in high school students.

Method

Data was collected as part of a summer studentship between 9 December 2021 and 23 February 2022 at Christchurch Hospital. Teenagers aged 13–16 years and parents of children presenting in the paediatric outpatient department were eligible to participate. The study was approved by the Human Ethics Committee (Health) of the University of Otago (H21/169), and locality authorisation was provided by the Canterbury District Health Board. Information about the study was provided to prospective participants in the waiting area and they were invited to take part. Written or online consent was obtained before completing the survey (for teenagers aged 13–15 years old we required their parental as well as their own consent).

The questionnaire included previously validated questions as well as new questions. The methods including these new questions were piloted for use in a wider study on vaping in high schools. Most questions on e-cigarette use (ever-use, frequency of use, reason for use, nicotine use, type of vaping device, and harm perception) were adapted from Pearson and colleagues.[16] The question on gender was adapted from previous research on smoking and vaping among university students in New Zealand.[17] The ethnicity question was based on the question in the New Zealand census.[18]

Participants could complete the survey online or on paper. Digital devices (iPads) were provided for participants to scan a QR code and complete the questionnaire anonymously. Participants were asked to complete the survey independently, without parents or teenagers viewing or influencing each other's responses and no issues were reported. We reassured teenagers that the study was anonymous, and that there were no repercussions on them, to encourage them to answer questions about smoking and vaping openly. Information was provided for participants to contact Quitline for support if they were concerned about their smoking or vaping. All participants completed the survey online and the questionnaire took five minutes on average.

Survey measures

Demographic information

For the purpose of analysis, participants aged 13–16 years were categorised as teenagers and participants aged 17 years or older were categorised as parents. Participants could identify their gender as male, female, other and "prefer not to say"; however, only male and female options were selected by participants. Participants indicated the ethnicities they identified with, and these were categorised as New Zealand European, Māori, Pasifika (included Samoan, Cook Island Māori and Tongan), Asian (included Indian and Chinese) and Other, consistent with previous research.[17]

E-cigarette use

Participants were asked if they had ever used an e-cigarette or vaping device (ever-use); whether they currently vaped at least monthly (current use); how often they vaped "in home" or "in car" when other people were present (never/almost never vs other); the primary reason for using an e-cigarette/vaping device; and whether their usual e-cigarette/vaping device contained nicotine. Additionally, participants were asked about the type of e-cigarette (disposable pod, rechargeable pod, mod system, large modular system); brand of the vaping device that they used the most and the main reason for choosing the brand; their favourite e-liquid/e-juice; and the main source of vaping supplies. Participants were asked about their perceptions of the harmfulness of e-cigarettes compared with tobacco cigarettes.

Knowledge about vaping

Participants were asked how much they agreed or disagreed with four statements about vaping: (1) e-cigarettes can be helpful in smoking cessation; (2) e-cigarettes can be dangerous to children; (3) vaping can be addictive; and (4) vaping is a healthy habit. The responses were agree (agree/strongly agree), neutral, and disagree (disagree/strongly disagree). The primary sources of information about vaping were also assessed and the options included vape shops, social media, friends/relatives, healthcare providers, commercials, and other.

Data analysis

Data was analysed descriptively using IBM SPSS Statistics V.28 and results reported as overall proportions by participant group (teenagers vs parents). Contingency table tests were used to compare the responses of teenagers and parents on knowledge about vaping and two-sided $p<0.05$ was considered statistically significant.

Results

Participants

A total of 102 participants took part and 95 were included in analysis (Table 1). Of those excluded, four were aged 12 or younger and three did not provide their age. Eight participants (8.4%) smoked conventional cigarettes at least monthly (4.8% of teenagers, 11.3% of parents).

E-cigarette use

Table 2 shows e-cigarette use characteristics of participants, harm perception, reasons for choosing their preferred vaping device, and favourite flavours.

Ever e-cigarette use was similar in teenagers and parents (33.3% vs 30.8%), but current use (i.e., vaping at least once a month) was higher in parents than in teenagers (15.1% vs 7.1%).

The common reasons for vaping in teenagers included curiosity (38.5%), enjoyment (30.8%), and to socialise or fit in with friends (15.4%), whereas most parents reported vaping to quit smoking (50.0%), reduce smoking, and to avoid returning to smoking (25.0%). Other reasons given by parents were vaping when unable to smoke, and curiosity (25.0%).

Teenagers were less likely than parents to report vaping in home (21.4% vs 46.7%) or in car (7.1% vs 28.6%) when others were present. More teenagers than parents used nicotine-containing e-cigarettes (100% vs 86.7%). Half of teenagers used a mod system with a tank that they refilled with vape juices/liquids, whereas a similar proportion of parents used a rechargeable e-cigarette or pod system that uses prefilled cartridges.

The sample of e-cigarette users was too small (13 teenagers, 16 parents) to provide useful information about brand preference, but there was no dominant brand for either group. Price (23.1%) and available flavours (23.1%) were the most common reasons that influenced the choice of preferred vaping device among teenagers, while recommendation from friend (26.7%), and price (20.0%), had the greatest influence among parents. Overall, fruit was the most preferred flavour (46.2% of teenagers, 40% % of parents). The primary source of vaping supplies for teenagers was friends/peers (53.8%) and vape shop for parents (40.0%).

Knowledge about vaping

Parents were significantly more likely than teenagers to agree that e-cigarettes can be dangerous to children (p=0.042); there were no statistically significant differences between parents and teenagers in other knowledge questions. Almost all (96.7%) agreed that e-cigarettes can be addictive, and 84.6% disagreed with the statement that "vaping is a healthy habit" (Table 3).

Table 4 displays the primary sources of information about vaping. Overall, friends/peers (for 46.3% of teenagers and 31.4% of parents), social media (16.3% overall) and "Other sources" (17.4% overall) were the most commonly reported sources of information about vaping.

Discussion

To the best of our knowledge, this is the first study in New Zealand to assess the patterns of e-cigarette

Table 1: Demographic characteristics of participants (n=95).

			n	%
Age		Teenagers (13–16 years)	42	44.2
		Parents (17 years or older)	53	55.8
Gender	Teenagers (n=42)	Male	22	52.4
		Female	20	47.6
	Parents (n=53)	Male	9	17.0
		Female	44	83.0
Ethnicity		New Zealand European	79	83.2
		Māori	15	15.8
		Pasifika	5	5.3
		Asian	4	4.2
		Other	7	7.4

Table 2: Teenagers vs parents: e-cigarette use; harm perception; brand preference, and e-liquid flavour.

		Teenagers (%)	Parents (%)	Total (%)
E-cigarette use	Ever tried an e-cigarette	33.3	30.8	31.9
	Current use	7.1	15.1	11.6
Did not vape when others were present	In home	78.6	53.3	65.5
	In car	92.9	71.4	82.1
Perceptions of harm: e-cigarettes vs tobacco cigarettes	Less harmful than cigarettes	40.0	41.9	41.0
	About the same as cigarettes	34.3	41.9	38.5
	More harmful than cigarettes	25.7	16.3	20.5
Main reason for choosing the current brand of e-cigarette	Look/feel of the device	15.4	13.3	14.3
	Flavours available	23.1	13.3	17.9
	Price	23.1	20.0	21.4
	Safety factors	0.0	6.7	3.6
	Recommendation from friend	7.7	26.7	17.9
	Advised by vape shop	0.0	13.3	7.1
	Can be used discreetly	15.4	0.0	7.1
	Other reason	15.4	6.7	10.7
Favourite flavour of e-liquid/e-juice	Tobacco	0.0	6.7	3.6
	Mint and menthol	23.1	6.7	14.3
	Candy	7.7	0.0	3.6
	Desserts/sweets	7.7	20.0	14.3
	Nuts/spices	0.0	6.7	3.6
	Fruit	46.2	40.0	42.9
	Other	15.4	20.0	17.9
Main source of vaping supplies (device, e-liquids or e-juices)	Vape shop	0.0	40.0	21.4
	Online purchase	15.4	20.0	17.9
	Supermarket	0.0	6.7	3.6
	Convenience stores or dairies	0.0	20.0	10.7
	Friends or peers	53.8	6.7	28.6
	Family member	15.4	0.0	7.1
	I prepare my own vape juice/ liquid	7.7	0.0	3.6
	Another source	7.7	6.7	7.1

Table 3: Teenagers vs parents: knowledge about vaping.

		Teenagers (%)	Parents (%)	Total (%)	P value
E-cigarettes can be helpful in smoking cessation	Agree	46.3	54.0	50.5	0.530
	Other*	53.7	46.0	49.5	
E-cigarettes can be dangerous to children	Agree	85.0	98.0	92.2	0.042
	Other*	15.0	2.0	7.8	
E-cigarettes can be addictive	Agree	97.5	96.1	96.7	1.000
	Other*	2.5	3.9	3.3	
Vaping is a healthy habit	Disagree	82.5	86.3	84.6	0.771
	Other†	17.5	13.7	15.4	

*Neutral or disagree. †Agree or neutral.

Table 4: Teenagers vs parents: primary source of information about vaping.

		Teenagers (%)	Parents (%)	Total (%)
Primary source of information about vaping	Vape shops	7.3	5.9	6.5
	Social media	14.6	17.6	16.3
	Commercials	4.9	3.9	4.3
	Friends or peers	46.3	31.4	38.0
	Healthcare providers	2.4	19.6	12.0
	Relatives	7.3	3.9	(5.4
	Other sources	17.1	17.6	17.4

use, brand preferences, and knowledge about vaping in an outpatient setting. We estimate the prevalence of ever-use vaping, current vaping and current cigarette smoking of 33.3% vs 30.8%, 7.1% vs 15.1% and 4.8% vs 11.3%, respectively, among teenagers compared to parents. Parents were also more likely than teenagers to vape in home or car when other people were present. All teenagers who vaped used nicotine-containing e-liquids/juices, compared with 86.7% of parents. Overall, fruit was the most preferred flavour and friends/peers were the primary sources of information about vaping. All participants appeared to have a good understanding of the potential benefits and harms of vaping.

Our finding of current smoking among teenagers is consistent with a finding of a 2019 New Zealand Youth19 survey (4% smoked at least monthly),[1] but current vaping was lower in our study (7.1% vs 10%). This may be explained by our small opportunistic sample, and potential differences in sample characteristics and environmental factors. Teenagers in the current study were in hospital for follow-up of health conditions, including respiratory illnesses which might have influenced their reporting of vaping and smoking, whereas the 2019 New Zealand Youth19 survey was conducted in a general student population.

The prevalence estimates of current smoking among parents (11.3%) in our sample are comparable to estimates in the general population (10.9%), but current vaping was much higher in the current study (15.1% vs 8.2% in the general population).[19]

It is possible that some parents may have chosen to vape rather than smoke while around children. This appears to be supported in part by a finding of higher rates of use of e-cigarettes by parents versus teenagers in the home (46.7% vs 21.4% respectively) or in the car (28.6%% vs 7.1%) when other people were present.

An interesting finding of this study was that among teenagers who vaped, 53.8% obtained their vape products from friends or peers and 15.4% each from a family member, or online and none from vape shops or convenience stores. On the one hand, this finding suggests that vape shops and convenience stores are adhering to their retail obligations. On the other hand, it indicates that current restrictions on e-cigarette access that are focused on vape shops, while necessary as part of a comprehensive strategy, will not prevent access to e-cigarettes among young people aged under 18 years. Additional strategies, including targeted media and educational interventions,[20] should be explored to increase young people's knowledge on vaping-related health effects and possibly increase vaping cessation. Public health communication could focus on educating adults about the impact of nicotine exposure, especially on adolescent brain development and the increased generalised risk of drug misuse.[21]

Our data show that teenagers state they understand that vaping isn't a healthy habit, but they are still vaping. It suggests teenagers are not acting on the information they have about vaping. One reason might be response bias: they are giving what they think are the socially acceptable, expected or model answers to the questions about the effects of vaping. Another may be because their primary sources of information about vaping are also the main sources of vaping supplies for teenagers, hence, the need for independent information/education, from a third party (e.g., public health, health professional). A third party may be in a better place to help a teenager to understand the insidious nature of nicotine addiction.

The questionnaire was well received, and participants did not seek assistance to complete the survey online using Qualtrics. This validates our research tools and gives us the confidence to use them in the upcoming survey on vaping in high school students.

Policy implications

The implications of our findings are twofold. First, they suggest more work is needed to improve the general understanding of the potential harms of exposure to e-cigarettes in young people. While it might be less harmful than smoking,[1] vaping is not harmless.[8] It is not desirable that a new generation of young people should become regular recreational users of an addictive product with unknown long-term effects. Mass media campaigns can be used to reinforce this message. Secondly, there is need for the Government to refocus efforts to reduce e-cigarette uptake among children and young people. The current regulations, including the Smokefree Environments and Regulated Products (Vaping),[22] have not prevented teenagers from accessing these products.

Limitations

The small sample restricted most of the analysis to descriptive statistics and the results may not be generalisable to an outpatient hospital population. Further, the questionnaire did not ask about the reasons why the teenage participants were being seen in the outpatient department. Information about participants' health status, for example, respiratory or other medical conditions that could be aggravated by vaping or smoking, is useful when counselling patients about vaping.

Conclusion

Vaping was common among teenagers and parents. More parents than teenagers vaped in home or in car when other people were present. Teenagers, most commonly, vaped for curiosity and flavour and obtained e-cigarettes from sources other than vape shops, suggesting current vape shop regulations are unlikely to prevent teenagers from accessing vape products. Further educative and regulatory input is needed to reduce e-cigarette use in young people.

COMPETING INTERESTS
Nil.

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Pākehā/Palangi positionality: disentangling power and paralysis

Andi Crawford, Fiona Langridge

ABSTRACT

Significant health inequities in Aotearoa present compelling evidence that responsibilities under Te Tiriti o Waitangi have not been upheld. The aim of this paper is to present our experiences as Pākehā/Palangi working in Māori and Pasifika health in Aotearoa. We are interested in what prevents the upholding of responsibilities by tangata Tiriti and in how, as tangata Tiriti, we can do better. In this paper we explore responsibilities of tangata Tiriti by describing the context and evaluating power, paralysis, and positionality. "Power" is identified as a key factor continuing to perpetuate colonisation and systemic racism. "Paralysis" occurs due to individual racism, apathy, guilt and/or a fear of doing wrong. "Positionality" is an internal and external process that involves consciousness of biases, perspectives, values, privileges, beliefs, superiority and identities. Finally, we point to tools of engagement with the aim of serving and creating space for self-determination for Māori and Pasifika peoples.

This paper explores our viewpoint based on experiences as Pākehā/Palangi health practitioners and researchers working in Māori and Pasifika communities. In reflecting on our practice, we noted there was limited literature that explored and critiqued Pākehā/Palangi perspectives in health and health research environments. We acknowledge Te Tiriti o Waitangi as a foundational constitutional document. However, we do not want to assert ourselves as experts in this field instead as early career researchers and mid-career health professionals we recognise a need for further discussion on this. Furthermore, we do not profess to speak for all Pākehā/Palangi and acknowledge others will have differing perspectives and extensions of ideas. We hope this paper will provide a useful contribution to the conversation.

I am Pākehā, part of the dominant settler culture that has been imposed across Aotearoa over the last 200–250 years. My ancestors are from many European countries: the Czech Republic, Switzerland, Prussia, Scotland, Ireland and England. I'm privileged through my ancestors' acquisition of Māori land, and through systems that benefit Pākehā such as myself. I have been raised within an urban, middle-class Pākehā culture and found my way to Māori communities through my work and personal connections over the last 20 years. In my work as a research fellow and clinical psychologist working with pregnant women and parents of young children who experience addiction, I work alongside mana whenua and provide clinical services to many whānau Māori. In this work I have sought to understand my belonging and connection to Aotearoa and tangata whenua and have learnt that I belong here by way of Te Tiriti o Waitangi. I am tangata Tiriti and this comes with responsibilities. – Andi Crawford

I am Pākehā/Palangi with formal and informal exposure to Māori and Pacific worldviews. I spent my childhood years in Papua New Guinea, and this unique experience adds another layer to my Pākehā/Palangi lens. I have worked clinically as a paediatric physiotherapist and a developmental coordinator in the community and the hospital system in Aotearoa. My research is focussed predominantly on Pacific children's health, and it has included work both in the Pacific regions and in Aotearoa. This work is embedded in, and prioritises, Pacific paradigms and leadership and is based on operating principles of service, humility, empathy, respect and trust. – Fiona Langridge

While we work in different contexts, we share common experiences as white women who primarily work within Māori and Pasifika commu-

nities. In this paper, we reflect on our experiences of being Pākehā/Palangi while working in Māori and Pasifika health in Aotearoa. We do this by 1) describing the context; 2) exploring power mechanisms; 3) examining the concept of paralysis; 4) describing positionality; and 5) suggesting tools of engagement.

In writing these experiences, we are cautious as we understand that conflating and speaking to experiences of Māori and Pasifika peoples is problematic. We are focused on the commonalities for Pākehā/Palangi in how they respond to these communities, and in actions needed when working within these communities. Te Tiriti o Waitangi is the foundation for relationships here, and there is need for an essential shift away from colonising monocultural ways in order to better support Māori and Pasifika peoples. We acknowledge that Māori understandings and the Māori translation take precedence over the Pākehā in interpretations of Te Tiriti o Waitangi.

We are also aware that centring a Pākehā/Palangi voice can be problematic, yet Pākehā/Palangi critique of the mechanisms that uphold structural power is a necessary part of dismantling these systems. This paper aims to encourage other Pākehā/Palangi health practitioners and researchers working with Māori or Pasifika communities, challenging all of us to make individual and systemic changes.

In this paper, we define Pākehā as the dominant settler ethnicity in Aotearoa. Tangata Tiriti include all non-Māori who are people of Aotearoa, and we acknowledge that our reflections as Pākehā women will be different to other tangata Tiriti. Whilst we use "Māori", we recognise hapū and iwi as distinct and diverse authorities. Similarly, in using "Pasifika peoples", we acknowledge the heterogeneous ethnicities and nations within the Pacific Islands that this term encompasses.

Power

This section explores the mechanisms that establish and maintain the power we hold/represent/experience and are trying to mitigate as Pākehā/Palangi. The first is the power of a government based on the colonial Westminster system. This system mandates power via democratic voting rather than a sharing of power and enabling Māori rights to exercise tino rangatiratanga (sovereignty and self-determination) as agreed in Te Tiriti o Waitangi. Pākehā/Palangi also hold the majority within the population, and so are automatically at a power advantage in this system.

Colonisation, in the context of Aotearoa, is the processes of the Crown dominating and asserting power over Indigenous people. The inequities existing in Aotearoa are the result of past, predominantly Pākehā, governments' assertions of power, law and rule over Māori. Significant health inequities provide compelling evidence that we have not upheld our responsibilities under Te Tiriti o Waitangi.[1,2] The Waitangi Tribunal's Hauora Report states colonisation had a severe impact on Māori and *"the Crown's failures prejudicially affect the ability of Māori to sustain their health and wellbeing"* (p.161).[3]

Pasifika peoples in Aotearoa experience the negative impacts of racism that are foundational to colonisation. This includes the targeting of Pasifika peoples via the Dawn Raids in the 1970s, and subsequent legislation rendering children born here as stateless, resulting in many Pasifika peoples being branded "illegal immigrants".[4] These and other experiences for Pasifika peoples have suppressed their citizenship in Aotearoa to the monoculture of colonisation resulting in stigmatisation and inequities in health, education and economic position.[5,6]

Colonisation is not historical, as it is ongoing structures that suit and prioritise Pākehā/Palangi systems which are racist. Rangihau and authors describe institutional racism: *"National structures are evolved which are rooted in the values, systems and viewpoints of one culture only. Participation by minorities is conditional on their subjugating their own values and systems to those of "the system" of the power culture*" (p.19).[7] Māori and Pasifika peoples face inequities due to diverse, historical and ongoing effects of colonisation, trauma and systemic racism. This includes lower life expectancy and higher burden of disease, hardship, mental health and incarceration.[8,9,10] *"Importantly, it is not lack of awareness about 'the culture of other groups' that is driving health care inequities – inequities are primarily due to unequal power relationships, unfair distribution of the social determinants of health, marginalisation, biases, unexamined privilege, and institutional racism*" (p. 2).[1] Furthermore, Borell et al. (2018) argue that to enable systemic change and social justice we must consider the historical and current privileges experienced by colonial settlers.[11] As clinicians, researchers and service providers we may strive to work in a flexible holistic way to improve wellbeing. However, these ways of working that are central to the wellbeing of the communities we work for are obstructed by inflexible, individuals, systems and agendas. Furthermore, society and institutions maintain

systemic racism and inequity by rewarding those people who adhere to the rules of the system and achieve outputs that are valued by society, not necessarily the community they are serving.[12] System and structural change is needed, alongside critical analysis of privilege and mitigating of Pākehā/Palangi practitioners' defensiveness and fragility. There are models and solutions that have been developed which provide a roadmap for societal, systemic and constitutional change.[13,14]

Reflecting on paralysis

In this section, we reflect on paralysis and how white fragility also serves to maintain power and uphold inequitable racist systems. Understanding power structures requires us to understand the system; however, our fragility stops the dialogue and maintains power.[15]

We, Pākehā/Palangi, can think racism is individual, conscious, and intentional with white defensiveness occurring because we might feel our moral character is challenged. What we fail to understand is that individuals are racist, as we uphold racist societies and structures.[15] Despite increased acknowledgement of systemic and/or institutional racism, many Pākehā/Palangi don't see ourselves as key contributors because "we aren't consciously or intentionally racist". Often the human equality or "I don't see colour" argument is used by those purporting to not be racist. This takes race off the table and protects the system. Thus, as Diangelo surmises, white fragility is not a state of vulnerability; instead, it is a powerful place that silences important challenges and maintains white superiority and power.[15] Until Pākehā/Palangi recognise our power is strengthened by racist systems we will continue to look outside of ourselves for solutions rather than within.

We as Pākehā/Palangi people can be fragile to criticism. This may be due to experiencing our dominant culture as always being right or inherently superior. For most Pākehā/Palangi we haven't had to think of our ethnicity, particularly because most of our leaders and public personalities (prime ministers, doctors, teachers, actors) are predominantly white, and also because "European" and whiteness is viewed as status quo while everything that deviates from that is often named or othered. Change is happening, for example, currently approximately 28% of members of parliament are Māori and Pacific peoples;[16] however, whiteness is still the norm. We, as Pākehā/Palangi, may have felt inadequate because of age, gender, or physical ability, but never because of our ethnicity. As Diangelo states: *"The experience of belonging is so natural that I do not have to think about it. The rare moments in which I don't belong racially come as a surprise-a surprise that I can either enjoy for its novelty or easily avoid if I find it unsettling*" (p.53).[15] The privilege that comes with being white is having a choice whether to engage with the racism debate or not. We as Pākehā/Palangi need to move past our defensiveness and think about our ethnicity and race identity, and its effect on the collective of all those living in Aotearoa.

An extension of white fragility is the concept of Pākehā/Palangi paralysis. The posture of doing nothing for fear of doing it wrong. It is a position that renders Pākehā/Palangi to be apathetic, and avoidant of doing anything at all due to the discomfort attached. Hotere-Barnes describes Pākehā paralysis as: *"Emotional and intellectual difficulties that Pākehā can experience when engaging in social, cultural, economic and political relations with Māori because of: a fear of getting it wrong; concern about perpetuating Māori cultural tokenism; negative previous experiences with Māori; a confusion about what the 'right' course of action may be*" (p.41).[17] Kiddle suggests our fragility and paralysis may exist because we are relatively new in our collective community, and we do not have shared values providing security when we disagree.[18] Furthermore, Borell argues that the Pākehā/Palangi culture of stoicism and emphasis on individual autonomy, rather than collective community, contributes to spaces (such as hospitals) being unsafe for Māori/Pasifika peoples who desire, more collective sharing of emotion in their own cultural traditions.[19]

Pākehā/Palangi may experience guilt when understanding the history of Aotearoa. However, to be able to withdraw from personal reflection because of feelings of guilt is an example of our privilege. Remaining in guilt prioritises our egos. Instead, we must hold the history of this country, so rather than being paralysed by guilt we can move forward with acknowledgement and responsibility.

> *"People get caught up in feelings of guilt. White people like to be comfortable and 'right' in their actions and can become immobilised in not knowing what to do. If you are feeling uncomfortable it probably means you are doing the work."*[2]

What is the tangata Tiriti role when it comes to paralysis? For us it is being comfortable with being uncomfortable. Being active as allies, with a

relinquishing of ego. Those of us that acknowledge the history of Aotearoa has not been just, then fight to make it so. However, we often still centre our own voices. Only by relinquishing power, resisting paralysis and working within Māori/Pasifika leadership can the balance start to emerge. Ultimately if we allow our over-protective and hyper cognisance of "doing the right thing" to paralyse us, it could in fact be causing us to do the wrong thing.[21]

How do we move out of paralysis—positionality

To move out of paralysis we must understand and state our position and intentionally act for change. Positionality is a concept that grew in response to people being "othered".[22] Being attentive to power and knowledge imbalances and reflecting on context and insider/outsider positions changes the way we do our work, including in research—what topics we choose, who we engage with, how we engage, how we analyse our data, and what our priorities are for communicating our findings.[23,24,25]

Positioning is the process of placing oneself both internally (personal reflection) and externally (the transparent front facing self). It requires a sense of security in our own cultural identity first.[26] Internally it involves reflecting on the influence of our biases, perspectives, values, privileges, beliefs and identities and how they shape our world view and work. Externally it involves transparently stating our position and place in this world in the work we do. As Pākehā/Palangi clinicians/researchers positionality includes service both to leaders that are Māori/Pasifika, and to mātauranga Māori/Pasifika paradigms. Some of it we do, some of it is aspirational. There are challenges to fully realising this aspiration because of the way the system is, and the individuals in the system are, set up.

If you do not position yourself, you are inviting others to position you instead.[22] A question often asked is "should Pākehā/Palangi be involved in work in Māori/Pasifika spaces?" If the answer is yes, the next question is how can Pākeha/Palangi conduct cross-cultural work after the history, and ongoing perpetuation of exploitation and inequities? Alex Hotere Barnes states there "*will always be suspicion of Pākehā working in Māori spaces. I just need to face the reality and find the most effective way of working with it*" (p.47).[20] We often ask ourselves: "who am I to do this? Should I be here at all? Should I say something or be quiet? Am I contributing and embedding Pākehā/Palangi power structures?" The answer is probably "yes" and "no" to all these questions. However, to stop this work is not right either as we have been invited into the communities we work with. What is required is accountability processes, to the Māori/Pasifika peoples we are working in relationship with.

We need to be clear about our own cultural identity. In our families we were taught to work hard, be kind, help our family and friends, and find solutions ourselves—these are values from our culture that we can apply positively. With a secure identity, we may shift the power away from ourselves.

Alongside understanding our own culture, we need to acknowledge historical and current realities. Moana Jackson gives an inspirational quote from Ben Okri: "*nations and people are largely the stories they feed themselves. If they tell themselves stories that are lies , they will suffer the future consequences of those lies. If they tell themselves stories that face their own truths, they will free their histories for future flowerings*" (p.112).[27] As well as acknowledging the truthful stories of Aotearoa we must disrupt systems and challenge our own biases.

Recently there have been renewed efforts to ensure health care workers are culturally competent. However, the idea of competence can be problematic as it suggests that with a little training, we can learn, understand and be fully fluent in the cultures that are not our own. Although it is our responsibility to be competent when engaging with Te Ao Māori and Pasifika spaces, we, prefer to also adhere to principles and disciplines of cultural safety.[1] *"Health practitioners, healthcare organisations and health systems all need to be engaged in working towards cultural safety and critical consciousness. To do this, they must be prepared to critique the 'taken for granted' power structures and be prepared to challenge their own culture, biases, privilege and power rather than attempt to become 'competent' in the cultures of others"* (pp1).[1] We must reflect on our position and disrupt the systemic power structures that maintain inequity and our own racism.

Tools of engagement

The relationship between power, paralysis and positionality is dynamic. Power is established through colonisation, legislature, population and inequitable access to resources. Pākehā/Palangi paralysis maintains this power through fear and apathy. It is the responsibility of tangata Tiriti to disrupt and disestablish racist power structures. This is not generally comfortable or perfectly

achieved but involves intentional involvement in a different system where Māori/Pasifika have ownership and leadership of projects. As Sharon Shea Co-Chair, Māori Health Authority and Māori Health Authority representative on Health New Zealand Board, says *"I believe in how we treat people, matters; how we think and act matters; what we do, matters and how we serve others, matters. Inherent in this whakaaro, is a belief that implementing Te Tiriti o Waitangi with integrity is a powerful disruptor for positive good."*[28]

In our own experience, this has included:

1. *Centre Māori/Pasifika knowledge frameworks.* In our work in child health, mental health and addiction services it is impossible to silo needs into boxes. What is required are services that form strong relationships, create community and holistically work with whānau. Māori and Pasifika models provide the pathway to do this. However, as Pākehā/Palangi we must seek guidance and partnership without misappropriating knowledge. This is a continual process and not something that happens at the end of projects or initiatives.
2. *Working within Māori/Pasifika led projects*. This includes having strong Māori and Pasifika mentors and advisors who guide and teach. Within academic environments, it also means actively promoting Māori/Pasifika leadership voice and stepping back in media for projects. It also means ensuring Māori/Pasifika involvement is not tokenistic, with Pākehā also taking responsibility and action on Māori/Pasifika led principles frameworks and directions. It includes considering not being first author, primary investigator or primary supervisor even if it means "our career" may be affected. This stepping back provides more benefits than disadvantages, in the building of learning, relationships and collaborations. In all spheres, it is important that representation does not fall to one person and instead has support from a wider group.
3. *Actively resisting existing power and career structures.* This may involve, first, challenging decision making and processes, and second, resigning from professional networks and walking away from research opportunities if relationships have not been established and power is withheld by Pākehā. In addition, pushing back on government initiatives if they haven't involved tangata whenua from the start, advocating for Māori/Pasifika led projects, and producing outputs only if they are meaningful for communities, not for career progression. It has been important to advocate for Te Tiriti o Waitangi honouring project structures and implementation.
4. *Stating position*. Within health and academic systems, we have presented and engaged in conversations with other Pākehā/Palangi people about the importance of understanding the history of Aotearoa and acknowledging our historical and current role that have upheld a racist system. It has also been important in academic papers to position ourselves as authors as writing from a western perspective and acknowledge the need for genuine partnership and cultural critique.

Our conviction is there are four key disciplines which must be engaged in order to dismantle power systems, overcome paralysis and prioritise positioning. These disciplines of 1) Learning, 2) Reflecting, 3) Serving/Acting, and 4) Disrupting, are what facilitate this journey (See Figure 1).[17,20,29,30,31,32]

Learning is listening and understanding the history. A separate Te Tiriti journey must be taken as Pākehā/Palangi before we can collaborate in a shared space. This involves learning about Te Tiriti and listening to the stories of the history of Aotearoa in a non-defensive manner while making space for and upholding indigenous knowledge. It includes acknowledging the politics of utilising Māori and Pasifika languages, knowledge and resources. We must be prepared to make mistakes and be called out. Learning should include an understanding of Pākehā/Palangi culture while continuing to ensure cultural safety in all contexts.

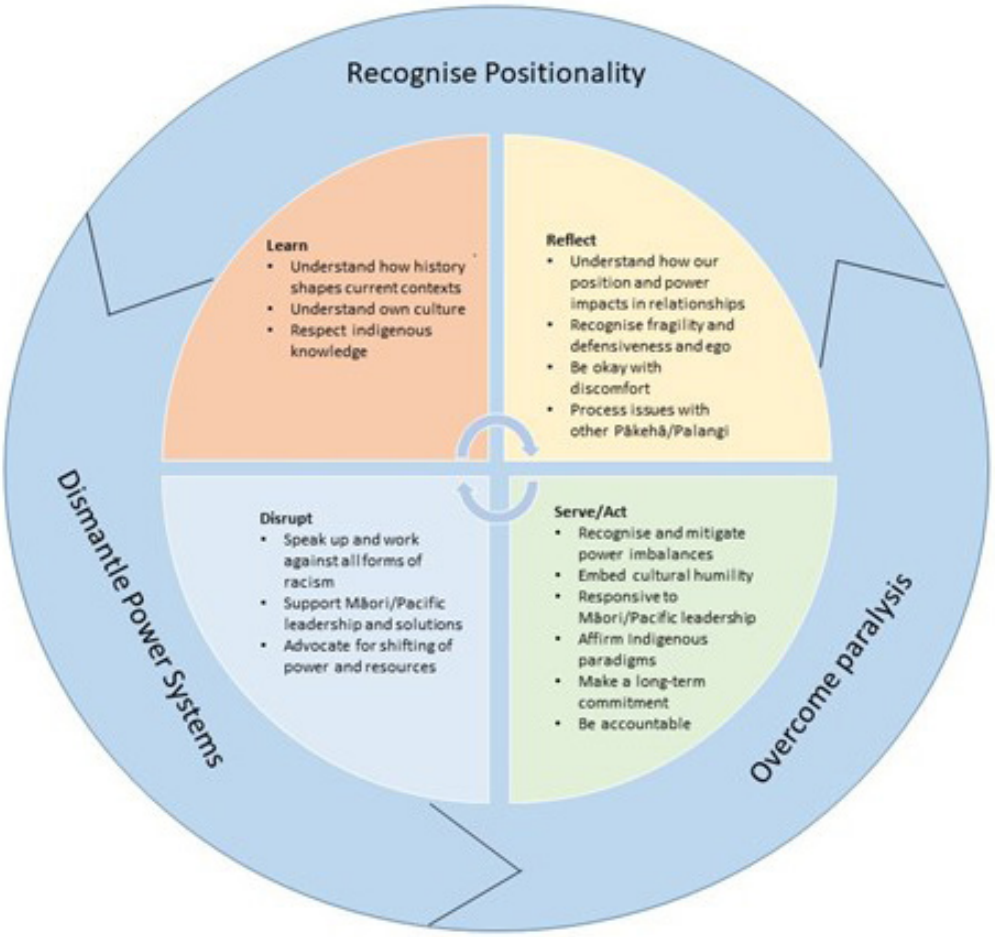
Reflecting involves being conscious of defensiveness and allowing ourselves to sit with the discomfort. Processing of discomfort should occur with other Pākehā /Palangi. There must be reflective internal processing of biases, perspectives, privileges, beliefs, and identities. A useful guide to personal practice and organisational action is outlined in Margaret and Came's chapter "Organizing – What Do White People Need to Know to Be Effective Antiracism Allies Within Public Health".[31]

Serving/Acting demands recognition of power imbalances, knowing when to speak and be quiet, when to step back and step forward. Utilising frameworks such as Came et al.'s Critical Tiriti Analysis

can be useful to measure and monitor responses in accordance with Te Tiriti o Waitangi.32 Indigenous voices must be prioritised. Service will involve responding to invitations to work under Māori/Pasifika leadership while championing mātauranga Māori and Pasifika paradigms. This includes meaningfully being situated within the communities we are allied to. Relationships must be prioritised above the work, which means allowing for the time it will take for these to develop. It is being clear about your position and place in the world and being available to respond to the call from the community, which means you should be in it for the long haul. It will require examining ego and motives and actively embedding cultural humility. It means prioritising acting and speaking out about important developments for example supporting the new Māori Health Authority.

Disrupting is simply working and speaking up against all forms of racism both within yourself and within the institutions and systems. Being an ally is not career enhancing as it contravenes current dominant individualistic hierarchical systems. We must be prepared to put ego aside and replace it with a sense of satisfaction in the work we are doing. At a constitutional level we must also be prepared to disrupt the status quo for constitutional change that honours Te Tiriti o Waitangi. Matike Mai Aotearoa developed a model for constitutional transformation that signifies He Whakaputanga o te Rangatiratanga o Niu Tireni of 1835, Te Tiriti o Waitangi of 1840, UN Declaration on the Rights of Indigenous Peoples (UNDRIP) and He Puapua. As allies, our role is to move forward and support constitutional change where in the "rangatiratanga sphere, Māori make decisions for Māori" and similarly Pasifika make decisions for Pasifika. (p.9)[13]

Figure 1: Competencies and actions required to overcome paralysis, recognise positionality and dismantle power systems.



Summary

Pākehā/Palangi have a responsibility to engage in the work for equity and justice alongside Māori and Pasifika in ways that do not perpetuate harm. Wherever we are right now in the system we have a responsibility to lead change and reposition the control. We acknowledge that we will not get it "right". However, by shifting power, challenging our defensiveness and understanding our position in our country, community and workspaces as well as advocating for constitutional change we may together achieve a more just and equitable society. We expect to be critiqued, both in this paper and in our practice. Being open to this and continuing to act for a Te Tiriti based society in Aotearoa will create positive changes for all of us.

> *"Proactive, mutually supportive, and innovative relationships between Tangata Whenua and Tangata Tiriti are our future. We should embrace the change and reflect it within our new outcome-focused and equitable health system."*[24]

COMPETING INTERESTS
Nil.

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The Venereal Disease Problem.

NZMJ, 1922

A committee of the Board of Health is taking evidence on the venereal disease problem for the purpose of advising the Government on masures necessary for the control of this great evil. The committee will meet in Wellington, Auckland, Christchurch, and probably Dunedin, and as this investigation has been promoted mainly by the medical profession, it is expected that representative doctors will assist by giving evidence before the committee. If the Divisions of the Association will earnestly and promptly give heed to the instruction of delegates or deputy delegates, the Council of the Branch should be in a position at the meeting next month in Christchurch to voice the opinion on this question of the large majority of doctors practising in New Zealand. But there is, in addition, an opportunity for every individual doctor in the country to perform a national service by carefully supplying a return when called upon of the number of cases under his care. The committee wishes a full and reasonably accurate tally of all cases of venereal disease under medical treatment in this country, and also an enumeration of the total number of cases of all diseases primarily due to a venereal infection. Now that both the Government and public opinion are aroused, it would be indeed lamentable if this investigation should be hindered or postponed through the partial failure of doctors to supply necessary data for the estimation of the extent of the so-called scarlet plague in New Zealand. Doctors are busy men, but no intrusions upon their time, no distractions or misunderstandings should prevent them from supplying the enumeration desired of them. This point has been perhaps over-laboured, but a previous return under less favourable auspices and conditions was too incomplete to be valuable, and a similar result again would not be creditable to the public spirit of the profession.