Vitamins in humans: then, now and future global food and health

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Scurvy in New Zealand—a forgotten disease

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Albee’s Bonegraft Operation for Tubercular Disease of the Spine
Ethnic inequality in diagnosis with depression and anxiety disorders
Carol HJ Lee, Isabelle M Duck, Chris G Sibley

Our results indicate an ethnic inequality in self-reported diagnosis of depression or an anxiety disorder by a doctor, relative to scores on the screening measure (ie, Kessler-6 scale) for these same forms of mental illness in a nationally representative sample of New Zealand adults. Māori, Pacific and Asian New Zealanders were more likely to score in the ‘at risk’ range of the Kessler-6 scale, indicating an increased likelihood of depression or anxiety, relative to European New Zealanders. However, European New Zealanders reported the highest rate of actual diagnosis with depression or anxiety in the previous five-year period. This inequality may reflect ethnic group differences in access to, expectations from and style of communication with, medical professionals.

Suicide mortality among Pacific peoples in New Zealand, 1996–2013
Jemaima Tiatia-Seath, Roy Lay-Yee, Martin Von Randow

This study is a review of all recorded suicide deaths for Pacific peoples in New Zealand over a 17-year period (1996–2013) and is the first of its kind. This will help in the planning of policies, programmes and services for mental health and suicide prevention and the need to be mindful of the shifting trends over time, in order to adequately and appropriately address the issue of Pacific mental health and suicide.

Ethnic disparities in the use of seclusion for adult psychiatric inpatients in New Zealand
Melissa McLeod, Paula King, James Stanley, Cameron Lacey, Ruth Cunningham

Within New Zealand inpatient mental health services, Māori adults are more likely than non-Māori adults to be placed in seclusion; where they are placed by themselves in an area or room that they cannot leave. We found that the higher use of seclusion for Māori was partly due to the Māori population being younger, and being admitted to the ward involuntarily. There is a push internationally and within New Zealand to reduce the use of seclusion in the inpatient setting. In addition, for Māori, there should be a focus on providing appropriate and high-quality community mental health services responsive to Māori needs, to keep people well in the community, and reduce the need for hospital admissions.

‘Everyone's talking Jadelle’: the experiences and attitudes of service providers regarding the use of the contraceptive implant, Jadelle in young people in New Zealand
Meghan Sandle, P Tuohy

Health professionals who work with young people and provide contraception were interviewed about their experiences of the contraceptive implant Jadelle. Jadelle was thought to be effective and a good option for young people. There were, however, difficulties for some young people to get this type of contraception due costs, lack of appropriate services and fear of having a procedure.
A critical exploration of a collaborative Kaupapa Māori consistent research project on physician-assisted dying
Phillipa Malpas, Anneka Anderson, Julie Wade, Rawiri Wharemate, Dolly Paul, Pio Jacobs, Takawai Jacobs, Jim Rauwhero, Danielle Lunistra
This paper critically explored a research approach undertaken by Māori and tauiwi/non-Māori researchers within the context of physician-assisted dying. We describe the strengths and challenges of the collaborative research process.

A multifaceted intervention to improve primary care radiology referral quality and value in Canterbury
Kieran Holland, Graham McGeoch, Carolyn Gullery
This article describes changes made to Canterbury's community radiology service over a seven-year period to improve the quality and value of care delivered to patients. Changes included clearly defining access criteria according to patient need on the HealthPathways website, improvements to processes and systems, and analysis and feedback of referral data to general practitioners. Conserved resources were reallocated to support new community-based pathways for care.

Accuracy of ethnicity data recorded in hospital-based patient clinical records and the Australia and New Zealand Dialysis and Transplant Registry
Matthew J Page, Emma H Wyeth, Ari Samaranayaka, Bronwen McNoe, Rachael C Walker, John Schollum, Mark R Marshall, Rob Walker, Sarah Derrett
Collecting accurate and consistent ethnicity data information is necessary for healthcare planning, provision and monitoring, especially to address health inequities. We investigated the accuracy of ethnicity data for a group of end-stage kidney patients using data from a clinical registry, hospital records and from a research project where these participants reported their own ethnicity/ethnicities. We found there were high levels of agreement between the three different ethnicity data sources. However, it is recommended that the same collection methods are used for all research and clinical activities in New Zealand.

The clear and present danger of carbapenemase-producing Enterobacteriaceae (CPE) in New Zealand: time for a national response plan
Matthew Blakiston, Helen Heffernan, Sally Roberts, Joshua Freeman
Carbapenemase-producing Enterobacteriaceae (CPE) are a group of bacteria that can cause serious infections in hospitalised patients and are resistant to nearly all known antibiotics. Over the last five years, CPE have spread widely internationally and are being encountered more and more frequently in New Zealand. The pattern of spread of CPE is similar to that seen in New Zealand over the last decade for ESBL-producing Enterobacteriaceae (ESBL-E). ESBL-E are extremely resistant to antibiotics, but not as resistant as CPE. In many New Zealand hospitals, ESBL-E are now encountered on a daily basis. To prevent CPE following the path of ESBL-E in New Zealand, a nationally coordinated response plan for CPE is urgently needed. The response plan must include measures to minimise the risk of CPE spreading undetected between patients in New Zealand healthcare facilities.
Discussions of vitamin deficiencies can seem so passé in Westernised countries. Have we been lulled into thinking that all the processed food was adequately fortified, that we could take supplements and that authorities regulated food to be safe for consumption? Most of us are aware that serious problems are brewing, and that obesity is almost always a global nutritional problem, behind which is so much chronic metabolic disease accumulation. Our highly-marketed, commodity-technology driven world has been very good at eclipsing the reality, even from scientists.

Reporting significant vitamin deficiencies in clinical cases is bringing this global problem into local clinical focus, but also gives us a chance to put such disease and causes in a wider context—that of our specific human biology in our global environment and within our societies’ organisation.

Most school pupils know that we require the water-soluble Vitamin C for survival, and we get it from eating many types of coloured fruits. However, most of us do not realise that humans are one of few mammals that can’t synthesise Vitamin C/ascorbic acid and in addition is an example of our overall metabolism being rather different from other mammals. Vitamin C and fructose interact with another metabolite, uric acid, which can rise to very high levels in humans, due to at least two mutations leading to a loss of uricase in higher order primates. One theory is that after humans had been consuming large qualities of plants with plenty of vitamin C in the growing season, they gorge on large qualities of sugary ripe fruit with relatively low vitamin C at the beginning of the lean period. They become comparatively insulin resistant, and like omnivorous hibernating bears, are able to gain fat stores to survive the off/wet/cold season where little food is to be had. Fat stores are metabolised, and, when lean tissue begins to be used and purines are released, uric acid levels rise markedly, maintaining blood pressure if thirst/starvation is a problem, and stimulating foraging.

So what is wrong with just adding in vitamin supplements to prevent scurvy and all the other vitamin deficiencies? There have been thousands of vitamin, mineral and nutraceutical supplement epidemiological and intervention studies, and massive marketing hype keeps the supplement (and pharmaceutical) industries funded. However, overall human health will only improve with appropriate food. Only the few longitudinal and/or interventional studies of low input whole and heritage type food consistently show health improvement.

This is where the bigger evolution picture of specialised human physiology comes in.

Evidence from human-specific evolutionary physiology indicates that, due to the high nutrient (energy and micronutrient) requirements of the enlarging brain, we co-evolved strong drives to consume energy-dense and palatable food. Some of us (mostly women) have variably large, safe, subcutaneous fat storage potential, and we rely on a wide variety and high volumes of food phytonutrients to modulate our cell protection systems for remarkably long, functional lives.

This unique set of survival physiological characteristics, that accompanied bipedalism and the use of forelimbs as dexterous hands, cannot be well-appreciated until many disciplines of science are reviewed.

As humans had become so nomadic, their metabolism thrived on picking and choosing the useful nutrients, but also...
managing the numerous plants and other toxins that came with such a diverse diet. It is these thousands of dietary secondary plant chemicals, often concentrated in herbs and spices, that need to be trafficked and protected as they move through our upper gut. The many types of vegetable fibre adsorb these polyphenols, flavonoids and untold types of other nutrients. Then, our healthy, diverse classes of colonic gut microbes ferment these variably soluble and digestible carbohydrates, and release the appropriate micronutrients for absorption. Additionally, the invertebrate chiton/chitosan polysaccharide sheets and other fibre can help excretion of excess or toxic levels of transition metals. Importantly, these fermentable carbohydrates, which include natural oligosaccharides (prebiotics), appear to transport and replenish digestion-resistant microbes, probably in spore form, all of which facilitate micronutrient absorption.

There are multiple reasons that supplemental vitamins, minerals and extracts fail to improve markers and signs of developmental and degenerative disease. There are also complex synergies within the food components: phytонutrients, enzymes, minerals, fibre, the microbes, and gut epithelium complex and payers patches, all of which play a part in what nutrients are absorbed and toxins excreted. Many micronutrients, including Vitamin C, function as mildly pro-oxidant signalling molecules that stimulate a coordinated, amplified anti-oxidant response pathway, in humans particularly. Megadoses of pro-oxidant vitamins flood the system, unbalance the interaction with other metabolites and can worsen disease.

It is worth putting into context the increasingly low micronutrient to macronutrient ratio that has been occurring over the Anthropocene, when humans and their technologies have been making significant changes to large environments. Early technologies seem to have conferred nutritional benefits. Controlling fire to cook food started approximately 800,000 years ago, reducing bacterial contaminants and releasing extra nutrients. Gradually, some 10–12 millennia ago, after some cultures began agriculture (horticulture and animal husbandry) to produce high energy food, nutrient variety became increasingly limited. Suboptimal metabolic, immune and physical robustness became more common. However, periodically, agricultural systems failed due to climate disasters and pest plagues; such boom and bust cycles were typical of the altered or damaged ecologies.

Storage, transport and trade of these highly palatable energy-dense foods permitted humans to take over resource-rich, favourable niches. Possibly to escape other human competition, some peoples migrated into more difficult environments. Gradually, the exploitation of local resources and those used by other human groups increased with more sophisticated technologies, most likely initially for own-tribe social good and survival advantage.

However, there is a long history of the dominant few concentrating power in an obsessive-compulsive despotic manner. There are numerous examples of ‘advanced civilisations’ collapsing—an Easter Island effect. When technologies have been used for exploiting environments and for protracted wars, the remaining polluted environments mean food deprivation and susceptibility to ‘devastating plagues’ occur, such as the flu pandemic after World War I. More slowly developing is the toxicity and oxidative stress that damages fast turnover cells, such as cardiovascular endothelium where atherosclerosis develops. This and lack of healthy food nutrients is a plausible cause of coronary artery disease. And over many years of less overtly toxic insults and deprivation of nutrients, immune and endocrine epithelial disruption and acquired genetic damage are likely events in the cause of ever-increasing cancer rates.

If humans specifically evolved to physically and mentally thrive on a wide variety of micronutrient dense/low additive food, then expecting us to adapt to degraded/foreign chemical (xenobiotic) laden foodstuffs is unrealistic. We can only expect more infant developmental disease, and earlier and more severe degenerative disease, no matter what money is spent on ‘high tech’ cancer prevention research or public health messaging to change our ‘life situation status’.

Interdependent human and environmental health requires real environmentally sustainable ‘low-input’ ecofarming of fit heritage crops and stock, and its products to be accessed in a fair and equitable manner. Enough real basic evolutionary, biological and environmental science is done to continue organic...
farming in some areas\textsuperscript{29} and restart mixed ecofarms.\textsuperscript{30,31,32} Conversion of the extensive high-input agribusiness areas of harmful high-energy/low nutrient crops may well rid the world of the unmetabolised toxic fat on the bodies of domestic animals and humans. This is not an unrealistic ideal, but it is the only way forward with any semblance of global health, according to a number of authors.\textsuperscript{30,31,32}

In the era of ‘post truth’ administration of states, and ‘commodity technology’ being the only ‘science’ the public and industry use but don’t understand, now is the time. Real nutrition, physiology, ecology scientists and civil socialites need to take a long-term view, and mobilise, in public sector policy, on the land, in the kitchen, out on the streets and in all health clinics.

\textbf{Competing interests:}
Nil.

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\textbf{REFERENCES:}


Ethnic inequality in diagnosis with depression and anxiety disorders
Carol HJ Lee, Isabelle M Duck, Chris G Sibley

ABSTRACT
AIMS: This study explored ethnic disparities in self-reported diagnosis of depression or an anxiety disorder by a doctor, relative to scores on the screening measure for these same forms of mental illness in a probability sample of New Zealand adults.

METHODS: 15,822 participants responded to the 2014/15 New Zealand Attitudes and Values Study (NZAVS) longitudinal panel. Participants completed the Kessler-6 scale (a screening measure of non-specific psychological distress over the last month) and reported whether a doctor had diagnosed them with depression or an anxiety disorder any time in the last five years.

RESULTS: Māori, Pacific and Asian New Zealanders were more likely to score in the ‘at risk’ range of the Kessler-6 scale, indicating an increased likelihood of depression or anxiety, relative to European New Zealanders. However, European New Zealanders reported the highest rate of actual diagnosis with depression or anxiety in the previous five-year period.

CONCLUSION: There is an ethnic inequality in diagnosis received in the last five years relative to population-level screening risk for depression and anxiety disorders over the last month. Māori, Pacific and Asian New Zealanders are more likely to be under-diagnosed with depression and anxiety disorders relative to European New Zealanders. This inequality may reflect ethnic group differences in access to, expectations from and style of communication with, medical professionals.

Psychological distress and mental illness are prevalent in New Zealand.1,2 The 2014/15 New Zealand Health Survey (NZHS) indicated that around 6% of New Zealand adults experienced high psychological distress in the past month and 17% have been diagnosed with a mood or an anxiety disorder in their lifetime.2 However, there are inconsistencies between assessed mental health and rate of diagnosis of mental illness across ethnic groups. For instance, both Pacific and Māori peoples tend to have poorer mental health, but Pacific peoples exhibit lower rates of actual diagnosis and mental health service use than Māori.1,2 Furthermore, despite generally being found to have good mental health,1,2 some studies reveal that Asian peoples have high psychological distress.3,4

Signal Detection Theory (SDT) is a commonly used framework for categorising inconsistencies in mental illness diagnosis. From the perspective of SDT, correctly diagnosing a patient with mental illness represents a ‘hit’, failing to diagnose a mental illness a ‘miss’, incorrectly diagnosing an absent mental illness a ‘false alarm’ and not diagnosing an absent illness a ‘correct rejection’.5 However, it should be noted that the classification of ‘false alarms’ may not be appropriate when there is a time difference between the diagnosis and psychological distress measure (e.g., lifetime diagnosis versus distress in past month). This is because previously diagnosed individuals with no or low current psychological distress may represent those who have received successful treatment or recovered from episodic mental illness after being diagnosed.

Research on ethnic disparities in rate of diagnosis is crucial in order to more accurately identify those who are being ‘missed’ and in need of focused psychiatric healthcare. The current paper aims to contribute to this goal by analysing ethnic
group differences in rates of self-reported diagnosis of depression or an anxiety disorder relative to the likelihood of scoring in the ‘at risk’ range of the Kessler-6 measure of psychological distress in a probability sample of New Zealanders.

According to the 2014/15 NZHS, Pacific and Asian New Zealanders have the lowest rate of a mood or an anxiety disorder diagnosis (5% and 8% respectively).2 This contradicts repeated findings that Pacific peoples reported higher psychological distress than non-Pacific peoples,1,2 a factor that should increase their risk for developing mental illness.2 In terms of SDT, these findings suggest that there may be a greater rate of ‘misses’ among Pacific peoples. This high rate of under-diagnosis may be due to their high deprivation, lack of healthcare access and cultural differences in health beliefs.3,6,7

Some suggest that findings that Asian peoples tend to have good health status may reflect a “healthy immigrant effect”.6,8 This refers to the effect where migrants, who usually come from high social classes and are required to be healthy before immigrating, have good health upon their arrival to the host country but experience negative health consequences over time. Such adverse effects can be linked to their feelings of isolation, experiences of racism and low rates of healthcare utilisation.6,8,9 This in turn might increase the likelihood of ‘misses’ in the diagnosis of mental illness among Asian New Zealanders.

The Kessler-scales are self-report measures used to screen for non-specific psychological distress in the population.10 Previous studies have confirmed the accuracy and utility of these scales,10,11 and hence, they are commonly used in both international12,13 and New Zealand studies.2,3,14 Furthermore, Ministry of Health New Zealand,15 as well as other foreign health organisations,16 have promoted the use of Kessler scales by primary-care practitioners. These scales enable us to estimate the proportion of Māori, Pacific, Asian and European New Zealanders who may be at risk (ie, scoring in the ‘at risk’ scale range) of experiencing non-specific psychological distress. This is possible because the Kessler-6 includes optimal and frequently used cut-points categorising people into broad ‘low-risk’ and ‘high risk’ groups.11–13

Extending previous research, we use a nationally representative sample of New Zealand adults to examine ethnic disparities in rate of mental illness diagnosis. We employ the Kessler-6 scale to assess the proportion of Māori, Pacific, Asian and European New Zealanders who score in the ‘at risk’ scale range over the past month, and compare this to the proportion of those who reported being diagnosed with depression or an anxiety disorder by a doctor in the last five years. Our analysis can be thought of as a broad test in terms of SDT, as we aim to compare the proportion of ‘hits’, ‘misses’, ‘correct rejections’ and previously diagnosed individuals with low current distress (referred to as ‘diagnosed/low distress’) across ethnic groups. Findings from this study will reveal those who are most in need of psychiatric healthcare and provide a framework for future research on ethnicity-specific barriers to healthcare provision.

Method

Sampling procedure

The Time 1 (2009) NZAVS longitudinal panel recruited participants by randomly selecting samples from the New Zealand electoral roll (response rate: 16.6%). A booster sample was recruited at Time 3 (2011) through an unrelated survey posted on a major New Zealand newspaper website. Further booster samples were recruited from the 2012 and 2014 electoral roll in subsequent waves (response rates: 6.2–12.33%, retention rates: around 60% across waves). We used the Time 6 (2014/15) NZAVS sample, containing 15,822 participants, for this study (retention rate: 57.2% over five years, 81.5% from previous year, see technical document).17

Participants

15,822 participants (10,003 female, 5,800 male; 19 missing) completed the Time 6 questionnaire. Participants’ mean age was 49.34 years (SD = 14.04, range 18–95; nine missing). The medians of the annual household income quartile groups were $33,900, $73,000, $110,000 and $190,000 (1,143 missing). Additionally, 74.6% (259 missing) were parents, 74.7% (640 missing) were in a committed romantic relationship and 77% (188 missing) were employed. Education (1,114 missing) was coded as a 10-point ordinal variable ranging from 0 (none) to 10 (PhD/equivalent degree, M = 5.05, SD = 2.85).
Measures

Psychological distress was measured using the Kessler-6 scale. This self-report measure includes six items asking participants to rate on a 5-point scale (0 = none of the time, 4 = all of the time) how often, over the last 30 days:

- ... you feel hopeless
- ... you feel so depressed that nothing could cheer you up
- ... you feel restless or fidgety
- ... you feel that everything was an effort
- ... you feel worthless
- ... you feel nervous.

Ratings for each item were summed to create a final Kessler score between 0 and 24. As discussed by Kessler et al., we created a categorical ‘Kessler risk score’ where participants who scored between 0–12 were coded as ‘0’ (low risk) and those who scored 13 and above were coded a ‘1’ (high risk). The NZHS also uses findings from Kessler et al to define cut-points on the Kessler-10 scale. Specifically, they use a score of 12 as the optimal cut-point to identify those with high ‘psychological distress’ and at higher risk of developing anxiety or depression (scores 0–11 indicating no/low distress, 12–40 indicating high distress). Participants completed the question “have you been diagnosed with, or treated for, any of the following health conditions by a doctor in the last five years?” This question contained various response options, including depression and anxiety disorder. Those who selected either or both depression and anxiety disorder were coded as having been diagnosed by a doctor.

Ethnicity was measured using the standard New Zealand Census item, for which participants could select or nominate each ethnic group they identified with. Participants were priority coded into four mutually exclusive ethnic groups. ‘Māori’ had priority coding over all other ethnicities, followed by ‘Pacific’ and ‘Asian’ peoples, then ‘European’ respectively. The ‘European’ category included all those of European descent (eg, New Zealand European, Irish, English). Those who did not fit into these four categories were excluded from this variable.

Statistical analyses

We conducted a log linear and nested Chi-square analysis with three categorical variables: ‘diagnosis’ (no, yes), ‘Kessler risk score’ (low, high) and ‘ethnicity’ (Māori, Pacific, Asian, European) on SPSS. Analyses applied a post-stratification sample weight for men and women from the four primary ethnic groups separately, and region of residence based on the 2013 New Zealand Census. Unweighted analyses are reported in tabulated form.

Results

The three-way log linear analysis produced a final model that retained all effects. The highest-order interaction (diagnosis × Kessler risk score × ethnicity) was significant, $\chi^2(3) = 10.97$, $p=.012$. To break down this effect, separate Chi-Square tests

<table>
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<tr>
<th>Ethnicity</th>
<th>High Kessler score</th>
<th>Diagnosis</th>
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</thead>
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<tr>
<td></td>
<td>Unweighted</td>
<td>Weighted on gender, ethnicity and region</td>
</tr>
<tr>
<td>European</td>
<td>4.6% (4.3–5.0%)</td>
<td>4.5% (4.1–4.9%)</td>
</tr>
<tr>
<td>Māori</td>
<td>7.6% (6.5–8.8%)</td>
<td>7.5% (6.4–8.7%)</td>
</tr>
<tr>
<td>Pacific</td>
<td>8.4% (6.1–11.4%)</td>
<td>8.0% (6.4–10.0%)</td>
</tr>
<tr>
<td>Asian</td>
<td>8.8% (6.8–11.3%)</td>
<td>8.5% (7.3–9.8%)</td>
</tr>
</tbody>
</table>
Europeans had a significantly lower rate of high Kessler scores, but higher rate of diagnosis with depression or an anxiety disorder compared to all other ethnic groups (see Table 1). Conversely, Asian peoples had a significantly lower rate of diagnosis compared to other ethnic groups. Here, it is important to note the time difference on ‘diagnosis’ and ‘Kessler risk scores’ were performed for each ethnicity. For Europeans, there was a significant association between Kessler risk score and diagnosis, $\chi^2(1) = 653.50$, $p<.001$. This was also true for Māori, $\chi^2(1) = 103.74$, $p<.001$, Pacific, $\chi^2(1) = 29.66$, $p<.001$ and Asian peoples, $\chi^2(1) = 65.71$, $p<.001$.

Table 2: Percentage of correct rejections, diagnosed/low distress, misses and hits within ethnic groups.

<table>
<thead>
<tr>
<th>Prioritised Ethnicity</th>
<th>SDT categories</th>
<th>Unweighted (95% CI)</th>
<th>Weighted on gender, ethnicity and region (95% CI)</th>
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</thead>
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<tr>
<td>European</td>
<td>Correct rejection</td>
<td>82.7% (82.1–83.4%)</td>
<td>83.4% (82.7–84.1%)</td>
</tr>
<tr>
<td></td>
<td>Diagnosed/low distress</td>
<td>12.7% (12.1–13.3%)</td>
<td>12.1% (11.5–12.7%)</td>
</tr>
<tr>
<td></td>
<td>Miss</td>
<td>2.0% (1.8–2.3%)</td>
<td>2.1% (1.8–2.3%)</td>
</tr>
<tr>
<td></td>
<td>Hit</td>
<td>2.6% (2.3–2.9%)</td>
<td>2.5% (2.2–2.8%)</td>
</tr>
<tr>
<td>Māori</td>
<td>Correct rejection</td>
<td>81.4% (79.6–83.1%)</td>
<td>82.9% (81.1–84.5%)</td>
</tr>
<tr>
<td></td>
<td>Diagnosed/low distress</td>
<td>11.0% (9.7–12.5%)</td>
<td>9.7% (8.4–11.1%)</td>
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<td></td>
<td>Miss</td>
<td>4.2% (3.4–5.2%)</td>
<td>4.5% (3.7–5.5%)</td>
</tr>
<tr>
<td></td>
<td>Hit</td>
<td>3.3% (2.6–4.2%)</td>
<td>3.0% (2.3–3.8%)</td>
</tr>
<tr>
<td>Pacific</td>
<td>Correct rejection</td>
<td>80.6% (76.6–84.1%)</td>
<td>83.8% (81.2–86.1%)</td>
</tr>
<tr>
<td></td>
<td>Diagnosed/low distress</td>
<td>11.0% (8.4–14.3%)</td>
<td>8.2% (6.5–10.2%)</td>
</tr>
<tr>
<td></td>
<td>Miss</td>
<td>5.4% (3.6–7.9%)</td>
<td>5.7% (4.3–7.4%)</td>
</tr>
<tr>
<td></td>
<td>Hit</td>
<td>3.0% (1.8–5.1%)</td>
<td>2.4% (1.6–3.6%)</td>
</tr>
<tr>
<td>Asian</td>
<td>Correct rejection</td>
<td>84.6% (81.6–87.2%)</td>
<td>85.9% (84.2–87.3%)</td>
</tr>
<tr>
<td></td>
<td>Diagnosed/low distress</td>
<td>6.6% (4.9–8.9%)</td>
<td>5.6% (4.7–6.8%)</td>
</tr>
<tr>
<td></td>
<td>Miss</td>
<td>6.6% (4.9–8.9%)</td>
<td>6.5% (5.5–7.7%)</td>
</tr>
<tr>
<td></td>
<td>Hit</td>
<td>2.2% (1.3–3.7%)</td>
<td>2.0% (1.5–2.8%)</td>
</tr>
</tbody>
</table>
between the Kessler-6 scale (psychological distress over the *last month*) and our diagnosis measure (self-reported diagnosis over the *last five years*). Consequently, the prevalence of diagnosis is higher than that for high Kessler risk scores for most ethnic groups.

As illustrated in Table 2, all ethnic groups show high rates of ‘correct rejections’ and low rates of ‘hits’. Asian peoples show the highest rate of ‘misses’, followed by Pacific peoples, Māori and Europeans respectively. The rate of those categorised as ‘diagnosed/low distress’ show the reverse order, with Europeans showing the highest and Asian peoples showing the lowest rate. There were significant differences between ‘diagnosed/low distress’ and ‘misses’ proportions between any two ethnic groups, except for between ‘misses’ proportions of Asian and Pacific peoples (see Figure 1).

To further explore our data, a nested Chi-square analysis using ‘diagnosis’, ‘Kessler risk scores’ and ‘ethnicity’ was conducted (see Table 3). Overall comparisons \(\chi^2(3) = 74.02, p<.001\), as well as those within ethnic group \(\chi^2(3) = 70.14, p<.001\) and high Kessler risk scores \(\chi^2(3) = 55.98, p<.001\) were significant. Of those with low Kessler risk scores in the last month, Europeans (12.6%) showed the highest and Asian peoples (6.2%) showed the lowest rate of within ethnic group diagnosis in the previous five years (Māori: 10.4%, Pacific: 8.9%).

Among those with high Kessler risk scores, Europeans (54.5%) again showed the highest and Asian peoples (23.8%) showed the lowest rate of within ethnic group diagnosis (Māori: 39.9%, Pacific: 29.6%; Table 4 presents unweighted proportions).

Relative to Europeans, Māori, Pacific and Asian peoples are more likely to score in the ‘high risk’ range over the last month, but are less likely to be diagnosed in the last five years. Of those with high Kessler risk scores, Māori are 1.32 times more likely, Pacific peoples 1.54 times more likely and Asian peoples 1.67 times more likely to be undiagnosed (within ethnic group) compared to Europeans. Alternatively, of those with low Kessler risk scores, Māori are .82 times, Pacific peoples .71 times and Asian peoples .49 times less likely to be diagnosed (within ethnic group) than Europeans.

**Figure 1:** The percentage of ‘correct rejections’, ‘diagnosed/low distress’, ‘misses’ and ‘hits’ within each ethnicity (weighted on gender, ethnicity and region).

Note: Proportions with significant differences within Correct rejection (European & Asian, Māori & Asian), diagnosed/low distress (all comparisons), Miss (all comparisons except Asian & Pacific) and Hit (none).
Table 3: Weighted cross-tabulation of diagnosis and priority-coded ethnicity within low and high Kessler risk score groups (with 95% Confidence Intervals).

<table>
<thead>
<tr>
<th>Kessler risk score</th>
<th>Diagnosis</th>
<th>NZ European/ Pakeha</th>
<th>Māori</th>
<th>Pacific</th>
<th>Asian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (scored between 0–12)</td>
<td>No Count</td>
<td>8,938&lt;sub&gt;a&lt;/sub&gt;</td>
<td>1,587&lt;sub&gt;b&lt;/sub&gt;</td>
<td>739&lt;sub&gt;b&lt;/sub&gt;</td>
<td>1,657&lt;sub&gt;c&lt;/sub&gt;</td>
<td>12,921</td>
</tr>
<tr>
<td>% within diagnosis</td>
<td>69.2% (68.4–70.0%)</td>
<td>12.3% (11.7–12.9%)</td>
<td>5.7% (5.3–6.1%)</td>
<td>12.8% (12.3–13.4%)</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within ethnicity</td>
<td>87.4% (86.7–88.0%)</td>
<td>89.6% (88.1–90.9%)</td>
<td>91.1% (89.0–92.9%)</td>
<td>93.8% (92.6–94.9%)</td>
<td>88.6% (88.1–89.1%)</td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>61.3% (60.5–62.1%)</td>
<td>10.9% (10.4–11.4%)</td>
<td>5.1% (4.7–5.4%)</td>
<td>11.4% (10.7–11.9%)</td>
<td>88.6%</td>
<td></td>
</tr>
<tr>
<td>Yes Count</td>
<td>1,293&lt;sub&gt;a&lt;/sub&gt;</td>
<td>185&lt;sub&gt;b&lt;/sub&gt;</td>
<td>72&lt;sub&gt;b,c&lt;/sub&gt;</td>
<td>109&lt;sub&gt;c&lt;/sub&gt;</td>
<td>1,659</td>
<td></td>
</tr>
<tr>
<td>% within diagnosis</td>
<td>77.9% (75.9–79.9%)</td>
<td>11.2% (9.7–12.8%)</td>
<td>4.3% (3.5–5.4%)</td>
<td>6.6% (5.5–7.9%)</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within ethnicity</td>
<td>12.6% (12.0–13.3%)</td>
<td>10.4% (9.1–12.0%)</td>
<td>8.9% (7.1–11.0%)</td>
<td>6.2% (5.1–7.4%)</td>
<td>11.4% (10.9–11.9%)</td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>8.9% (8.4–9.3%)</td>
<td>1.3% (1.1–1.5%)</td>
<td>0.5% (0.4–0.6%)</td>
<td>0.7% (0.6–0.9%)</td>
<td>11.4%</td>
<td></td>
</tr>
<tr>
<td>High (scores between 13–24)</td>
<td>No Count</td>
<td>220&lt;sub&gt;a&lt;/sub&gt;</td>
<td>86&lt;sub&gt;b&lt;/sub&gt;</td>
<td>50&lt;sub&gt;b,c&lt;/sub&gt;</td>
<td>125&lt;sub&gt;c&lt;/sub&gt;</td>
<td>481</td>
</tr>
<tr>
<td>% within diagnosis</td>
<td>45.7% (41.3–50.2%)</td>
<td>17.9% (14.7–21.6%)</td>
<td>10.4% (8.0–13.4%)</td>
<td>26.0% (22.3–30.1%)</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within ethnicity</td>
<td>45.5% (41.1–49.9%)</td>
<td>60.1% (52.0–67.8%)</td>
<td>70.4% (59.0–79.8%)</td>
<td>76.2% (69.2–82.1%)</td>
<td>55.8% (52.5–59.1%)</td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>25.5% (22.7–28.5%)</td>
<td>10.0% (8.2–12.2%)</td>
<td>5.8% (4.4–7.6%)</td>
<td>14.5% (12.3–17.0%)</td>
<td>55.8%</td>
<td></td>
</tr>
<tr>
<td>Yes Count</td>
<td>264&lt;sub&gt;a&lt;/sub&gt;</td>
<td>57&lt;sub&gt;b&lt;/sub&gt;</td>
<td>21&lt;sub&gt;b,c&lt;/sub&gt;</td>
<td>39&lt;sub&gt;c&lt;/sub&gt;</td>
<td>381</td>
<td></td>
</tr>
<tr>
<td>% within diagnosis</td>
<td>69.3% (69.3–64.5%)</td>
<td>15.0% (11.7–19.0%)</td>
<td>5.5% (3.6–8.3%)</td>
<td>10.2% (7.6–13.7%)</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>% within ethnicity</td>
<td>54.5% (50.1–58.9%)</td>
<td>39.9% (32.2–48.1%)</td>
<td>29.6% (20.2–41.0%)</td>
<td>23.8% (17.9–30.9%)</td>
<td>44.2% (40.9–47.5%)</td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>30.6% (27.6–33.8%)</td>
<td>6.6% (5.1–8.5%)</td>
<td>2.4% (1.6–3.7%)</td>
<td>4.5% (3.3–6.1%)</td>
<td>44.2%</td>
<td></td>
</tr>
</tbody>
</table>

Note: N=15,442, weighted on gender, ethnicity and region of residence, different subscript letters for proportions indicate significant differences across columns (z-test based on standard procedures in SPSS).
**Table 4:** *Unweighted* cross-tabulation of diagnosis and priority-coded ethnicity within low and high Kessler risk score groups (with 95% Confidence Intervals).

<table>
<thead>
<tr>
<th>Kessler risk score</th>
<th>Diagnosis</th>
<th>NZ European/Pakeha</th>
<th>Māori</th>
<th>Pacific</th>
<th>Asian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low (scored between 0–12)</strong></td>
<td>No Count</td>
<td>10,287&lt;sub&gt;a&lt;/sub&gt;</td>
<td>1,584&lt;sub&gt;a&lt;/sub&gt;</td>
<td>345&lt;sub&gt;a&lt;/sub&gt;</td>
<td>528&lt;sub&gt;b&lt;/sub&gt;</td>
<td>12,744</td>
</tr>
<tr>
<td></td>
<td>% within diagnosis</td>
<td>80.7% (80.0–81.4%)</td>
<td>12.4% (11.9–13.0%)</td>
<td>2.7% (2.4–3.0%)</td>
<td>4.1% (3.8–4.5%)</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ethnicity</td>
<td>86.7% (86.1–87.3%)</td>
<td>88.0% (86.5–89.5%)</td>
<td>88.0% (84.4–90.9%)</td>
<td>92.8% (90.4–94.6%)</td>
<td>87.2% (86.6–87.7%)</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>70.4% (69.6–71.1%)</td>
<td>10.8% (10.3–11.4%)</td>
<td>2.4% (2.1–2.6%)</td>
<td>3.6% (3.3–3.9%)</td>
<td>87.2%</td>
</tr>
<tr>
<td>Yes Count</td>
<td>1,573&lt;sub&gt;a&lt;/sub&gt;</td>
<td>215&lt;sub&gt;a&lt;/sub&gt;</td>
<td>47&lt;sub&gt;a&lt;/sub&gt;</td>
<td>41&lt;sub&gt;a&lt;/sub&gt;</td>
<td>1,876</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% within diagnosis</td>
<td>83.8% (82.1–85.4%)</td>
<td>11.5% (10.1–13.0%)</td>
<td>2.5% (1.9–3.3%)</td>
<td>2.2% (1.6–3.0%)</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ethnicity</td>
<td>13.3% (12.7–13.9%)</td>
<td>12.0% (10.5–13.5%)</td>
<td>12.0% (9.1–15.6%)</td>
<td>7.2% (5.4–9.6%)</td>
<td>12.8% (12.3–13.4%)</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>10.8% (10.3–11.3%)</td>
<td>1.5% (1.3–1.7%)</td>
<td>0.3% (0.2–0.4%)</td>
<td>0.3% (0.2–0.4%)</td>
<td>12.8%</td>
</tr>
<tr>
<td><strong>High (scores between 13-24)</strong></td>
<td>No Count</td>
<td>250&lt;sub&gt;a&lt;/sub&gt;</td>
<td>82&lt;sub&gt;a&lt;/sub&gt;</td>
<td>23&lt;sub&gt;b,c&lt;/sub&gt;</td>
<td>41&lt;sub&gt;c&lt;/sub&gt;</td>
<td>396</td>
</tr>
<tr>
<td></td>
<td>% within diagnosis</td>
<td>63.1% (58.3–67.7%)</td>
<td>20.7% (17.0–25.0%)</td>
<td>5.8% (3.9–8.6%)</td>
<td>10.4% (7.7–13.7%)</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ethnicity</td>
<td>43.7% (39.7–47.8%)</td>
<td>55.8% (47.7–63.6%)</td>
<td>63.9% (47.6–77.5%)</td>
<td>74.5% (61.7–84.2%)</td>
<td>48.9% (45.5–52.3%)</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>30.9% (27.8–34.1%)</td>
<td>10.1% (8.2–12.4%)</td>
<td>2.8% (1.9–4.2%)</td>
<td>5.1% (3.8–6.8%)</td>
<td>48.9%</td>
</tr>
<tr>
<td>Yes Count</td>
<td>322&lt;sub&gt;a&lt;/sub&gt;</td>
<td>65&lt;sub&gt;b&lt;/sub&gt;</td>
<td>13&lt;sub&gt;c&lt;/sub&gt;</td>
<td>14&lt;sub&gt;c&lt;/sub&gt;</td>
<td>414</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% within diagnosis</td>
<td>77.8% (73.5–81.5%)</td>
<td>15.7% (12.5–19.5%)</td>
<td>3.1% (1.8–5.3%)</td>
<td>3.4% (2.0–5.6%)</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>% within ethnicity</td>
<td>56.3% (52.2–60.3%)</td>
<td>44.2% (36.4–52.3%)</td>
<td>36.1% (22.5–52.4%)</td>
<td>25.5% (15.8–38.3%)</td>
<td>51.1% (47.7–54.5%)</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>39.8% (36.4–43.2%)</td>
<td>8.0% (6.4–10.1%)</td>
<td>1.6% (0.9–2.7%)</td>
<td>1.7% (1.0–2.9%)</td>
<td>51.1%</td>
</tr>
</tbody>
</table>

Note: N=15,430, Chi-square overall ($\chi^2$(3) = 20.07, p<.001) within low ($\chi^2$(3) = 19.57, p<.001) and high Kessler risk scores ($\chi^2$(3) = 26.67, p<.001), different subscript letters indicate significant differences across columns (z-test based on standard procedures in SPSS).
Discussion

The present study examined ethnic disparities in mental illness diagnosis using a probability sample of New Zealand adults. We used the Kessler-6 scale to identify those who scored in the ‘at risk’ range over the last month, and compared this to the proportion of those actually diagnosed with depression or an anxiety disorder by a doctor in the past five years. Our results reveal ethnic inequalities in rate of diagnosis, which are inconsistent with ethnic differences in the screening risk for mental illness.

Ethnic differences in mental illness diagnosis

After applying sample weighting on gender, ethnicity and region of residence, we found that Europeans (4.5%) were the least likely to score in the high Kessler risk range (Māori: 7.5%, Pacific: 8%, Asian: 8.5%), but showed the highest prevalence of diagnosed depression and anxiety disorder (European: 14.5%, Māori: 12.6%, Pacific: 10.5%, Asian: 7.7%). Most ethnic groups exhibited a higher rate of diagnosis than high Kessler-risk scores, which can be explained by the time difference between the Kessler-6 scale (distress over the last month) and our diagnostic measure (diagnosis over the last five years).

The 2014/15 NZHS found that both Māori (9.6%) and Pacific (10.2%) adults exhibited greater rates of high Kessler-10 risk scores (ie, 12 or above), but Māori individuals showed a much higher rate of lifetime diagnosis with mood or an anxiety disorder (17.4% and 7.5% respectively). In comparison to the NZHS, our results indicate a slightly lower prevalence of high psychological distress for Māori (7.5%) and Pacific peoples (8%). Furthermore, the NZHS found that Asian peoples have the lowest (5.5%), whereas our study found that Asian peoples have the highest rate (8.5%) of high psychological distress. Regarding mental illness diagnosis, the 2006 New Zealand Mental Health Survey (NZMHS) found that, after adjusting for demographic factors, Māori (5.7%) and non-Māori/non-Pacific peoples (5.8%) exhibited a higher 12-month prevalence of major depressive disorder than Pacific peoples (3.5%). However, there were no significant ethnic differences in 12-month prevalence of anxiety disorders (12.9–15.6%).

In terms of SDT, we found that mental health problems of Māori (4.5%), Asian (6.5%) and Pacific peoples (5.7%) are more likely to be ‘missed’ compared to Europeans (2.1%). Although ethnic minorities exhibited greater rates of high Kessler-risk scores, all ethnic groups showed similar rates of ‘hits’ (2–3%). Additionally, Europeans (12.1%) showed the highest proportion of those categorised as ‘diagnosed/low distress’ (Māori: 9.7%, Pacific: 8.2%, Asian: 5.6%). As the self-reported diagnosis question asked about the last five years, this indicates that Europeans who were diagnosed in the past may have been more likely to successfully manage or be treated for their depression/anxiety disorder within the asked five-year period, relative to people from other ethnic groups.

Under-diagnosis among Pacific and Asian peoples

For Asian peoples, their under-diagnosis is likely to be associated with their low rate of psychiatric healthcare utilisation, in turn linked with language or cultural barriers to healthcare access. This includes the greater stigma surrounding mental illness in Asian cultures. Among Pacific peoples, factors such as costs, transport and language barriers are likely to contribute to their low utilisation of healthcare services and under-diagnosis. Moreover, perhaps due to the lack of cultural competence among doctors, many Pacific peoples report experiences of low-quality service in primary healthcare.6

Previous American studies indicate that patients’ ethnicities influence the ability of physicians to accurately detect mental health problems. For instance, Borowsky et al found that American physicians were less likely to detect depression in African-American or Hispanic patients. Likewise, New Zealand physicians may be less likely to recognise mental health problems in Pacific and Asian peoples. Alegria and McGuire found that ‘cultural, social and contextual’ factors have important influence on how one expresses psychiatric symptoms. Unlike Western perspectives, Pacific peoples place greater emphasis on familial wellbeing as an aspect of their own subjective wellbeing. Similarly, Asian peoples tend to work through health problems as a family and often endorse non-Western models of health treatment. These cultural beliefs may be
influencing how Pacific and Asian peoples express their mental illness in differential ways and hence, medical professionals need to develop cultural competence to understand and accurately diagnose these individuals.

Caveats and future research

The 2006 NZMHS found that the high prevalence of mental illness among Pacific peoples was largely explained by population differences in age and gender.\textsuperscript{20} Future studies should examine whether population age, in addition to gender and region of residence, may be affecting ethnic differences in psychological health and diagnosis. Furthermore, although the Kessler-6 scale is a widely used and validated measure of psychological distress, optimal scaling rules were found to differ across countries.\textsuperscript{25} Therefore, it is crucial to investigate potential cultural variations in understandings of ‘depression’ and ‘anxiety’, and how this may influence the accuracy of Kessler-risk scores.

This study analysed data from the broader longitudinal self-report postal NZAVS. It is important to note that the NZAVS has a relatively low initial response rate of 16.6\% in 2009. Although general survey response rates have been declining over the years, some medical research has nevertheless achieved much higher response rates. For example, a recent study by Chesang et al\textsuperscript{26} on contraceptive use in New Zealand achieved a response rate of 47\% by recruiting participants through a postal survey with telephone follow-up. The NZAVS did not employ a telephone follow-up at Time 1. Although low response rates do not necessarily indicate non-response bias, high response rates are desirable in probability sample surveys, as this enables more accurate estimation of sampling error and the ability to correct for biases in estimates.\textsuperscript{27}

Applying post-survey adjustments can correct for bias in data collection even without high response rates.\textsuperscript{27} In support of this idea, the 2012 telephone survey by Pew Centre (with a 9\% response rate) report that their sample provided a reliable reflection of the general public on social and economic measures after applying sample weighting.\textsuperscript{28} Similarly, the NZAVS applies post-stratification sample weighting on demographics, and its validity in monitoring changes in New Zealanders’ political attitudes over time has been demonstrated.\textsuperscript{29} The point, however, remains that as non-response bias tends to vary depending on the variable of interest,\textsuperscript{27} we were unable to determine the exact degree of bias in the specific items used in this study.

Concluding comments

The current study investigated ethnic disparities in self-reported diagnosis of depression or an anxiety disorder by a doctor relative to scores on a screening measure for these same mental illnesses using data from the NZAVS. Our results reveal ethnic disparities in diagnosis of mental illness, which are inconsistent with scores on the screening measure. Although a larger proportion of Māori, Pacific and Asian peoples scored in the high Kessler risk range, Europeans reported the highest rate of doctor diagnosed depression or anxiety. Mental health problems of ethnic minorities, especially Pacific and Asian peoples, are more likely to be ‘missed’, while those of Europeans are more likely to be ‘hit’. These findings are likely to reflect ethnic inequalities in access to, expectations from and style of communication with, medical professionals.
Competing interests:
Nil.

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URL:

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Suicide mortality among Pacific peoples in New Zealand, 1996–2013
Jemaima Tiatia-Seath, Roy Lay-Yee, Martin Von Randow

ABSTRACT
AIM: The aim of this study was to describe trends in suicide mortality for Pacific peoples in New Zealand by reviewing official data over the period 1996–2013.

METHOD: Death registrations where the underlying causes of death were intentional self-harm was examined and area of interest was identified and presented.

RESULTS: Over a 17-year period (1996–2013), there were 380 total Pacific suicides (4.1%) out of 9,307 suicides nationally for New Zealand's total population.

CONCLUSION: Priority areas for effective suicide prevention include: Pacific young males, Pacific ethnic foci, clear ethnic disparities and inequalities for Pacific suicide mortality when compared to New Zealand's total population; safe, ethical and culturally appropriate messaging around suicide methods; the importance of the role of mental health and addictions in suicide prevention. On average, there are at least 22 Pacific suicides annually in New Zealand. Irrespective of small numbers, further Pacific ethnic breakdown is needed other than Samoan, Cook Islands and Tongan, as this is problematic for suicide prevention efforts for the exclusion of other Pacific groups.

Suicide is a major public health concern. The World Health Organization (WHO) estimates that, globally, over 800,000 people die by suicide each year, representing an annual global age-standardised suicide rate of 11.4 per 100,000 population (15.0 for males and 8.0 for females), or one suicide death occurring every 40 seconds. There are in fact more deaths due to suicide than to war and homicide combined. Moreover, as suicide is a sensitive issue, and illegal in some countries, it is highly likely that there is under-reporting. It is predicted that by 2020, the rate will increase to 1.53 million per year, equating to one suicide death occurring every 20 seconds. In New Zealand, there are approximately 500 suicide deaths per year.

While suicide mortality for Pacific peoples and Asians aged 15 years and older in New Zealand occurs at a lower rate when compared to the population as a whole, Pacific peoples, and in particular Pacific young peoples (12–18 years of age), are disproportionately three times more likely to attempt suicide, at 8.6% in comparison to New Zealand Europeans at 2.7%. Across Australasia and the wider Pacific region, more investigations focused on Pacific suicide prevention are needed to continue informing current initiatives. There is unease that suicide is increasing among Pacific communities in New Zealand. While investigations into Pacific suicide prevention have been growing, this accumulation has been gradual and often dominated by qualitative studies. In New Zealand over the last decade, Pacific suicide prevention efforts have relied upon this evidence base.

What has been relatively obscure from this body of knowledge is the statistical trend for Pacific suicidal behaviours and outcomes over time. An examination of Ministry of Health suicide mortality data allows the potential to converge on specific areas for prevention and further research.
This study is the first statistical analysis of trends in suicide mortality for Pacific peoples across Australasia and the wider Pacific Region.

The aim of this study is to describe trends in suicide mortality for Pacific peoples in New Zealand using official data over the period 1996–2013.

Method

Suicide mortality rates for Pacific peoples in New Zealand were derived from Ministry of Health data to examine trends over time from January 1996 to December 2013. The data comprise death registrations where the underlying cause of death was intentional self-harm (ICD9CM codes 950–959, ICD10AM codes X60–X84). Only the most recent official data available at the time of writing have been included. There is a delay between the year of death and data release, primarily as deaths are required to be classified by a coroner, and data are only released at the completion of their inquiry.

Descriptive tables of the outcome of interest are presented, and include: suicide deaths by Pacific ethnic breakdown (ie, Samoan, Cook Islands, Tongan and Other), gender, age group and deprivation quintile; suicide deaths per year by ethnicity; cause of death and other contributing causes; suicide deaths by ethnicity and years living in New Zealand; and suicide deaths by district health board area. [Note that tables exclude missing data, so the total numbers (and associated percentages) may vary from table to table.] For each substantive variable, the numbers of admissions/discharges (and the percentages) in various categories are shown.

Results

In the 17-year period of January 1996–December 2013, there were 380 Total Pacific suicides (4.1%) out of 9,307 suicides nationally (Total NZ). Samoans made up the largest Pacific group with 135 or 35.5% of Total Pacific suicides. Suicide is more prevalent in males across all Pacific ethnic groups ranging from 68.8% (Tongan) to 83.7% (Samoan). In total, Pacific males comprised 77.6% compared to 75.7% in Total NZ, showing a similar pattern by gender (Table 1).

Across Pacific ethnic groups, suicides were most prevalent in the youth age range (15–24 years), followed by the 25–39 group, except for among Samoans where the order was reversed. For Total Pacific, the percentages in each age group in order of magnitude were: 15–24 (45.8%), 25–39 (35.3%), 40+ (16.8%) and <15 (2.1%); from a peak in youth there is a gradual decline in prevalence at older ages. This can be compared to the Total NZ distribution shown as follows: 40+ (45.3%), 25–39 (30.8%), 15–24 (22.8%), <15 (1.1%); here it can be seen that prevalence increases with age group so the highest percentage is in the 40+ group. In Total Pacific, the largest group were males aged 15–24 (35.5% of all suicides), compared to males aged 40+ (34.3% of all suicides), who were the largest group in Total NZ (Table 1).

The prevalence of suicides increased with deprivation across all Pacific ethnic groups, whereby 57.4% of Pacific peoples were in the worst deprivation quintile for Total Pacific. The percentage was highest in Cook Islands people (66.7%). Although prevalence also increased with deprivation in Total NZ, the distribution was much more even with a gradual rise to 25.0% in the worst deprivation quintile (Table 1).
Table 1: Suicides by ethnicity and characteristics (gender-age group, deprivation\(^9\)), January 1996–December 2013.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Samoan</th>
<th>Cook Islands</th>
<th>Tongan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>All</td>
</tr>
<tr>
<td>&lt;15</td>
<td>1</td>
<td>2</td>
<td>3 (2.2%)</td>
</tr>
<tr>
<td>15–24</td>
<td>42</td>
<td>6</td>
<td>48 (35.6%)</td>
</tr>
<tr>
<td>25–39</td>
<td>47</td>
<td>10</td>
<td>57 (42.2%)</td>
</tr>
<tr>
<td>40+</td>
<td>23</td>
<td>4</td>
<td>27 (20.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>22</td>
<td>135 (100%)</td>
</tr>
<tr>
<td>Deprivation</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>1 Least</td>
<td>3</td>
<td>3</td>
<td>3 (3.2%)</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>11</td>
<td>11 (8.2%)</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>18</td>
<td>18 (13.4%)</td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>26</td>
<td>26 (19.4%)</td>
</tr>
<tr>
<td>5 Most</td>
<td>76</td>
<td>62</td>
<td>62 (56.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>134</td>
<td>79</td>
<td>79 (100%)</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Pacific</th>
<th>Total Pacific</th>
<th>Total NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;15</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>15–24</td>
<td>27</td>
<td>37</td>
</tr>
<tr>
<td>25–39</td>
<td>21</td>
<td>26</td>
</tr>
<tr>
<td>40+</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>17</td>
</tr>
<tr>
<td>Deprivation</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>1 Least</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>46</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>73</td>
</tr>
<tr>
<td>5 Most</td>
<td>37</td>
<td>216</td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>376</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

\(^9\)NZDep is an area-based measure of deprivation.
Table 2 demonstrates that from 1996 to 2013, though fluctuations exist from year to year, there appears to be, on average, a very gradual increase in the incidence of suicide among Pacific peoples compared to the reverse trend in the total NZ population; this finding needs to be taken with caution because of small numbers. Trends are impossible to discern among particular Pacific groups because of even smaller numbers.

Table 2: Suicides per year by ethnicity, January 1996–December 2013.

<table>
<thead>
<tr>
<th>Year</th>
<th>Samoan</th>
<th>Cook Islands</th>
<th>Tongan</th>
<th>Other Pacific</th>
<th>Total Pacific</th>
<th>Total NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>11</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>18</td>
<td>540</td>
</tr>
<tr>
<td>1997</td>
<td>5</td>
<td>4</td>
<td>-</td>
<td>4</td>
<td>13</td>
<td>562</td>
</tr>
<tr>
<td>1998</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>24</td>
<td>579</td>
</tr>
<tr>
<td>1999</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>14</td>
<td>517</td>
</tr>
<tr>
<td>2000</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>12</td>
<td>459</td>
</tr>
<tr>
<td>2001</td>
<td>12</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>22</td>
<td>508</td>
</tr>
<tr>
<td>2002</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>18</td>
<td>470</td>
</tr>
<tr>
<td>2003</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>7</td>
<td>23</td>
<td>522</td>
</tr>
<tr>
<td>2004</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>15</td>
<td>494</td>
</tr>
<tr>
<td>2005</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>21</td>
<td>515</td>
</tr>
<tr>
<td>2006</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>21</td>
<td>524</td>
</tr>
<tr>
<td>2007</td>
<td>11</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>25</td>
<td>501</td>
</tr>
<tr>
<td>2008</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>10</td>
<td>29</td>
<td>518</td>
</tr>
<tr>
<td>2009</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>28</td>
<td>512</td>
</tr>
<tr>
<td>2010</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>22</td>
<td>534</td>
</tr>
<tr>
<td>2011</td>
<td>6</td>
<td>7</td>
<td>11</td>
<td>1</td>
<td>25</td>
<td>493</td>
</tr>
<tr>
<td>2012</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>29</td>
<td>550</td>
</tr>
<tr>
<td>2013</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>21</td>
<td>509</td>
</tr>
<tr>
<td>Total</td>
<td>135</td>
<td>93</td>
<td>71</td>
<td>81</td>
<td>380</td>
<td>9,307</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Samoan n</th>
<th>Samoan %</th>
<th>Cook Islands n</th>
<th>Cook Islands %</th>
<th>Tongan n</th>
<th>Tongan %</th>
<th>Other Pacific n</th>
<th>Other Pacific %</th>
<th>Total Pacific n</th>
<th>Total Pacific %</th>
<th>Total NZ n</th>
<th>Total NZ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanging</td>
<td>102</td>
<td>75.6</td>
<td>78</td>
<td>83.9</td>
<td>60</td>
<td>84.5</td>
<td>59</td>
<td>72.8</td>
<td>299</td>
<td>78.7</td>
<td>4,816</td>
<td>51.7</td>
</tr>
<tr>
<td>Poisoning</td>
<td>10</td>
<td>7.4</td>
<td>5</td>
<td>5.4</td>
<td>2</td>
<td>2.8</td>
<td>10</td>
<td>12.3</td>
<td>27</td>
<td>7.1</td>
<td>2,668</td>
<td>28.7</td>
</tr>
<tr>
<td>Burning</td>
<td>3</td>
<td>2.2</td>
<td>3</td>
<td>3.2</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2.5</td>
<td>8</td>
<td>2.1</td>
<td>91</td>
<td>1.0</td>
</tr>
<tr>
<td>Drowning</td>
<td>2</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>0.5</td>
<td>2</td>
<td>0.5</td>
<td>204</td>
<td>2.2</td>
</tr>
<tr>
<td>Shooting</td>
<td>3</td>
<td>2.2</td>
<td>2</td>
<td>2.2</td>
<td>1</td>
<td>1.4</td>
<td>2</td>
<td>2.5</td>
<td>8</td>
<td>2.1</td>
<td>847</td>
<td>9.1</td>
</tr>
<tr>
<td>Jumping</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>1.1</td>
<td>5</td>
<td>7.0</td>
<td>4</td>
<td>4.9</td>
<td>12</td>
<td>3.2</td>
<td>259</td>
<td>2.8</td>
</tr>
<tr>
<td>Crashing</td>
<td>9</td>
<td>6.7</td>
<td>3</td>
<td>3.2</td>
<td>-</td>
<td>0.0</td>
<td>2</td>
<td>2.5</td>
<td>14</td>
<td>3.7</td>
<td>187</td>
<td>2.0</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>3.0</td>
<td>1</td>
<td>1.1</td>
<td>3</td>
<td>4.2</td>
<td>2</td>
<td>2.5</td>
<td>10</td>
<td>2.6</td>
<td>235</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>135</td>
<td>100</td>
<td>93</td>
<td>100</td>
<td>71</td>
<td>100</td>
<td>81</td>
<td>100</td>
<td>380</td>
<td>100</td>
<td>9,307</td>
<td>100</td>
</tr>
</tbody>
</table>
Hanging is by far the most common cause of death at 78.7% of Total Pacific and 51.7% of Total NZ. This is followed by poisoning at 7.1% of Total Pacific and 28.7% of Total NZ. Among Pacific ethnic groups, hanging was most prevalent in Tongans (84.5%) with poisoning prevailing in Other Pacific (12.3%) (Table 3).

Table 4 shows those suicides where another relevant disease or contributing cause was reported. Mental or behavioural disorders due to drugs or alcohol comprised 16.1% of all suicides in Total Pacific, compared to 13.1% of all suicides in Total NZ. Among Pacific ethnic groups, this percentage was highest in Samoan (19.3%). Prevalence was higher in the New Zealand-born group compared to the overseas-born group in Total Pacific (56.6%) and more so in Total NZ (83.9%) as indicated. This pattern was not uniform across Pacific ethnic groups, with overseas-born being higher in Tongan (50.8%) and Other Pacific (56.3%). For those born overseas, the highest prevalence was in the 40+ age-group in Total Pacific (29.6%) and more so in Total NZ (48.7%) (Table 5).

Analysis by district health board region highlights that most of the Total Pacific suicides occurred in Counties-Manukau (32.7%), Auckland (21.5%), Waiarapā (12.2%) and Waitematā (10.1%). By comparison, most of the Total NZ suicides occurred in Canterbury (12.4%), Waitematā (10.3%), Counties-Manukau (9.3%) and Auckland (8.5%) (Table 6).

### Table 4: Suicides with other relevant diseases or contributing causes, January 1996–December 2013.

<table>
<thead>
<tr>
<th></th>
<th>Samoan</th>
<th>Cook Islands</th>
<th>Tongan</th>
<th>Other Pacific</th>
<th>Total Pacific</th>
<th>Total NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental/behavioural disorders due to drugs/alcohol</td>
<td>26 (19.3%)</td>
<td>17 (18.3%)</td>
<td>7 (9.9%)</td>
<td>11 (13.6%)</td>
<td>61 (16.1%)</td>
<td>1,218 (13.1%)</td>
</tr>
<tr>
<td>Other</td>
<td>11 (8.1%)</td>
<td>4 (4.3%)</td>
<td>8 (11.3%)</td>
<td>9 (11.1%)</td>
<td>32 (8.4%)</td>
<td>473 (5.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>135 (100%)</td>
<td>93 (100%)</td>
<td>71 (100%)</td>
<td>81 (100%)</td>
<td>380 (100%)</td>
<td>9,307 (100%)</td>
</tr>
</tbody>
</table>

### Table 5: Suicides by ethnicity: years living in New Zealand, January 1996–December 2013.

<table>
<thead>
<tr>
<th></th>
<th>Samoan</th>
<th>Cook Islands</th>
<th>Tongan</th>
<th>Other Pacific</th>
<th>Total Pacific</th>
<th>Total NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born overseas: Years in New Zealand</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>0–4</td>
<td>5</td>
<td>(9.3%)</td>
<td>7</td>
<td>(28.0%)</td>
<td>8</td>
<td>(24.2%)</td>
</tr>
<tr>
<td>5–9</td>
<td>5</td>
<td>(9.3%)</td>
<td>5</td>
<td>(20.0%)</td>
<td>6</td>
<td>(18.2%)</td>
</tr>
<tr>
<td>10–14</td>
<td>12</td>
<td>(22.2%)</td>
<td>5</td>
<td>(20.0%)</td>
<td>8</td>
<td>(24.2%)</td>
</tr>
<tr>
<td>15–19</td>
<td>13</td>
<td>(24.1%)</td>
<td>1</td>
<td>(4.0%)</td>
<td>6</td>
<td>(18.2%)</td>
</tr>
<tr>
<td>20+</td>
<td>19</td>
<td>(35.2%)</td>
<td>7</td>
<td>(28.0%)</td>
<td>6</td>
<td>(18.2%)</td>
</tr>
<tr>
<td>Sub-total</td>
<td>54</td>
<td>(42.2%)</td>
<td>25</td>
<td>(29.1%)</td>
<td>100</td>
<td>(50.8%)</td>
</tr>
<tr>
<td>Born in New Zealand</td>
<td>74</td>
<td>(57.8%)</td>
<td>61</td>
<td>(70.9%)</td>
<td>32</td>
<td>(49.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
<td>(100%)</td>
<td>86</td>
<td>(100%)</td>
<td>65</td>
<td>(100%)</td>
</tr>
<tr>
<td>Missing</td>
<td>7</td>
<td>(7%)</td>
<td>6</td>
<td>(10%)</td>
<td>30</td>
<td>(100%)</td>
</tr>
</tbody>
</table>
Discussion
This study is the first statistical analysis of trends in suicide mortality in Pacific peoples in New Zealand. Across Pacific ethnic groups, suicide remains a concern, particularly among young people as demonstrated by a higher prevalence. However, Samoan suicides are much higher than all other Pacific groups in the age ranges of 25–39 and 40+ years. Even within the Pacific population there are distinctions—the often obscured heterogeneity of the Pacific population cannot be ignored. It also suggests that Pacific ethnic-specific investigations into suicide prevention are still very much needed.

Over the last 17 years, on average there have been around 22 suicides among Pacific peoples in New Zealand each year. In addition, Samoan suicides in particular appear to increase every five years. It is not surprising that, by district health board, the urban regions of Counties Manukau,
Auckland, Capital Coast and Waitematā have a greater prevalence of Pacific suicides than other regions in the country, particularly as they have a high Pacific population density.

For Total NZ, it can be seen that prevalence increases with age group, with the highest percentage in the 40+ age range. This, however, is not the case for Pacific groups (except for Samoans and Pacific children under 15 years of age). Could this be attributed to the prescribed cultural value held by most Pacific peoples in supporting and caring for their older members? For instance, for most Pacific peoples, aged members are the most respected, regardless of biological ties, and considered the most important members of society. Reciprocal care is vital to Pacific families. This may be one explanation ascribed to the rare occurrence of suicide in the 40+ age group. This is an area of research that could be a positive contribution not only to suicide prevention, but also for aged care. One could take learnings from the cultural experiences and expectations of caring for the Pacific older population.

Clearly, more work needs to be undertaken in the Pacific male youth space where suicide has been predominant among Total Pacific males aged 15–24 (35.5% of all suicides) compared to males aged 40+ (34.3% of all suicides) in Total NZ. Young Pacific male-focused research is required, along with considerations given to gender, age and ethnic disparities, inequities and inequalities to support and strengthen existing programmes and to facilitate new approaches.

Although not a novel finding, where the prevalence of suicide is higher in the New Zealand-born group compared to the overseas-born (primarily Pacific Islands-born) group in Total Pacific (56.6% versus 43.4%), what often tends to be overlooked, is the significant gap between New Zealand-born and Total NZ (83.9% versus 43.4%).

Pacific suicide increases with level of deprivation, as is also commonly found in national and global investigations. However, what is distressing is that in comparison to Total NZ, significant disparity existed in the period of study, where Pacific suicides were around double those of all other New Zealanders in the worst deprivation quintile.

A focus on suicide methods is important to Pacific suicide prevention, particularly the preference for hanging. However, due to its accessibility, it would be extremely challenging to confine. Evidence tells us that prevention strategies should seek ways of dispelling the myth that hanging is a “clean, painless and rapid method that is easily implemented”. What is required is safe messaging around: the process and consequences; the possibility of neurological damage if one were to survive; and the impact it may have on the person who discovers the deceased. Cautionary measures in the delivery of these messages are equally important, as this type of information dissemination may provide a ‘how to’ for some. Evidently, more research in the development, monitoring and evaluation of these types of interventions is essential.

Such investigations will help to ensure these messages that are safe, ethical and culturally appropriate for Pacific communities.

A Pacific-focused suicide postvention study by Tiatia-Seath (2016) found that of the 173 Pacific survey respondents bereaved by suicide, the majority reported that the first person to discover the body was a family member (65%). This implies that most suicides occurred in a familiar environment (in the home or in the home of a family member). Accurate information about suicide methods and location is important for designing strategies and initiatives for suicide prevention. However, this may be a challenge, as the New Zealand law changed in July 2016 in relation to reporting suicide or suspected suicide, and governs what can be reported, broadcast or posted on the internet without the coroner’s permission. Additionally, it is important to recognise that specific knowledge and training is needed in order to provide better support for the person(s) who found the deceased (Tiatia-Seath, 2016).

There are clear ethnic disparities over the 17-year period, where mental/behavioural disorders due to drugs/alcohol, are high for Pacific peoples in comparison to the Total New Zealand population, and that Samoans demonstrate the highest representation among Pacific groups. Suicides can be alleviated if the elimination of alcohol and other drug misuse is equally addressed. Mental health and addictions issues must remain a priority.
**Limitations**

Though a major strength of the study is complete coverage of the Pacific population in New Zealand over a prolonged period of 17 years, the study has its limitations. For those reporting multiple ethnic affiliations, according to Statistics New Zealand’s protocol, information is prioritised, such that Māori ethnicity takes precedence over Pacific.\(^2\)

The ‘Pacific peoples’ category continues to perpetuate the assumed homogeneity of this population group. While this study was able to provide Pacific ethnic breakdowns for Samoan, Cook Islands, and Tongan populations, it was unable to do so for ‘Other’ Pacific groups due to small numbers. The categorisation of ‘Other’ becomes problematic for Pacific ethnic-specific suicide prevention efforts for the remaining Pacific groups.

Gender identification is confined to the biological binary classification of male and female, therefore excluding those who do not identify with either (eg, transgender or intersex).

In order to evaluate distinct Pacific ethnic issues and plan for effective suicide countermeasures, there needs to be routinely collected data with distinct Pacific ethnic group classifications, particularly as those identifying with a Pacific ethnicity are projected to increase from 8% in 2013 to 11% in 2038.\(^2\) Moreover, there will also be Pacific peoples who will undergo climate change-induced migration.\(^2\) Consequently, there will be distinct needs for different sections of this diverse population. Thus policies, programmes and services need to be mindful of shifting trends over time in order to adequately and appropriately address the issue of Pacific suicides.

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**Competing interests:**

Nil.

**Acknowledgements:**

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Ethnic disparities in the use of seclusion for adult psychiatric inpatients in New Zealand

Melissa McLeod, Paula King, James Stanley, Cameron Lacey, Ruth Cunningham

ABSTRACT

AIM: This study aims to investigate disparities in seclusion between Māori and non-Māori non-Pacific (nMnP) adults in mental health inpatient units in New Zealand.

METHOD: This study uses data on 7,239 inpatient psychiatric admissions and 782 seclusion events for nine district health boards (servicing 39% of the New Zealand population) for the period 1 July 2008 to 30 June 2010, from a New Zealand Ministry of Health dataset (PRIMHD). We calculate the age-standardised rates of seclusion per monthly inpatient admissions. Regression modelling of seclusion event rate ratios for Māori compared to nMnP adjusted for age, gender, socioeconomic deprivation (NZDep2006), legal status, referral pathway and diagnosis.

RESULTS: Māori psychiatric inpatients are 39% more likely to experience a seclusion episode than nMnP adults in New Zealand. Important contributors to the disparity in seclusion rates between Māori and nMnP were age and legal status on admission. Adjustment for a range of demographic and admission variables accounted for part of the measured disparity between Māori and nMnP (RR 1.33, fully adjusted).

CONCLUSIONS: To reduce seclusion use for Māori, community mental health services responsive to Māori needs are required to prevent the need for inpatient admission, and reduce the acuity of illness where admission is required.

In a seclusion episode, the service user is placed by themselves in an area or room from which they cannot freely exit. The use of seclusion is commonly justified as a way of keeping patients and staff safe on the ward. However, evidence for the value of seclusion as an intervention is lacking. Across the world there has been a movement over the past decade to reduce the use of seclusion and restraint. Internationally, ethnic and racial disparities in seclusion use have been reported.

The indigenous Māori population (approximately 15% of the total population) have a higher prevalence of mental health problems than the non-Māori population (largely consisting of New Zealand European). In 2011, Māori were found to contribute a higher proportion of specialist mental health service contacts (two-thirds higher than non-Māori New Zealanders) and a higher proportion of inpatient admissions (one quarter of mental health inpatients are Māori). However, in terms of contact with any health services (eg, community, primary care, specialist services) Māori are considered to be under accessing health services for mental health problems according to need. In New Zealand there have been reported ethnic differences in the use of seclusion, with the indigenous Māori population more likely to be secluded than non-Māori, although previous studies were insufficiently powered to allow adjustment for other factors associated with seclusion (eg, age, gender, diagnosis, severity, etc).

In this study we aim to expand the limited research base by investigating factors associated with ethnic disparities in the use of seclusion for adults in mental health inpatient units in New Zealand.
Methods

Advisory group
An advisory group was established to contribute towards the identification of variables that might contribute to ethnic disparities, advise on aspects of study design and scope, and to assist in the interpretation of the study findings. The members of the advisory group had experience in areas of Māori health research, mental health research and in the provision of and use of mental health services, both general and specifically designed for Māori.

Study sample
This study uses the Programme for the Integration of Mental Health Data (PRIMHD) dataset, a national mental health and addiction services-integrated data collection system, managed and held by the New Zealand Ministry of Health (MoH). The PRIMHD dataset provides information on inpatient psychiatric admissions, including data on seclusion use in district health boards (DHB).

Anonymised data on all inpatient bed-night and seclusion events reported to the NZ MoH PRIMHD dataset was obtained for nine (of 21) DHBs, who were deemed by the MoH to have complete seclusion event reporting over the two-year study period. The nine included DHBs provide services to 38.5% of the New Zealand resident population (based on the 2006 New Zealand Census). The timeframe was the two-year period of 1 July 2008 to 30 June 2010.

The nine included DHBs varied considerably in size and in ethnic population proportions (based on 2006 New Zealand Census data), with four DHBs having more than 15% of their population recorded as Māori (other five DHBs ranged from 5.9 to 10.6% Māori), and two DHBs with relatively high Pacific populations at more than 5% (other seven DHBs: 0.6 to 1.5% Pacific). The nine DHBs combined had an average of 14% of their population identifying as Māori.

Admissions of individuals aged over 18 years were included in the study. To examine seclusion use for general adult psychiatric inpatients, admissions to forensic units, psychogeriatric units and intellectual disability units were excluded.

Ethical approval was received from the Multi-region Ethics Committee of the New Zealand Health and Disabilities Ethics Committees (MEC/10/060/EXP).

Key variables

Admission episode
An admission episode was defined as a continuous period of psychiatric inpatient admission from hospital bed-night activity within the DHB. An admission episode ended when an individual had no bed-night activity recorded for 24 hours (excluding periods of leave recorded in the PRIMHD dataset). This definition was used to focus the analysis on actual time spent in the mental health inpatient unit from the patient’s point of view.

Seclusion events
For the analyses, seclusion events included the total time spent in seclusion, excluding any breaks that occurred during the seclusion activity. Multiple seclusion activity records were combined using a rule whereby a seclusion event began on entry to seclusion and ended when the person had been out of seclusion for more than two continuous hours.\footnote{1}

Ethnicity
Individuals were classified into two mutually exclusive groups of Māori and non-Māori non-Pacific (nMnP). Individuals were classified as Māori if Māori was recorded within any of the ethnicity fields in the activity codes table for that admission (a prioritised ethnicity approach).\footnote{18} Pacific peoples (7.0% of total admission events) not included in the prioritised Māori group were excluded from the non-Māori (largely New Zealand European) comparator group, as Pacific peoples had similar proportions of seclusion to Māori and could obscure comparisons with majority New Zealand European ethnicity.

Gender and age
Gender was taken from the gender description recorded in the PRIMHD data extract. Service users were categorised into age groups based on age at the time of admission as (in years): 18–24, 25–34, 35–44, 45–54, 55–64 and 65 years and over.
Socioeconomic deprivation
NZDep06 was used as a measure of socioeconomic deprivation. NZDep06 is a census-based small area measure of material deprivation that combines nine variables from census information reflective of eight dimensions of material and social deprivation (income, employment, qualifications, transport, owned home, living space, communication and support). The domicile code recorded (indicating geographical area of residence) for each admission was mapped to NZDep06 quintiles.

Primary diagnosis on admission
Primary diagnoses on admission (coded within three months of admission) were ordered into eight diagnostic categories. Diagnostic categories in this study were: Schizophrenia (includes Schizophreniform and Schizoaffective disorders); Other psychosis; Bipolar disorders; Depressive disorders; Personality disorders; Substance-related disorders; No axis I/II diagnosis (this is a recording of no diagnosis) and Miscellaneous (all remaining diagnoses).

For admissions and referrals with more than one primary diagnosis, primary diagnoses were prioritised in the order of the list above, and substance abuse (where not the prioritised primary diagnosis) has been counted as a secondary diagnosis for adjustment in the multivariable analyses.

Legal status on admission
Admissions were classified as involuntary if the Mental Health (Compulsory Assessment and Treatment) Act 1992 was used during the admission with the remaining admissions classified as voluntary.

Referral pathway
Referral pathways on admission were categorised into the following sub-groups: Mental Health; Hospital (non-Psychiatric); General Practitioner; Justice/Police; Self; and Other. As the last four categories were relatively sparse, these were combined into a single category for the calculation of rates and in the multivariable analyses.

Univariate analyses
All calculations of descriptive statistics, 95% confidence intervals and p-values were performed using Stata 11.2. An alpha of 0.05 was used for considering statistical significance.

Rates of admission/seclusion events
Rates of seclusion events per cumulative month of psychiatric inpatient admission are presented as the number of events per month of cumulative inpatient admission. The numerator in these rate calculations is the number of seclusion events observed for a particular group of patients; the exposure-time denominator is cumulative person time—the summed total of admission durations for all people in that group (excluding leave periods).

Age-standardisation to the 2001 census population of Māori was performed for calculation of univariate rates of seclusion (reported for Māori and nMnP; along with rate ratios). Age-standardised rates for Māori and nMnP service users are also presented stratified across several demographic and clinical factors.

Multivariable analysis
Regression modelling was performed in Stata 11.2, using a random effects model Poisson regression (xtmepoisson procedure). Random effects were included according to DHB of service user, and included a random intercept term and a random coefficient for the principal comparison (Māori compared to nMnP). These random effects allow for the consideration of heterogeneity across the DHB areas studied for (a) baseline rate of seclusion; and (b) impact of ethnicity on rates of seclusion.

Seclusion rates were modelled according to ethnicity (Māori/nMnP), gender and age group as personal characteristics; NZDep2006 as a measure of socioeconomic deprivation; and legal status on admission, referral pathway, principal diagnosis and secondary diagnosis for alcohol/substance abuse as admission-level characteristics. The fully adjusted model is limited to individuals admitted in the study period who had diagnostic data coded in PRIMHD. To check that our ‘diagnosis only’ model (Supplementary Table 1) was not biased, we also ran the same model all admissions (regardless of whether a diagnosis had been recorded), and the results were very similar.
Results

Over the two-year study period between 1 July 2008 and 30 June 2010, there were 1,944 Māori admissions (for 1,245 unique individuals) and 5,295 nMnP admissions (for 3,454 unique individuals) to the nine study DHBs. Where seclusion events occurred during an admission, it was most commonly as a single event (Table 1).

Of all general adult psychiatric inpatient admissions for Māori, 15.2% included at least one seclusion event compared to 9.2% for nMnP admissions (p<0.001). Māori male and female admissions to the inpatient unit were significantly more likely to be secluded than nMnP of the same gender. Of Māori male admissions, 16.7% were secluded compared with 10.7% of nMnP (p<0.001). Of Māori female admissions, 13.3% were secluded compared with 7.6% of nMnP (p<0.001).

Among those secluded, the patterns of duration of seclusion events were similar for Māori and nMnP admissions. The majority of seclusion events lasted between 0–24 hours in duration (Māori 75.5% vs. nMnP 74.4%), with the most common seclusion duration being between 0–8 hours for both groups.

Māori admissions to adult inpatient mental health services were younger and relatively more deprived than nMnP admissions (not presented). This pattern was also reflected in the secluded Māori population, which was younger (56.9% being aged 34 years or under compared to 45.5% of nMnP) and overrepresented in the highest quintiles (quintiles 4 and 5, relatively more deprived) of socioeconomic deprivation compared to secluded nMnP (Table 2).

The age-standardised rate of seclusion events per month of psychiatric inpatient admission for Māori overall was significantly higher at 0.37 compared to the rate of 0.31 for nMnP. The age-standardised rate of seclusion events per month of psychiatric inpatient admission was significantly higher for Māori female admissions compared to nMnP female admissions, but similar for Māori and nMnP among male admissions.

There was no gradient apparent for Māori in age-specific rates of seclusion. In comparison, the nMnP group showed a gradient by age with decreasing rates of seclusion events with increasing age (Table 2). Māori had higher rates of seclusion per month of psychiatric inpatient admission compared to nMnP for all deprivation quintiles.

Māori had higher rates of seclusion than nMnP admissions across most primary diagnosis groupings (Table 2).

### Table 1: Number and proportion of seclusion events per admission for Māori and non-Māori non-Pacific in nine study DHBs for the dates 1 July 2008–30 June 2010.

<table>
<thead>
<tr>
<th>Seclusion events per admission</th>
<th>Māori (n=1,944 admissions)</th>
<th>non-Māori non-Pacific (n=5,295 admissions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>% of admissions</td>
</tr>
<tr>
<td>No seclusion events</td>
<td>1,648</td>
<td>84.8</td>
</tr>
<tr>
<td>One</td>
<td>192</td>
<td>9.9</td>
</tr>
<tr>
<td>Two</td>
<td>49</td>
<td>2.5</td>
</tr>
<tr>
<td>Three</td>
<td>22</td>
<td>1.1</td>
</tr>
<tr>
<td>Four or more</td>
<td>33</td>
<td>1.7</td>
</tr>
</tbody>
</table>

*Māori includes all individuals with Māori recorded on any of the ethnicity fields (prioritised Māori). Pacific peoples (not included in the prioritised Māori group) were excluded from the non-Māori non-Pacific comparator group.
Table 2: Rates and rate ratios of seclusion events per cumulative month of inpatient admission by demographics and admission factors for Māori and non-Māori non-Pacific.

<table>
<thead>
<tr>
<th></th>
<th>Māori</th>
<th>Non-Māori non-Pacific</th>
<th>Māori: nMnP rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events Rate per month (95%CI)</td>
<td>Events Rate per month (95%CI)</td>
<td>RR (95%CI)</td>
</tr>
<tr>
<td>Overall*</td>
<td>582 0.37 (0.34–0.41)</td>
<td>901 0.31 (0.29–0.33)</td>
<td>1.20 (1.07–1.33)</td>
</tr>
<tr>
<td>Gender*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>263 0.17 (0.15–0.19)</td>
<td>359 0.12 (0.11–0.13)</td>
<td>1.43 (1.21–1.69)</td>
</tr>
<tr>
<td>Male</td>
<td>319 0.20 (0.18–0.23)</td>
<td>542 0.19 (0.18–0.21)</td>
<td>1.05 (0.91–1.21)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>177 0.40 (0.35–0.47)</td>
<td>194 0.45 (0.39–0.52)</td>
<td>0.89 (0.72–1.10)</td>
</tr>
<tr>
<td>25–34</td>
<td>154 0.35 (0.29–0.41)</td>
<td>216 0.30 (0.26–0.34)</td>
<td>1.16 (0.94–1.44)</td>
</tr>
<tr>
<td>35–44</td>
<td>132 0.35 (0.29–0.42)</td>
<td>211 0.26 (0.22–0.29)</td>
<td>1.37 (1.09–1.71)</td>
</tr>
<tr>
<td>45–54</td>
<td>49 0.27 (0.20–0.36)</td>
<td>168 0.23 (0.20–0.27)</td>
<td>1.19 (0.85–1.64)</td>
</tr>
<tr>
<td>55–64</td>
<td>70 0.57 (0.44–0.71)</td>
<td>90 0.21 (0.17–0.26)</td>
<td>2.65 (1.91–3.66)</td>
</tr>
<tr>
<td>65 &amp; over</td>
<td>0</td>
<td>22</td>
<td>0.12 (0.07–0.18)</td>
</tr>
<tr>
<td>NZ Dep 2006 Quintile**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quintile 1</td>
<td>18 0.42 (0.25–0.67)</td>
<td>70 0.20 (0.15–0.25)</td>
<td>2.12 (1.19–3.61)</td>
</tr>
<tr>
<td>Quintile 2</td>
<td>54 0.46 (0.34–0.60)</td>
<td>128 0.28 (0.23–0.33)</td>
<td>1.64 (1.18–2.28)</td>
</tr>
<tr>
<td>Quintile 3</td>
<td>78 0.33 (0.26–0.41)</td>
<td>190 0.28 (0.24–0.32)</td>
<td>1.18 (0.89–1.54)</td>
</tr>
<tr>
<td>Quintile 4</td>
<td>181 0.44 (0.37–0.50)</td>
<td>363 0.37 (0.33–0.41)</td>
<td>1.19 (0.99–1.42)</td>
</tr>
<tr>
<td>Quintile 5</td>
<td>251 0.32 (0.28–0.36)</td>
<td>137 0.17 (0.14–0.20)</td>
<td>1.88 (1.53–2.34)</td>
</tr>
<tr>
<td>Primary diagnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>203 0.38 (0.33–0.43)</td>
<td>214 0.27 (0.23–0.31)</td>
<td>1.41 (1.16–1.72)</td>
</tr>
<tr>
<td>Other psychosis</td>
<td>22 0.45 (0.28–0.67)</td>
<td>49 0.40 (0.29–0.53)</td>
<td>1.12 (0.65–1.89)</td>
</tr>
<tr>
<td>Bipolar disorder</td>
<td>123 0.79 (0.66–0.94)</td>
<td>198 0.53 (0.46–0.61)</td>
<td>1.50 (1.19–1.89)</td>
</tr>
<tr>
<td>Other depressive</td>
<td>12 0.23 (0.12–0.40)</td>
<td>17 0.07 (0.04–0.11)</td>
<td>3.21 (1.40–7.13)</td>
</tr>
<tr>
<td>Personality disorder</td>
<td>5 0.75 (0.24–1.74)</td>
<td>12 0.23 (0.12–0.41)</td>
<td>3.19 (0.88–9.72)</td>
</tr>
<tr>
<td>Alcohol/substance</td>
<td>16 0.68 (0.39–1.11)</td>
<td>18 0.23 (0.14–0.36)</td>
<td>2.98 (1.42–6.20)</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>16 0.28 (0.16–0.46)</td>
<td>53 0.28 (0.21–0.36)</td>
<td>1.01 (0.54–1.79)</td>
</tr>
<tr>
<td>No axis I/II condition</td>
<td>110 0.25 (0.20–0.30)</td>
<td>249 0.24 (0.21–0.27)</td>
<td>1.04 (0.83–1.31)</td>
</tr>
</tbody>
</table>

*Age standardised to the 2001 census Māori population.
**Quintile 1 is least deprived and Quintile 5 is the most deprived.
Table 3: Modelled seclusion event rate ratios for Māori* compared to non-Māori non-Pacific, sequentially adjusted for demographic and admission factors. Results for patients with recorded diagnostic information (n=6,049).

<table>
<thead>
<tr>
<th>Model including</th>
<th>Adjusted rate ratio (Māori: nMnP)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude estimate</td>
<td>1.39</td>
<td>1.05–1.83</td>
</tr>
<tr>
<td>Adjusted for age group, gender</td>
<td>1.27</td>
<td>0.95–1.70</td>
</tr>
<tr>
<td>+adj for NZDep2006</td>
<td>1.31</td>
<td>0.96–1.80</td>
</tr>
<tr>
<td>+adj for legal status on admission</td>
<td>1.32</td>
<td>0.98–1.77</td>
</tr>
<tr>
<td>+adj for referral pathway</td>
<td>1.32</td>
<td>0.98–1.77</td>
</tr>
<tr>
<td>+adj for principal diagnosis</td>
<td>1.34</td>
<td>0.98–1.84</td>
</tr>
<tr>
<td>+adj for alcohol/substance abuse as secondary diagnosis</td>
<td>1.33</td>
<td>0.97–1.81</td>
</tr>
</tbody>
</table>

*Māori includes all individuals with Māori recorded on any of the ethnicity fields (prioritised Māori). Pacific peoples (not included in the prioritised Māori group) were excluded from the non-Māori non-Pacific comparator group.

Multivariable analyses

Table 3 presents the modelled rate ratios comparing seclusion between Māori with nMnP using sequentially adjusted models to consider the impact of demographic variables (age, gender and NZDep2006) and admission factors (referral pathway, legal status and diagnosis on admission) for those admissions with a diagnosis coded (n=6,049). The crude estimate was a 39% higher seclusion rate for Māori compared to nMnP; following adjustment for all of the above sociodemographic and clinical characteristics, this reduced slightly to a 33% higher rate for Māori (RR 1.33, fully adjusted model). As a sensitivity analysis, we also ran the full model for all admissions (n=7,239) and found very similar results to the diagnosis-only model.

In addition to the ethnicity variable, several other factors in the fully-adjusted model (Supplementary Table 1) were significantly associated with the seclusion rate. Service users who were admitted involuntarily under the Mental Health (Compulsory Assessment and Treatment) Act 1992 had higher rates of seclusion than voluntary service users.

Service users referred from non-psychiatric hospital settings had higher seclusion rates than service users referred from mental health services (RR 1.42, 95% CI 1.02–1.97); while service users referred from other settings (including self-referral, general practitioner, police/justice settings) had a lower rate of seclusion than patients referred from mental health settings (RR 0.75, 95% CI 0.57–0.99).

Seclusion rates also differed by primary diagnosis: compared to service users with a diagnosis of schizophrenia as per DSM-IV criteria, seclusion rates were higher among service users with diagnoses for bipolar disorder (RR 2.25, 95% CI 1.92–2.64), personality disorder (RR 1.83, 95% CI 1.10–3.02), other psychosis (RR 1.47, 95% CI 1.12–2.93) and a primary diagnosis of alcohol or substance abuse (RR 1.75, 95% CI 1.22–2.51). Seclusion rates were lower for service users with an ‘other depressive diagnosis’ (i.e., not bipolar disorder; RR=0.64, 95% CI=0.43–0.94).

Discussion

In this study, ethnic disparities between Māori and nMnP were found in the use of seclusion. Māori admitted as inpatients to the psychiatric unit had a 39% higher rate of seclusion. Such findings are consistent with the limited data available identifying ethnic disparities in the use of seclusion between Māori and non-Māori in New Zealand.16,17

There is a limited evidence base (internationally and in New Zealand) in terms of what drives differences in seclusion use for indigenous and ethnic minority populations. One previous New Zealand study estimated ethnic differences in seclusion use for Māori compared to non-Māori having adjusted for age, sex, diagnosis, time (days) between onset of illness and admission and readmission rates, and found no remaining significant differences (but the study was noted to be underpowered).21 International studies have also attempted to adjust their analyses for a range of factors thought to be potential contributors to ethnic disparities in seclusion use, including age, gender, diagnosis, legal status on admission11 and mental
health trust, resulting in no significant differences following adjustment.

In this study, factors that were important contributors to the disparity in seclusion rates between Māori and nMnP were age and legal status on admission. The impact of age on seclusion rates is at least in part the result of Māori having a younger population age structure than nMnP population, as well as the higher rate of seclusion use in younger age groups. However, even after adjusting for a range of demographic variables (age, gender and NZDep06) and admission factors (referral pathway, legal status and diagnosis on admission), Māori rates of seclusion remained 33% greater than for nMnP admissions. This suggests that there are additional factors that contribute to the differences in seclusion rates between Māori and nMnP, and beyond the demographic and admission factors we were able to adjust for based on the PRIMHD dataset. For example, Māori may have more severe disease on admission, they may be more likely to be admitted to DHBs with higher seclusion use in general or ethnicity itself may have an influence on inpatient treatment. International evidence has suggested that ethnic or racial stereotyping of psychiatric inpatients by healthcare workers may influence management with regard to the use of coercive measures such as seclusion.

One important factor, which we were unable to directly adjust for, is the relative level of acuity of illness between Māori and nMnP. In an Australian study, Health of the Nation Outcomes (HoNOS) behavioural subscale (for those aged 25–34 years) were found to be significantly associated with the use of seclusion. However, we included or adjusted for proxy measures of acuity, such as the length of admission, primary diagnosis and referral pathway measures.

For both Māori and nMnP, most admissions are through a mental health pathway (50.4% for Māori admissions and 47.4% for nMnP). However, Māori who are admitted through non-psychiatric hospital admissions had 1.4 times the rate of seclusion events as nMnP admissions through the same pathway. This may be the result of differential access to primary care or community mental health services for Māori resulting in more severe illness on presentation. In order to reduce the use of seclusion for Māori within the inpatient mental health setting, effort should be placed on attempting to prevent the need for inpatient admission, as well as reducing the acuity of disease where admission is required. This may be achieved through the provision of accessible and high quality community mental health services for Māori.

Limitations of the DHB findings

There are a number of limitations to the study findings. This study included a group of nine DHBs (out of a total twenty-one DHBs in New Zealand) who were deemed to have reasonable quality seclusion data reported to the PRIMHD dataset that would be usable for the planned analyses. It is important to note that the DHBs included were not a random sample from all New Zealand DHBs; however, the majority of DHBs included in the study demonstrated a higher rate of seclusion use (unadjusted) for Māori compared to nMnP (not presented).

The variables available for the quantitative analyses were limited by inclusion and completeness in the PRIMHD database. For example, we were unable to include direct measures of acuity of illness on admission (such as HoNOS) despite this being identified in the literature as important to consider.

There were also limitations that resulted from the way we chose to categorise variables. For example, the principal diagnosis on admission was our main method of analysing and adjusting for diagnosis on admission. However, dual diagnoses may have an important role in disparities in seclusion use between Māori and nMnP, and further development of methods to capture dual diagnoses is required.

Conclusion

In this study, Māori were found to have a higher rate of seclusion use than nMnP. Part of the difference in seclusion rates between Māori and nMnP has been demonstrated to result from the differential distribution of age and legal status on admission. Some of the remaining disparity not accounted for in our model may result from other factors we were not able to adjust for, such as differences in disease severity, differential access to and quality of community care for Māori, and staff and organisational factors and features of the ward environment. Future research is required to investigate the role of service-provider level factors in the differential use of seclusion by ethnicity.

In order to reduce the use of seclusion for Māori, high quality community mental health services responsive to Māori needs are required to prevent the need for inpatient admission and to reduce the acuity of illness where admission occurs.
### Supplementary Table 1: Modelled rate ratios (and 95% CI) of seclusion events during inpatient admission for population characteristics and admission factors (adjusted for all other variables) for the nine study DHBs for the dates 1 July 2008–30 June 2010.

<table>
<thead>
<tr>
<th></th>
<th>Admissions with diagnosis (n=6,049)</th>
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<tbody>
<tr>
<td></td>
<td>Rate ratio</td>
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<tr>
<td>5 (most deprived)</td>
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Competing interests:
All authors report grants from Te Pou o Te Whakaaro Nui during the conduct of the study.

Acknowledgements:
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‘Everyone’s talking Jadelle’: the experiences and attitudes of service providers regarding the use of the contraceptive implant, Jadelle in young people in New Zealand

Meghan Sandle, P Tuohy

ABSTRACT

AIMS: The contraceptive implant Jadelle, along with other types of long-acting reversible contraception, is thought to be an ideal choice for young people wanting to avoid pregnancy, however, uptake is low. This study aimed to explore the attitudes and experiences of health professionals regarding the use of Jadelle in teenagers.

METHODS: Semi-structured interviews were carried out with professionals providing contraceptive services to young people. Sampling was by identifying key informants and subsequent snowball sampling. Interviews were transcribed and main themes identified.

RESULTS: Ten interviews were done with service providers, including midwives, doctors and nurses. Five main themes were identified: characteristics of young people, contraceptive services, positive features of Jadelle, barriers to contraception and individual choice. Jadelle was seen as a good option due to its effectiveness, discreetness and user independence. Barriers for young people obtaining Jadelle included cost, access, fear of procedure and lack of appropriate services.

CONCLUSION: Health professionals had a range of experiences using the contraceptive implant Jadelle. Most felt that Jadelle was a good choice for young people. Improvements to access were identified, including reduced cost and more youth-friendly services, which may lead to increased Jadelle uptake and a subsequent reduction in unintended teenage pregnancies.

Teenage pregnancy can be associated with several adverse consequences, including poorer health for the mother and infant, social disadvantage and high financial costs. The majority of teenage pregnancies are unintended, and therefore there is a large unmet contraceptive need in this age group. Almost half of unintended pregnancies are the result of incorrect contraception use, and teenagers have been shown to have high rates of contraception non-use or misuse. New Zealand has high rates of teenage pregnancy, however, there has been a rapid reduction over recent years, and this trend has also been seen internationally. The availability of long-acting reversible contraception (LARC) is thought to have a role in this decline. Despite this reduction, teenage pregnancy rates in New Zealand remain comparatively high, second only to the US among developed nations.

LARC methods are fully reversible and require use less frequently than once a
month. They are thought to be ideal choices for teenagers as they are highly effective and user independent, yet rates of LARC uptake in young people has been low.\textsuperscript{7,8} In New Zealand, the contraceptive implant Jadelle was subsidised in 2010, becoming a more realistic option for teenagers.

Several barriers to young people obtaining LARC remain. Cost, education and service access are thought to be important barriers, and awareness and knowledge of LARC methods among young people appears to be low.\textsuperscript{9}

It has also been shown that provision of LARC is not universal among health care providers,\textsuperscript{10} This may be due to a lack of awareness of LARC use in young people or limited workforce training opportunities. A survey of family planning providers in the US identified several misconceptions regarding the use of LARC in adolescents, and a survey of primary care physicians in New York found limited knowledge of the contraceptive implant.\textsuperscript{11,12}

International studies show that LARC uptake has been low among teenagers and that LARC provision varies by service, however, the New Zealand experience of LARC use in teenagers has not been previously investigated.

The aim of this study was to explore the attitudes and experiences of health professionals using the contraceptive implant Jadelle for young people. This is important as health professionals' knowledge and attitudes may determine LARC provision and uptake by young women.

Methods

In order to examine the attitudes of service providers regarding the use of Jadelle for young people, health professionals currently providing contraceptive services to young people were interviewed. A qualitative methodology was used to allow full exploration of participants’ ideas and experiences, and to create a detailed insight into the use of Jadelle and the contraceptive services available to young people.

Sampling was achieved by a combination of purposive sampling, with the identification of key informants and subsequent snowball sampling. A range of health professionals from a variety of known services were contacted. Those that agreed to interview were selected. In some cases, health professionals suggested other relevant contacts who were then invited to participate.

Interviews were semi-structured as they were based around a flexible topic guide and used open questioning. This approach was chosen to enable the respondent to expand on ideas and explore areas that may have not been considered by the researcher.\textsuperscript{13}

Interviews were carried out over a three-week period. One interview was carried out face to face and the others were done via phone. Interviews lasted between 15 and 35 minutes.

Interviews were recorded and notes were taken. Each interview was transcribed verbatim. The interview transcripts were analysed and responses were coded into different subjects. Similar subjects were amalgamated to create main themes and subthemes.

Results

In total, interviews with 10 health professionals were carried out. Respondents were nurses, midwives and doctors working in obstetrics, paediatrics, sexual health and youth health. They were based in five district health boards around the North Island of New Zealand and worked in different primary and secondary care settings. All 10 respondents were female. Five main themes were identified from the interviews, including ideas regarding the characteristics of young people, contraceptive services, positive features of Jadelle, barriers to contraception and individual choice.

![Figure 1: Main themes identified from interviews.](image)

**Themes**

1. Developmental characteristics of young people
2. Contraceptive services
3. Positive features of Jadelle
4. Barriers
5. Choice
Developmental characteristics of young people

Adolescence is a time of rapid physical, cognitive and social development. Developmental characteristics of young people include risk taking, difficulties in complex decision making and need for peer acceptance.\(^\text{14}\) These traits and how they relate to contraceptive choices of young people were well described by the respondents.

The lifestyles of teenagers were viewed as busy and chaotic. Teenagers were thought to be poor planners and have a tendency to change their minds. Young people were felt to live in the moment, with short-term fulfilment being important.

“The idea being that young people, it’s all about them and it’s all about now.” (Respondent 9).

The majority of respondents highlighted difficulties young people may face remembering to take a pill every day or using condoms reliably. Young people were felt to be poor at attending appointments and often did not return for follow up.

“Because most of them will admit, they don’t remember to take the pill. You know they will say they are on the pill, but they have run out of it, or they went away for a couple of days or they just didn’t take it. Or that they are using condoms, but they don’t remember to actually take them out of the packet and put them on.” (Respondent 4).

During adolescence, the role of peers becomes increasingly important.\(^\text{15}\) Respondents in this study perceived young people as being influenced by their peers, with decisions about contraception affected by the experiences of others.

“Now that Jadelle is much more common, we’ve got so many of them in our community, they just come in and say I want one, my mate’s got one and it’s all good, can I have one please.” (Respondent 3).

Contraception services: accessible, opportunistc, youth friendly and informing

Most respondents identified access to services as important in addressing unintended pregnancy in young people, but acknowledged that access varied by geographical location. Structured appointment systems were thought to be a potential barrier for young people, with drop in services being more appropriate. Some respondents thought training more people in Jadelle insertion could help with its opportunistic use.

“So one of the reasons why we have looked at training nurses is to make it easier for them because if they get someone that’s a good candidate for a Jadelle, who is suitable for it to be inserted that day, then they can just insert one, so we have a few in the clinic so if somebody is there, and it’s the right time and the right thing, then they can just put it in.” (Respondent 4).

The need for good counselling was apparent in many interviews. Respondents saw the success of Jadelle for a young person as dependent on the counselling and information they received.

“The issue with the Jadelle is the retention rate is dependent purely on counselling...with good robust counselling the retention rate is higher.” (Respondent 2).

“It’s so effective and it’s so easy.” (Respondent 4).

All respondents talked about the positive attributes of Jadelle. Jadelle was described as an effective, reliable and easy form of contraception. Not having to take a pill every day was seen as major advantage of Jadelle for young people.

“The Jadelle is just there, and they don’t have to do anything else with it.” (Respondent 4).

Jadelle was described as being discreet. One respondent stated that a non-visible method was important for some young people, as “it can be unsafe for families to know they are on contraception.” (Respondent 1). The five-year contraceptive cover that Jadelle provided was also viewed as a positive feature.

Jadelle was thought to be acceptable to young people, and was seen as ‘the norm’. This highlights the importance of the
influence of others, with young people more willing to obtain Jadelle if it has become normal within their peer group. Jadelle was viewed as having several advantages over other methods of contraception for young people.

“In comparison to the Depo-Provera, they get a lot less side effects with Jadelle then they get with depo, it’s a smaller amount of hormone released more consistently. I think it is a lot better tolerated than a lot of other hormone-based contraception.” (Respondent 5).

Most respondents felt that increased use of Jadelle in young people has had a significant impact on reductions in teenage birth and abortion rates.

“It’s not just nationally within New Zealand, but also internationally they find that [teenage pregnancy rates] are dropping. I think it’s because you know, because of the introduction of LARCs have made a significant difference.” (Respondent 8).

Barriers to obtaining Jadelle: too expensive and too hard

It was thought that Jadelle use in young people was increasing, however, all respondents acknowledged there were barriers to young people obtaining effective contraception. Cost was thought to be a factor influencing uptake of Jadelle, with several respondents identifying this as the most important barrier. It was felt that any cost could be a problem for some young people.

Most respondents felt that reducing the financial barrier was important in increasing Jadelle uptake and some advocated for a completely free service, with no fees for prescription, insertion and removal of Jadelle. In addition to cost, other barriers to accessing services included difficulties with transport, a lack of confidence of young people to engage with health care providers and a feeling that getting to clinic is too difficult.

“In other places where young people don’t have confidence in having those conversations, or where the doctor or nurse doesn’t have the skill in having those conversations with young people, or if the services are difficult to get to or were expensive, then those would definitely be barriers.” (Respondent 3).

Some respondents felt that the barriers in their service had been eliminated, however, they agreed that they still existed in other places.

“I mean out there in the community, I’m sure there are lots of barriers. Like in terms of funding and transport and various issues with young people, but in our organisation, once they come in here, all our consults are free.” (Respondent 2).

Choice and control

The importance of contraceptive choice was highlighted. It was felt that no contraception method is ideal and therefore choices should be individualised and based on the preferences of the young person.

“I don’t think there is any perfect contraception at all. I mean, women often say to you which method do you think is better, and it’s the individual women’s choice. I mean, I think the most important thing is the woman herself feels comfortable using the method that, you know, she has hopefully chosen to use, and does not get pushed into using a method that someone else thinks would be good for her.” (Respondent 7).

“Like, you can’t, you can’t insist everyone has [Jadelle], it’s social engineering. Yeah, they have options you know.” (Respondent 1).

Most respondents talked about the discontinuation of Jadelle due to breakthrough bleeding. This seemed to be an important issue, especially younger girls who were thought to be less accepting of this side effect. Many respondents, however, felt that effective counselling and access to timely follow-up could help young people manage side effects.

The long acting contraception provided by Jadelle was seen by some respondents as a way of keeping young people safe and allowing young people to complete education without becoming pregnant.

“Because [Jadelle] gives you, the young person that really long period of time, for a lot of them knowing that, even if they start at fifteen, to know they can get through secondary school and still not be pregnant is huge.” (Respondent six).

One respondent raised the issue of acknowledging one’s own beliefs when providing options for young people, and that for some young women, teenage pregnancy can be a positive outcome.
Discussion

These interviews highlight that health professionals have a range of ideas and experiences of using the contraceptive implant Jadelle. There were common themes identified and these centred around the characteristics of young people, positive features of Jadelle, access to services, importance of counselling and potential barriers to obtaining long-acting reversible contraception.

Youth friendliness of contraceptive services has been associated with increased LARC provision to young people. In this study, respondents described a gap between the developmental characteristics of young people and the way in which many contraceptive services are delivered. It was felt that contraception should be offered opportunistically and with flexible appointment structure.

Jadelle was thought to have many advantages for young people, including effectiveness, discreetness and ease of use. A survey of health professionals and adolescents about the use of LARC found that the high efficacy and non-visible nature of LARC were seen as important advantages for young people.

Many respondents felt that increased availability of Jadelle had contributed to recent reductions in teenage abortion and birth rates. A study in England demonstrated a significant association between increased LARC use and decreased teenage pregnancy rates, whereas another study showed that LARC only had a small impact. In this study, most respondents recognised the potential of increased LARC use to reduce unintended teenage pregnancy, but it was felt that the uptake of Jadelle in young people remains relatively low.

Barriers to young people obtaining LARC are well described in the contraception and reproductive health literature. Previous studies have found that cost, concerns about side effects, fear of procedures and lack of trained providers can be challenges to young people obtaining LARC, and this study also identified these factors as barriers.

Cost is thought to play an important role in young people's decisions to access LARC. In this study, some respondents found it the most important barrier. A prospective study from the US showed that providing LARC to teenagers at no cost increased LARC uptake and was associated with a reduction in teenage pregnancy rates. Many respondents in this study felt that LARC should be provided to young people for free, and that a small prescription charge for Jadelle can be a deterrent.

Some respondents felt that they had removed most of the barriers at their services. These respondents tended to work within services that provided Jadelle as no cost and opportunistic insertion of Jadelle.

The narratives from the interviews created a sense of tension between individual choice and the health care professional wanting to keep young people safe. Only one respondent talked about the need of recognising personal beliefs when providing contraceptive to young people. In keeping with the existing literature, breakthrough bleeding was the most likely cause of Jadelle discontinuation, but health professionals report trying to manage side effects and encourage retention of the implant. This could potentially be a cause of conflict between young people and service providers, and was demonstrated in one study exploring young women's experiences of the side effects of contraceptive implants.

This study gives an insight into health professional's experiences in using Jadelle in young people in New Zealand, and provides suggestions for service improvement. Respondents included different professionals working sexual and youth health in order to provide a breadth of experience.

The limitations to this study include that the sample was obtained by purposive and snowballing sampling and therefore may not be representative of all providers of contraceptive services to young people. The sample was relatively small and included only females and those working on the North Island of New Zealand, whereas male providers or those in different areas may have provided a different perspective. Respondents were all currently working in services which provided Jadelle to young people. Interviews did not capture the experiences of providers less familiar with
Jadelle who may have unmet training and education needs. Increased training of providers could increase access to LARC methods for young people and therefore identifying these gaps would be useful.

This study focused on the attitudes and experiences of health care providers, and not those of young people. A previous study showed that the long-term contraceptive cover provided by LARC was viewed as a positive attribute by providers but seen negatively by some clients. A study of New Zealand women regarding Jadelle use demonstrated high rates of satisfaction, however, excluded under-16-year-olds, and used standardised questions to identify their experiences. Work should be carried out to further explore attitudes and experiences of young people in New Zealand with regard to the use of Jadelle and other LARC methods.

Health care professionals in New Zealand have positive experiences using Jadelle, but felt that there were significant barriers to young people obtaining this type of contraception. Jadelle was seen as an acceptable option for young people. It was thought that access to LARC could be improved with a reduction in cost and provision of more youth friendly services, and this may lead to increased uptake of Jadelle, which could reduce rates of unintended teenage pregnancies.

This paper does not constitute an endorsement of Jadelle by the Ministry of Health or represent Government policy.

Competing interests:
Nil.

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A critical exploration of a collaborative Kaupapa Māori consistent research project on physician-assisted dying

Phillippa Malpas, Anneka Anderson, Julie Wade, Rawiri Wharemate, Dolly Paul, Pio Jacobs, Takawai Jacobs, Jim Rauwhero, Danielle Lunistra

ABSTRACT

AIM: This paper critically explores the research approach undertaken by Māori and tauiwi researchers working alongside kaumātua within the context of physician-assisted dying. We critically explore the collaborative process we undertook in framing the research context and discuss the rewards and challenges that emerged.

METHOD: The research this critical discussion draws on undertook a qualitative Kaupapa Māori consistent research approach and drew on the principles of an Interface Research approach. The paper focuses on the collaborative approach taken between the 10 researchers involved in the study.

RESULTS: Challenges identified within the collaborative Kaupapa Māori consistent research process included: determining appropriate authority and representation of researchers and participants; maintaining clear communication; time and logistical management. The key strengths that emerged from this research design were: establishing a culturally safe and robust research process; an ability to build and maintain relationships between researchers and participants; and the opportunity to develop academic research skills between researchers and participants.

CONCLUSION: Collaborative Kaupapa Māori consistent research approaches to research can enable accountability, control and representation throughout the entire research process. Given the rich research results achieved and personal rewards gained from this study design, we would advocate for the application of such approaches within health research contexts.

Kaua e kaiponutia ngā taonga a ō tātou tūpuna. Tukuna mai ... Mā konā ka mau tonu ai ā rātou kōrero, ka mahue iho ai hei koha ki ngā uri e tipu ake nei, kei moumou te hari atu ā ngā kaumātua ki (Te Reinga) ā ka mahue kupu kore mātou ngā mokopuna.

(Do not over-zealously hold on to those treasures of our ancestors. Hand them over ... so that their stories will be captured and left behind as a bequest to the next generations, and not wastefully taken by the elders with them to the departing place of spirits (Te Reinga) leaving the grandchildren with nothing).1

Rapua tō Atuatanga i roto i tō Māoritanga. Rapua tō Māoritanga i roto i tō Atuatanga. Kaumātua (respected older Māori men and women)2 occupy an important position within whānau (family) and Māoridom, conducting Māori rituals and traditions, and supporting and “protecting interests of Māori people here and in the future”.3 They are the kaitiaki (guardians) of tikanga (customs and protocols) surrounding dying and death. They carry the important responsibilities and obligations within the Māori world.

Medical practices that hasten death are legally permissible in a number of countries around the world,4,5 with many other countries—including Aotearoa—discussing the issue from legal, ethical, political, social and medical perspectives. A doctor administering a lethal dose of medication...
at a patient's explicit request, or a doctor prescribing or supplying a patient with the lethal means to end their own life, are two practices generally referred to as physician-assisted dying (PAD). In both cases the doctor acts on the explicit request of a competent patient, death is intended and the patient dies as a result of the medication and not from the underlying condition. [Competency refers to both the mental and cognitive capabilities required to accomplish an action. It is also a legal term, although that is not our intended meaning in using the term here.] Despite being illegal in Aotearoa, such practices do occur, and a number of surveys and studies show public support for them in qualified circumstances.

Although societal support for PAD by predominately Pākehā (New Zealanders of European descent) in Aotearoa is clear, very little is known about the reasons individuals or broader social and family groups have for supporting or opposing such practices and the implications such reasoning may have on decision making at the end of life. Even less is known about what Māori think about such practices. While two small qualitative studies have contributed to our understanding of PAD in New Zealand, more research is needed.

The absence of Māori perspectives and understanding of PAD within the literature is concerning as the views of Māori must be heard within informed discussion about PAD because (possible) future legislation in this area has significant implications for Māori and health professionals caring for Māori at the end of life. Implications include: access to information about PAD, access to health professionals willing to assist in PAD, appropriate knowledge of tikanga around the dying process, support and guidance for those who want an assisted death and support for whānau at this time.

Additionally, given historical violations and injustices towards Māori in Aotearoa, all researchers have obligations and responsibilities under Te Tiriti o Waitangi (the Treaty of Waitangi) to ensure the project delivers its intended outcomes to Māori communities. Such an approach “stems from a Māori worldview”. Despite contested debate around the appropriateness of involvement of tauiwi within Kaupapa Māori research, control and ownership of the research process by Māori is central to Kaupapa Māori and is by negotiation of all involved in the research. As the lead researcher was tauiwi, a Kaupapa Māori consistent research approach was taken.

The aim of our research was to explore older Māori individuals' attitudes and beliefs towards medical practices that hasten death, such as PAD. We were interested in exploring the views of kaumātua for several reasons: as the kaitiaki of tikanga and tribal knowledge, they have important perspectives and responsibilities around the dying process. Moreover, many would have experienced illness, and the dying and death of others and cared for whānau at the end of life. They may also have thought about their own mortality. Held in high esteem, kaumātua are nurturers and leaders, thus their attitudes and beliefs towards PAD provide an important foundation of knowledge and a critical starting point for exploring PAD within Māori communities.

**Methods**

This paper describes the research approach undertaken by Māori and tauiwi (non-Māori) researchers working with kaumātua within the area of PAD. We explore the process we undertook in framing the research context within a Kaupapa Māori consistent research approach as well as drawing on the principles of an Interface Research methodology. We also discuss the rewards and challenges that emerged during the project thus far. The discussion focuses on the collaborative approach taken by the ten researchers within the study and the reflective process undertaken throughout the research process. Our rōpū rangahau (research group) were consulted about this paper and had a role in writing it.

**Kaupapa Māori consistent research framework**

At its heart, a Kaupapa Māori research framework recognises the significance of affiliations “and the responsibilities [of the researchers] to ensure the project delivers its intended outcomes to Māori communities”. Such an approach “stems from a Māori worldview”. Despite contested debate around the appropriateness of involvement of tauiwi within Kaupapa Māori research, control and ownership of the research process by Māori is central to Kaupapa Māori and is by negotiation of all involved in the research. As the lead researcher was tauiwi, a Kaupapa Māori consistent research approach was taken.
meaning the principles of Kaupapa Māori remained central to the research. This was the approach we took in the research.

**Interface Research principles**

According to Durie,16 four principles underlie learning and research at the interface of indigenous knowledge and science: 1) Mutual respect, 2) Shared benefits, 3) Human dignity and 4) Discovery. These principles were central to our research approach, underpinned the commitment of the researchers and kaumātua to the study and formed the foundation of our rōpū rangahau (research group).

**In the beginning**

The research focus of one of the authors (R8 see Table 1) explores the reasons New Zealanders support or oppose PAD with a particular focus on the ethical dimension. Several studies had been completed,10,11,12 however, the voices of Māori were largely absent. To overcome this, the principal author approached a leading Māori academic for advice and was referred to the second author of the paper who is a Māori health researcher (R9) and who agreed to take part in the collaborative Kaupapa Māori consistent research study.

No research has explored Māori perceptions and views about PAD. Yet research has shown the importance and significance of tikanga around the dying process, particularly as it relates to whānau and their decision-making responsibilities,22 especially those of kaumātua. It was clear to both researchers (R8 and R9) that we needed to explore Māori views of PAD if we were to understand the challenges and implications of PAD for individuals, whānau and health professionals at the end of life. Given that kaumātua speak with authority and are the experts on most things in Te Ao Māori (the Māori worldview),23 it was appropriate and necessary that we sought their guidance in developing and collaborating on a research project that explored the views of Māori on PAD, especially in terms of ensuring that everyone involved was safe, empowered and respected for what they brought to the research table.

Links with kaumātua within Te Kupenga Hauora Māori (Māori Leadership within the Faculty of Medical and Health Sciences) resulted in a group of seven kaumātua (Table 1) being prepared to listen critically to the proposed research outlined by the two researchers (R8 and R9). At this point in the research process, the role of the kaumātua was as kaitiaki, providing guidance and expertise in developing the project further.

Our first research hui (meeting) was in early October, 2012. At that hui, background context of the topic of PAD was discussed. Coincidentally at that time, the issue of PAD was being politically debated within Aotearoa, and a bill to permit PAD was sitting in the parliamentary ballot.24 This added a certain gravity and significance to the research hui, as it strongly highlighted the possibility of PAD becoming legally available in Aotearoa in the future.

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**Table 1: Researchers working in the study.**

<table>
<thead>
<tr>
<th>Research member</th>
<th>Principal roles</th>
<th>Gender</th>
<th>Tribal affiliation/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Kaumātua</td>
<td>Male</td>
<td>Ngāti Wai, Te Kawerau ā Maki, Ngāpuhi</td>
</tr>
<tr>
<td>R2</td>
<td>Kaumātua</td>
<td>Female</td>
<td>Ngāpuhi</td>
</tr>
<tr>
<td>R3</td>
<td>Kaumātua</td>
<td>Male</td>
<td>Waikato, Waiōhua</td>
</tr>
<tr>
<td>R4</td>
<td>Kaumātua</td>
<td>Female</td>
<td>Ngāti Mahanga, Te Ākitai</td>
</tr>
<tr>
<td>R5</td>
<td>Kaumātua</td>
<td>Male</td>
<td>Te Rarawa, Te Aupōuri</td>
</tr>
<tr>
<td>R6</td>
<td>Kaumātua</td>
<td>Female</td>
<td>Te Rarawa, Te Aupōuri</td>
</tr>
<tr>
<td>R7</td>
<td>Kaumātua</td>
<td>Female</td>
<td>Ngāti Mahanga, Ngāti Te Ata</td>
</tr>
<tr>
<td>R8</td>
<td>Principal investigator</td>
<td>Female</td>
<td>Tauiwai</td>
</tr>
<tr>
<td>R9</td>
<td>Co-investigator</td>
<td>Female</td>
<td>Kāti Māmoe, Kāi Tahu</td>
</tr>
<tr>
<td>R10</td>
<td>Research assistant</td>
<td>Female</td>
<td>Tūwharetoa</td>
</tr>
</tbody>
</table>
During this initial hui, kaumātua discussed personal experiences of dying and death; the lessons they had taken from such experiences and their own perspectives of any practices that hastened death—medical or otherwise. This hui was also an opportunity for kaumātua to question us as researchers about our motives for the research and what we brought to the study in terms of expertise and skills. This process led to R8 and R9 undertaking critical self-reflections of their positionality in regards to who they were to undertake the research in terms of their ethnicity, their engagement with and understanding of Te Ao Māori, and their academic skills and practices. Such processes of positionality have been argued by Mahuika to be essential to ensure that Kaupapa Māori research is kept critical and anti-colonial. The relationship with our kaumātua was central to ensuring that the research progressed in an ethical manner. We were cognisant of the need to work to create a safe space where everyone could be honest and open about the research being undertaken, especially given its controversial and challenging nature.

Over the following 18 months, the researchers and kaitiaki kaumātua met many times, clarifying, modifying, questioning and seeking feedback on each step of the research process. During this collaborative period, the role of our kaitiaki kaumātua changed to that of researcher kaumātua, culminating in our rōpū rangahau. Our focus was on mutual respect, sensitivity, trust and continual reflection of how we engaged together. This approach guided our rōpū rangahau and upheld the Māori principle of Āta, which relates specifically to the building and nurturing of relationships (how we behave and engage together). As the rōpū rangahau, we were asked ‘are you the right people to do this research?’, a question that drove to the heart of what the research aimed to do, how it would proceed and who was involved in its implementation, analysis and dissemination. Our response was that we may not be the most qualified people to undertake the research, however, we each bring unique skills to the table (as a medical ethicist (R8) and medical anthropologist (R9). We were also determined to provide a ‘voice’ for Māori that is currently absent from the political and research contexts surrounding PAD. Thus a collaborative approach was adopted where everyone in our rōpū rangahau was involved with all aspects of the study, yet each of us also held speciality roles which

Results and discussion

The challenges

At the first hui, three challenging questions arose that required honest consideration by the authors:

- Who were we to undertake this research?
- What skills could we contribute to the research?
- How do we (Māori and tauiwi researchers) navigate the research process together?

We were asked ‘are you the right people to do this research?’, a question that drove to the heart of what the research aimed to do, how it would proceed and who was involved in its implementation, analysis and dissemination. Our response was that we may not be the most qualified people to undertake the research, however, we each bring unique skills to the table (as a medical ethicist (R8) and medical anthropologist (R9). We were also determined to provide a ‘voice’ for Māori that is currently absent from the political and research contexts surrounding PAD. Thus a collaborative approach was adopted where everyone in our rōpū rangahau was involved with all aspects of the study, yet each of us also held speciality roles which

extremely subjective research method, it is common to some social science research approaches such as ethnographic participant observations and autoethnography. Such approaches perceive research as a socially conscious act that “seeks to describe and systematically analyse personal experience in order to understand cultural experience”.

Our research rōpū felt this structure would provide a normative and privileged cultural viewpoint of PAD that would form a strong foundation on which to build our Kaupapa Māori consistent research as we expanded our study focus to include younger Māori and older Māori and from a broad range of iwi (tribe) and hapū (sub-tribe). All members of the research rōpū were cognisant of the challenges that would arise: our kaumātua were not representative of all kaumātua across Aotearoa, thus the information that was shared and disclosed at the hui, and the findings that emerged, could not be generalised for all Māori. The research findings are reported elsewhere.
were respected. At the heart of the questions asked by kaumātua lay the historical context and the ‘colonizing gaze’30 that could not be dismissed—a past dominated by colonialisation, marginalisation, violation and oppression—and a present that “continues to harbour and maintain profound inequities in health, education and employment outcomes between Māori and non-Māori”.31

Linked to the past lay a further challenge concerning whether tauiwi should be involved in the research at all. Within the literature, opinion is divided on the role tauiwi should play in the advancement of Kaupapa Māori research.19,21,22 It has been argued that Kaupapa Māori research should be undertaken by Māori alone to ensure that Māori ways of knowing, understanding and being, remain academically rigorous, thus promoting a ‘pure’ Kaupapa Māori approach to research.31,34 In contrast, Barnes has argued that there is a space for tauiwi within Kaupapa Māori research where tauiwi can align with key principles of the approach while ensuring that the research is “controlled by Māori, for Māori and is of direct benefit to Māori”.20 Furthermore, as Kerr notes, what is important is the right attitude: those who support “the indigenous desire for self-determination should be welcome to join...it is this right attitude that we are looking for and trying to foster”.35 Such a view is also shared by Barnes: “making the commitment to build and sustain relationships over a long period and being prepared to walk alongside Māori groups...”.20

The rōpū rangahau were in agreement that we all have a role to play, including tauiwi, and that we were all in this space together. The challenges were not one-sided. Kaumātua were also very aware of the impact their authoritative voices have for Māori generally. This was poignantly expressed by one kaumātua who questioned her/his authority in speaking about PAD. She asked, ‘who am I to do this [research]’? Another kaumātua expressed concern that he was not entirely comfortable about the research because of the wairua (spiritual) aspect for his mokopuna (grandchildren) and tamariki (children) in the future. However, he was committed to being involved because of the significance of the context (PAD) for all Māori, and the importance of Māori voices being heard within a society that has traditionally ignored or dismissed all things Māori. He was also committed to ensuring that the knowledge that comes from the research would be available to future generations so that the stories would not be lost. As a consequence of this aspect of the research, it was agreed by everyone in the research rōpū that the verbal recordings and written transcripts would be securely archived, maintained and used within culturally appropriate processes approved of by kaumātua.

Finally there were challenges in terms of time and logistical management. All of our kaumātua were older in years with some experiencing poor health at times throughout the study. Finding time to meet together as a rōpū was challenging, however, the commitment from everyone to work together meant we accomplished this. The ways in which information is communicated and knowledge transferred can also create challenges for everyone involved. Ensuring that relevant concepts were clearly understood, and that different dialects of Te Reo Māori were acknowledged and respected during the transcription and translation process, was central to making certain we were listening carefully to what was being spoken.

The rewards
As a rōpū, one of the most satisfying aspects of the research has been the building of our research rōpū as whānau and the nurturing of relationships with kaumātua. Central to the principle of Āta,26 relationships define and sit centrally in how the research progressed. This was exemplified in a number of ways—many times it was more important to listen and hear than to talk.

Barnes proposes a descriptive framework as a “place to start in understanding the complexity of Pākehā engaging in kaupapa Māori research”.20 Such a model positions collective relationships at its heart and invites Pākehā researchers to be upfront and reflective in their Kaupapa Māori research journey. He further states that “acknowledging the diversity of research thinking and doing among Māori and Pākehā is important if new knowledge and practice is to emerge, and be learnt from.”20 One of the rewards (and challenges) of working within this Kaupapa Māori consistent research methodology has been continually reflecting on and questioning one’s own values and intentions throughout the study.
As mentioned earlier, the two researchers came from different academic disciplines and research backgrounds—R8 from medical ethics (philosophy) and R9 from anthropology. Furthermore, R9 is Māori and R8 is tauiwi. Yet our differences were also our strengths in that we came to the research with different skills and abilities that complemented the focus of the study. Having the opportunity to return to the safety of the research rōpū and ask questions in order to clarify any queries that came from the interpretative process gave further depth and meaning to the analysis. We were also proud to have the trust of our kaumātua.

For the kaumātua, some of the most rewarding aspects of being involved in this research related to hearing each other’s views and experiences, developing research skills and forming a close and trusting relationship with each other as a rōpū. They also enjoyed seeing how the learnings and knowledge gained by R8 and R9 resulted from their (kaumātua) participation in the research.

Conclusion

This paper has critically explored the Kaupapa Māori consistent research approach we took in exploring Māori attitudes and beliefs about medical practices that hasten death; the collaborative approach we embraced and the challenges and rewards that ensued. The four Interface Research principles were central to our study and formed the foundation of our rōpū rangahau.

Working together as a research rōpū and being committed to respecting the skills, insights and experiences that each individual brought to the study ensured accountability, control and representation throughout the entire research process. Given the rich research results achieved and personal rewards gained as a rōpū, we would advocate for the application of such collaborative research approaches within health research contexts.

Competing interests:
All authors report grants from Health Research Council during the conduct of the study. Dr Malpas is a member of the End-of-Life Choice Voluntary Euthanasia Society.

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Most health systems struggle to meet demand for care. However, not all services delivered are of value to patients, and some patients experience overdiagnosis and overtreatment. Strategies are needed to reduce unwarranted variation in diagnosis and treatment, and to focus resources on the care of most value to patients.

Concern about overuse and rising costs in the US health system led to the Choosing Wisely campaign. Launched in 2012, nine leading US medical organisations each nominated five overused tests or treatments. More than half of the nominations were directly related to radiology. Radiology features similarly in Choosing Wisely campaigns started subsequently in other countries, including New Zealand. Low value imaging is particularly problematic as modern imaging techniques detect ‘incidentalomas’ in up to 40% of people, leading to patient anxiety and further follow-up investigations. Strategies for managing value are therefore particularly important in the area of radiology.

There is substantial opportunity to improve quality and value of care at the point of referral. Studies suggest that outpatient referral quality from general practice is variable to a degree that cannot be explained by differences in practice populations, and that a substantial number of referred cases could be managed in primary care. There is less evidence about the quality of radiology referrals, but wide variation has been observed in hospital settings.

Referral management strategies are diverse, ranging from attempts to indirectly influence referral behaviour through to direct intervention in the referral process.
Indirect referral management strategies include education, clinical guidelines, decision support systems, peer review with feedback and financial incentives. Direct referral management strategies include structured referral forms, clinical triage and referral redirection. There is some evidence supporting indirect referral management strategies, but previous reviews have found little evidence that direct strategies are cost-effective.

Relatively little has been published about referral management in the area of primary care radiology, though there is evidence that guidelines and feedback reduce x-ray requests. A holistic approach may be needed because isolated interventions are likely to have complex effects.

Over the last decade, the Canterbury health system, in the South Island of New Zealand, has worked towards a vision of integrated health and social care, delivered close to people’s homes. The Canterbury region has a population of 539,000. The region has 120 general practice teams and over 600 general practitioners. Community radiology is provided at no cost to patients within a constrained budget managed by the Canterbury District Health Board (DHB), which receives population-based government funding.

In 2009, early in the development of a broad suite of community-based clinical pathways, it became clear that primary care access to radiology was often a barrier to caring for patients in the community. Waiting times were growing and the budget for community radiology had been exceeded. There was limited ability for the system to adapt to changes in demand or provider capacity.

General practitioners in Canterbury were making almost 40,000 referrals annually for radiology, including plain film, ultrasound and CT imaging. Preliminary referral audits identified a range of issues, including: 1) complicated referral processes, 2) variable referral quality, including inflation of referral urgency in 30% of requests and questionable clinical indications in 35% of plain film requests, 3) referrals to specialist services for diagnostics that could potentially be avoided if the investigation were available in the community and 4) poor prioritisation of waiting lists with unacceptably long waits for some patients.

This paper describes the implementation of a multifaceted intervention to improve primary care radiology referral quality and value in Canterbury, and discusses the transferability of the outcomes to other health systems.

**Methods**

In 2009, a small team was resourced by the Canterbury DHB to develop a better model for community radiology. The team established a radiology workgroup, including general practitioners, radiologists and hospital specialists. Workgroup members were introduced to the issues and asked to brainstorm solutions.

Subsequently, between 2010 and 2014, the following changes were implemented:

- Clinical access criteria to prioritise requests.
- Clinical pathways to promote testing guidance, access criteria and patient information.
- Electronic referral to improve referral accuracy and administration.
- A shared health record to increase visibility of prior results.
- Referral process improvements to streamline referral flow.
- Referral quality improvement strategies to ensure appropriate testing.
- Radiology reporting guidelines to improve utility of results.
- Clinical pathway audits to ensure patient safety.

**Clinical access criteria**

To provide a framework for prioritising requests, the workgroup developed clinical access criteria for community radiology in consultation with hospital specialists. The access criteria were designed to balance evidence and available resources. Gaps between the access criteria and best practice were highlighted to encourage general practitioners to discuss patient-funded options. To reduce the demand for urgent bookings, the access criteria were subsequently refined to specify explicit maximum wait times (<24 hours, <1 week, <4 weeks) for each condition.
Relative to previous practice, the criteria were most restrictive in the following areas:

- X-ray for suspected osteoarthritis without red flags.
- Post-pneumonia chest x-ray without risk factors for underlying cancer.
- Bone density scans when the estimated 10-year hip fracture risk was under 3%.
- Thyroid ultrasound where locally agreed pathways recommend other first line investigations or specialist referral.
- Musculoskeletal ultrasound where there was limited capacity for publicly funded treatment.

Clinical pathways

To disseminate the access criteria, these were published in an online clinical pathway tool for general practice teams called HealthPathways (http://www.healthpathwayscommunity.org). HealthPathways is developed collaboratively by general practitioners and hospital specialists, and provides evidence-informed clinical guidance for common conditions coupled with local service information and referral processes. It has a high level of adoption in Canterbury, with 94% of surveyed general practitioners reporting it is easy to use in clinical practice and 90% reporting it has improved the care they provide to patients.

Where possible, clinical pathways were modified to reinforce the criteria by recommending alternatives, including watchful waiting, other diagnostics or specialist referral. Aligned patient information is also provided in a public website (http://www.healthinfo.org.nz).

Electronic referral

To support locally agreed pathways and access criteria, Canterbury developed the Electronic Request Management System (ERMS). ERMS is a centrally managed electronic referral system enabling referrals from general practice to any service in the health system, including publicly- and privately-funded hospital and community services. It is integrated with general practice software to enable forms to be automatically populated with accurate information. It provides guidance on required referral information and reduces the risk of misdirection. In 2010, all referrals to community radiology were sent via fax. By late 2015, over 95% of referrals were electronically generated.

Shared health record

To reduce the risk of duplicate testing, prior radiology results were made available to general practice and hospital teams via an electronic shared health record called HealthOne. HealthOne, developed in Canterbury, includes information about the majority of the Canterbury population and gives community and hospital clinicians a unified view of a patient’s clinical history.

Referral process improvement

To enable control of referral flow and to improve capture of referral data, a community radiology referral hub was established. Historically, general practices sent referrals directly to radiology providers, making it difficult to shift volumes between providers as demand and capacity changed. Using ERMS, the referral hub can efficiently coordinate referral triage and flexibly allocate requests to providers depending on demand and capacity. For example, when the Canterbury DHB’s primary community CT scanner had an extended outage in 2012, referrals were seamlessly re-routed to the hospital CT service. Prior to the referral hub it would have been necessary to instruct each of the local general practices to update their referral templates and fax numbers, which is an inaccurate and inefficient process. With a single administrator, the hub is able to process 40,000 referrals per year.

Referral triage and feedback

Local radiologists noted that variability in the quality of referrals from general practice was an obstacle to accurate radiology reporting. The importance of a succinct clinical question and relevant clinical background was promoted to general practitioners and reinforced in the ERMS referral system. For example, the pelvic ultrasound request form prompts for the date of the last menstrual period in pre-menopausal women so that the scan can be scheduled early in the menstrual cycle when imaging is most informative.

Referrals are triaged according to agreed access criteria by a small team of general practitioners. The electronic triage system makes the process flexible and efficient. A
range of predefined reasons for returning requests have been developed, including references back to the relevant clinical pathway. Triagers can optionally modify these reasons to fit a specific case and are encouraged to superimpose their clinical judgement rather than applying the criteria rigidly. Referrers are advised to resubmit their request if they disagree with the decision of a triager. Referral triage decisions have been intermittently audited to ensure equity of access. Triagers can work from anywhere with an internet connection and most referrals are triaged within a few days. Overall, approximately 75% of referrals are triaged, with 13% of these being returned to the referrer with advice. Requests for urgent imaging bypass triage to avoid delays.

General practitioners are provided with feedback about their overall referral patterns relative to their peers. This data is discussed during practice liaison visits and at general practitioner education sessions.

Radiology reporting guidelines

Local general practitioners noted that radiology reports were often difficult to interpret and would sometimes recommend ordering investigations that were declined by the public health system. To ensure radiology reports were meaningful to general practitioners, guidelines were developed for radiologists outlining the features considered important:

- A concise report identifying key points of clinical importance.
- A clear distinction between normal and significantly abnormal.
- Provision of a diagnosis or differential diagnosis.
- Comparison with any previous images.
- A phone call to practices about critical results (e.g., new cancer).
- Careful wording of follow-up recommendations, taking into account locally agreed clinical pathways.

A standard footer was added to all reports stating that “Recommendations made in this report do not necessarily indicate availability via publicly-funded clinical pathways. Please refer to HealthPathways for further information.” A radiology advice phone line was promoted to enable general practitioners to discuss any points of uncertainty with a radiologist.

Clinical pathway audit

A clinical audit programme was established to enable continuous quality improvement of clinical pathways. The focus has been on areas where new radiology pathways have been introduced or access has been restricted. Audits of patients declined imaging have provided reassurance that patients are being appropriately selected and followed-up, without compromising patient safety.

Results

Improved referral quality

Triagers have observed a steady improvement in referral quality since the inception of the service with an increase in the median acceptance rate for individual referrers from 78% in 2011 to 88% in 2015 (Figure 1). Improvements have been most noticeable in areas such as gynaecological ultrasound where there has been a holistic approach, including well-developed clinical pathways, clear referral criteria, general practitioner education and detailed and constructive feedback provided to referrers from both gynaecology and radiology services.

Linking access criteria to explicit maximum wait times provided guidance and certainty for referrers. The proportion of referrals requested urgently (within one week) reduced from 59% in the 12-month period before the change to 22% in the subsequent 12 months (Table 1). The reduction in urgency of requests simplified the booking process and reduced pressure on administrative staff, eliminating delays for acute cases.

Table 1: Distribution of requested priorities in the 12-month periods before and after access criteria were linked to explicit target wait times.

<table>
<thead>
<tr>
<th>Requested priority</th>
<th>Before (%)</th>
<th>After (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 4 weeks</td>
<td>41</td>
<td>78</td>
</tr>
<tr>
<td>Within 1 week</td>
<td>52</td>
<td>18</td>
</tr>
<tr>
<td>Within 24 hours</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>
Figure 1: Distribution of acceptance rates of radiology referrals for individual referrers making at least 15 referrals in the calendar year.

The bottom and top of the box correspond to the first and third quartiles, respectively. The whiskers extend 1.5 times the interquartile range.

Improved referral value
Following the establishment of the community radiology referral management service in 2009, there has been a sustained reduction in plain film volumes of 40% (Figure 2). Volumes of CT and ultrasound have continued to grow. This growth is partly explained by a shift in imaging from the hospital to the community, as new community-based pathways of care have been introduced. In addition, it is likely there is a degree of ‘pathway-driven demand’, as patients who were not previously investigated are now being investigated by general practitioners who have adopted pathway recommendations.

Whereas previously waiting times were unpredictable, imaging is now performed consistently within the target wait times. For patients at risk of hospital admission, general practitioners can reliably access same-day x-ray, ultrasound and CT urogram.

Figure 2: Volume of radiology referrals accepted by financial year.
Resources conserved by a reduction in low-value imaging have been reallocated to enable new clinical pathways to support community-based investigation and management, including:

- Breast imaging and biopsy for breast symptoms.
- CT colonography for lower risk or frail patients with colorectal symptoms.
- CT head and carotid ultrasound for transient ischaemic attack.
- CT head for cognitive impairment.
- CT urogram for renal colic.
- Pelvic ultrasound for post-menopausal bleeding.

For an example of the benefits of resource reallocation, see the case study on the breast symptoms pathway in the supplementary materials.

Patient and clinician experience
In the first year of operation, the service received a number of complaints from clinicians and patients. Most complaints related to the reduction in access to lower value imaging. Each complaint was investigated and used to inform improvements to the service, including clarifications to clinical pathways, access criteria and processes. This feedback cycle has been critical to the ongoing development and improvement of the service. The frequency of complaints declined steadily and had become rare within three years of establishment.

Informal discussion with local clinicians suggests that by 2016 there was a high level of satisfaction with the service. Many find it useful to share access criteria with their patients during a consultation when they are pressured to order imaging they do not consider clinically necessary. The framework supports good clinical judgement, reducing pressures to practice defensively.

Discussion
Clinical guidelines and associated access criteria are often ignored. This paper draws on real world referral and audit data, collected over a seven-year period, to demonstrate that a multifaceted intervention led to sustained improvement in primary care radiology referral quality and value. We are not able to evaluate the relative contribution of each improvement intervention.

Our implementation is distinct because the access criteria have been embedded into pathway and referral tools that are highly valued by local general practice teams. The pathways and criteria are closely aligned, and reflect local resources, so are directly relevant to local clinical practice. The criteria have been reinforced with a range of direct and indirect referral management strategies.

Current perspectives on referral management have inevitably been shaped by existing implementations. In the UK, only 29% of the primary care trusts interviewed by The King’s Fund viewed quality improvement as a primary driver for referral management. Our implementation has focused on a range of outcomes, including quality improvement, patient experience and choice and enabling new pathways. In exchange for constraints, local clinicians have seen benefits of reduced waiting times and increased access to advanced imaging.

Published evidence favours retrospective audit of referrals over prospective triage. Our observation is that retrospective approaches are often not sustained beyond the scope of research. Prospective triage, when implemented as an operationally critical step in patient care, is carried out with the same sense of clinical duty as other clinical activities. Canterbury’s community radiology service has sustained prospective triage for seven years, and communication between referrers and triagers has informed continual improvements to access criteria and clinical pathways.

Prospective triage can also deliver immediate benefit to clinicians and patients. In Canterbury, it has been a powerful tool to raise awareness of locally agreed clinical pathways. Declined requests usually refer back to a particular pathway. Clinicians have commented that while this is sometimes frustrating it can also be a useful way to learn about new pathways during the course of regular clinical practice.

Clinical risk from poor triage decisions is an argument against direct referral management. The ethical imperative, however, depends on the risk of the status quo. As we observed in Canterbury, pre-existing clinical risk may be considerable when referred services are poorly prioritised. Our experience suggests that the...
risks of direct referral management can be
controlled if monitored carefully.

While operational triage data implies that
referral quality and appropriateness has
improved, a formal comparison of referral
quality before and after the establishment
of the service would be informative. It is
possible that referral acceptance rates have
increased partly due to ‘gaming’ of the
system, although the sustained reduction
in volumes suggests that the extent of any
such behaviour is limited.

Clinician experience of the community
radiology service reported here is anecdotal
based on discussions with general practi-
tioners and the low level of complaints to
the service in recent years. A systematic
evaluation of referrer and patient expe-
rience would be a useful adjunct.

Sustainability and transferability of these
improvements are difficult to study system-
atically. Interventions occur in the context of
an evolving health system, making it impos-
sible to control for all variables. Outcomes
are highly dependent on context and the
quality of implementation, so may not be
directly transferable between health systems.

We believe the following elements have
been critical to sustaining the outcomes
achieved by the community radiology
service in Canterbury:

- A philosophy of quality improvement
  and waste avoidance rather than cost
  saving.
- Long-term continuity of clinical and
  administrative leadership.
- A supportive funder.
- Broad clinical engagement with
  hospital specialists and general
  practitioners.
- A multifaceted intervention
  including direct and indirect referral
  management strategies.
- A rich and tightly integrated set of
  health system tools to embed process
  change.
- An agile and responsive implemen-
tation model.

In 2013, the New Zealand Ministry of
Health established a working group to
develop a national set of access criteria for
community radiology to improve equity of
access. The national criteria were based
on those developed in a few DHBs including
Canterbury. DHBs have been encouraged to
implement these criteria. While the national
criteria provide a helpful starting point, it
is not yet clear that these have increased
quality and value of referrals in other
districts. Our belief is that a multifaceted
approach is needed to deliver the full
benefits of a set of access criteria.

The multifaceted approach described here
is potentially relevant to other referred
services. However, the Choosing Wisely
nominations suggest that imaging may be a
more overused and discretionary resource
than specialist assessment and treatment, so
the potential gains could be smaller in
other clinical areas.

Appendix

Case study: breast symptoms
pathway

In 2011, waiting times for assessment of
patients with breast symptoms at the Christ-
church Hospital General Surgery Department
exceeded treatment targets. A workgroup
was established and identified that the
majority of women referred had benign
breast conditions (Figure 3). The group
recommended that breast diagnostic imaging
and biopsy be arranged in the community
by general practitioners to free up surgeon
capacity for clinics and surgery. The new
pathway was documented on Health-
Pathways and a contract was negotiated
between the community radiology service
and a private breast radiology provider. The
new pathway was launched in November
2011. After this date, referrals sent directly
to the General Surgery Department were
returned to the referrer with a reference
to the new pathway. Of women referred by
general practitioners for imaging, only about
5% required subsequent surgical assessment
(Figure 4). Nearly all patients now receive
a diagnosis within 1–4 weeks. Those with
benign conditions can be reassured by
their general practitioners and do not need
to traverse the hospital system. Flows in
the surgical service have improved so that
women with serious pathology are seen
and treated more quickly. The new pathway
reduced the maximum wait for treatment
from 30 weeks to 10 weeks, with urgent cases
receiving treatment within a month.
Figure 3: Canterbury's breast symptoms pathway prior to November 2011.

Women with benign lesions were seeing a specialist, while women with cancer were waiting too long for treatment. The dashed line is used to indicate that only some women were seen in the specialist clinic prior to radiology.

Figure 4: Canterbury's streamlined breast symptoms pathway after November 2011.

Only women with serious pathology see a specialist (approximately 5%). The waiting time for treatment is shorter because surgeon time is not used for patients with benign lesions.
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Accuracy of ethnicity data recorded in hospital-based patient clinical records and the Australia and New Zealand Dialysis and Transplant Registry

Matthew J Page, Emma H Wyeth, Ari Samaranayaka, Bronwen McNoe, Rachael C Walker, John Schollum, Mark R Marshall, Rob Walker, Sarah Derrett

ABSTRACT

AIM: Sustained health inequities are experienced by indigenous and minority populations. Accurate ethnicity data are fundamental to healthcare planning and provision and monitoring of health outcomes to address such inequities. This study investigated the accuracy of ethnicity data in a large clinical registry of end-stage kidney disease patients (the Australia and New Zealand Dialysis and Transplant Registry; ANZDATA) and hospital-based patient clinical records compared with self-reported ethnicity data collected in the ‘Dialysis Outcomes in those aged ≥65 years’ (DOS65+) study.

METHODS: Self-reported ethnicity data were collected, as per national guidelines, from DOS65+ participants and compared with ethnicity data recorded for these participants in ANZDATA and hospital-based patient clinical records. Ethnicities were first prioritised and then grouped into one of the following: European, Māori, Pacific, Asian and Other. Cohen’s Kappa statistics were calculated to determine overall non-random agreement. Concordances for ethnic group categories were calculated.

RESULTS: There was high concordance between self-reported ethnicity and ethnicity recorded in both the ANZDATA ($\kappa=0.95$) and hospital-based patient clinical records ($\kappa=0.93$). Concordances for ethnic group categories between datasets ranged from 86% to 100%.

CONCLUSION: Our findings show a high level of agreement for ethnicity recorded for end-stage kidney disease patients between the three datasets, suggesting robust data to support health planning and research. Despite this, alignment of ethnicity data collection methods, as per national guidelines, should occur for all databases used for research and clinical practice in New Zealand.

Statistics New Zealand defines an ethnic group as being a group of people who have some or all of the following features: “a common proper name; one or more elements of common culture which need not be specified, but may include religion, customs or language; a unique community of interests, feelings and actions; a shared sense of common origins or ancestry; or a common geographical origin”.¹ It is important that ethnicity is self-identified (as opposed to someone else defining someone’s ethnicity) and is defined by an individual’s affiliation to an ethnic group or groups.²³ Factors such as ancestry, culture, race, nationality and country of birth are related to an individual’s ethnicity, however, they do not exclusively determine it, nor are they the same as ethnicity.⁴

The concept of ethnicity in New Zealand has changed significantly and increased in importance in past decades, as demonstrated by the changes in the New Zealand census. In brief, from 1926 to 1971, the
The current ethnicity question, introduced to the national census in 2001 by Statistics New Zealand, allows more than one ethnic group to be reported by an individual.\(^5\) The health sector has since adopted the use of this question when collecting ethnicity data, and guidelines for use are well-defined and highly recommended.\(^4\) Despite this, previous research and anecdotal reports suggest the question is not administered correctly.\(^7\)

Current and accurate ethnicity data are required for the successful planning, provision and monitoring of healthcare and health outcomes in New Zealand. Healthcare providers’ funding models are, in part, based on the ethnic composition of the population they serve, and specifically require a focus on ethnic inequities.\(^8\) Previously, Māori (the indigenous people in New Zealand) have often been under-counted in many datasets.\(^9\)–\(^12\) This is of particular concern due to the persisting and multiple health disparities between Māori and non-Māori. For example, life expectancy for Māori is 7.1 years less than for non-Māori.\(^13\) Of particular relevance, Māori have a 50% increased risk of death during dialysis, for this study.\(^14\) As per the Treaty of Waitangi (an agreement signed between the British Crown and Māori representatives in 1840), the Crown has a responsibility to ensure that Māori have at least the same level of health as non-Māori.\(^15\) This underlines the need for systematic collection of high-quality ethnicity data to ensure effective monitoring and health service provision.

The delivery of end-stage kidney disease care in New Zealand is largely based on data from two sources: the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA)\(^16\) and patients’ hospital-based clinical records. ANZDATA records demographic and clinical information about every Australian and New Zealand patient who has been established on any form of renal replacement therapy. ANZDATA is funded, in part, by the New Zealand government and is used by researchers, policy makers and healthcare providers.\(^16\) Given New Zealand’s mandate to eliminate health inequities, it is imperative that ethnicity is recorded accurately in ANZDATA and hospital-based patient clinical records.

This paper uses self-reported ethnicity data collected in the ‘Dialysis Outcomes’ study (DOS65+)\(^17\) to evaluate the accuracy of ethnicity data recorded in two other datasets—ANZDATA and hospital-based patient clinical records. DOS65+ is a prospective longitudinal study investigating patient-centred outcomes for patients aged ≥65 years either on, or eligible for, dialysis treatment.

### Methods

This is a study of DOS65+ participants comparing self-reported ethnicity data from DOS65+ interviews with participants’ ethnicity data recorded in the ANZDATA and hospital-based clinical records. DOS65+ has been published elsewhere.\(^17\) In brief, participants were recruited from 1 January 2011 to 31 March 2014 if they were aged ≥65 years with end-stage kidney disease and receiving, or eligible to receive, dialysis therapy (chronic kidney disease stage 5, estimated glomerular filtration rate <15 ml/min/1.73 m\(^2\)) (n=227). Participants were recruited from nephrology centres based in three district health boards (DHBs) in New Zealand: Counties Manukau, Southern and Hawke’s Bay. The DOS65+ cohort is representative of other New Zealanders in this age group in these three regions.\(^17\) This study received ethical approval from the Multi-Region Health and Disability Ethics Committee (MEC/10/084).

### Variables

Self-reported ethnicity for DOS65+ participants was collected during baseline interviews. The Statistics New Zealand 2001 Census ethnicity question was used, administered by an interviewer, aligning with the New Zealand Ministry of Health Ethnicity Data Protocols.\(^4\) The interviewer asked which ethnic group or groups the participant belongs to from the options listed in the question.\(^6\) Participants could provide multiple responses, and all were recorded.
At the time of writing, the ANZDATA records patients’ ‘racial origin’, from a list of 17 options, which were taken to approximate ethnicity. To the best of our knowledge, there are no defined or written guidelines for the administration of this question. Participants’ ‘ethnicities’ recorded in the ANZDATA were collated. Racial origin is recorded at the time of dialysis inception or renal transplantation for each patient. All New Zealand dialysis services enrol patients in the ANZDATA.

Participants’ ethnicity data from hospital-based patient clinical records were sourced by the research team at each of the three study locations (as per ethics approval).

In order for ethnicity data to be compared and analysed in this study, it was necessary that the same ethnic categories were used for each dataset. For the purposes of the present analyses, ethnicity data were grouped into one of the prioritised ethnicity Level One codes: Māori, Pacific, Asian, European or Other ethnic groups as per the Ethnicity Data Protocols. For example, if a participant reported Māori and New Zealand European ethnicities, they are categorised as Māori, while if a participant reported Māori and Samoan ethnicities, they are categorised as Māori.

Statistical analyses

Frequency tables were created to describe the distribution of ethnicities for each dataset. Concordance tables were used to assess the accuracy of the ANZDATA and clinical record ethnicities. Cohen’s unweighted kappa statistics and 95% confidence intervals (CIs) were calculated to determine the level of non-random agreement between self-reported ethnicities (reference group) and both the ANZDATA and clinical record ethnicities. A kappa score of 0.81–1 is described as an ‘almost perfect agreement’. Additional 95% CIs were calculated and are presented where appropriate. Analyses were conducted using Stata® 13.1.

Results

All 227 DOS65+ participants were included in the analyses. Baseline demographic information for the DOS65+ cohort is presented in Table 1.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>146</td>
<td>64.3</td>
</tr>
<tr>
<td>Female</td>
<td>81</td>
<td>35.7</td>
</tr>
<tr>
<td><strong>Age group (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65–69</td>
<td>87</td>
<td>38.3</td>
</tr>
<tr>
<td>70–74</td>
<td>65</td>
<td>28.6</td>
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<tr>
<td>75–79</td>
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<td>19.8</td>
</tr>
<tr>
<td>≥80</td>
<td>30</td>
<td>13.2</td>
</tr>
<tr>
<td><strong>Ethnicity†</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European</td>
<td>105</td>
<td>46.3</td>
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<td>Māori</td>
<td>50</td>
<td>22.0</td>
</tr>
<tr>
<td>Pacific</td>
<td>50</td>
<td>22.0</td>
</tr>
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<td>Asian</td>
<td>21</td>
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<td>Other</td>
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<td>0.4</td>
</tr>
<tr>
<td><strong>Study region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern DHB</td>
<td>44</td>
<td>19.4</td>
</tr>
<tr>
<td>Hawke’s Bay DHB</td>
<td>30</td>
<td>13.2</td>
</tr>
<tr>
<td>Counties Manukau DHB</td>
<td>153</td>
<td>67.4</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In paid employment</td>
<td>17</td>
<td>7.5</td>
</tr>
<tr>
<td>Kidney disease prevents paid employment</td>
<td>58</td>
<td>25.6</td>
</tr>
<tr>
<td><strong>Highest educational qualification</strong></td>
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<td></td>
</tr>
<tr>
<td>None</td>
<td>114</td>
<td>50.2</td>
</tr>
<tr>
<td>Secondary school</td>
<td>42</td>
<td>18.5</td>
</tr>
<tr>
<td>Post-secondary school</td>
<td>71</td>
<td>31.3</td>
</tr>
</tbody>
</table>

†Self-reported ethnicities using Level One ethnic groupings as per the prioritisation method.

Note: baseline demographic data has been obtained from McNee B, Derrett S, Walker R, Marshall MR, Henderson A, Schollum J, et al. (Manuscript in preparation).

The DOS65+ cohort included participants identifying as European (46.3%), Māori (22.0%), Pacific (22.0%), Asian (9.3%) and ‘Other ethnic groups’ (0.4%). Seven participants identified with more than one ethnic group. DOS65+ included 32 participants.
who were receiving supportive (non-dialysis) care or were pre-dialysis. Therefore, 195 DOS65+ participants were in the ANZDATA registry and available to investigate ethnicity data accuracy. Concordances for each ethnic group are shown in Table 2 (ANZDATA) and Table 3 (hospital-based patient clinical records).

Table 2 presents comparisons between ANZDATA and DOS65+ (reference group) ethnicities. The ANZDATA ethnicity data demonstrated a Cohen’s kappa of 0.95 (95% CI 0.9, 1.0) when compared with the reference group. Self-reported DOS65+ ethnicity matched those recorded in the ANZDATA records for 96.4% (95% CI: 89.9–99.3%) of European participants; 93.3% (95% CI: 81.7–98.6%) of Māori participants; 100% (95% CI: 92.6–100%) of Pacific participants; and 94.4% (95% CI: 72.7–99.9%) of Asian participants. There were no participants within the ANZDATA registry who had self-reported ethnicities in the ‘Other Ethnic Group’ category in the DOS65+ study.

Table 3: Comparisons of ethnicities† as recorded for individuals in DOS65+ and hospital-based patient clinical records (n=227).

100% (95% CI: 92.6–100%) of Pacific participants; and 94.4% (95% CI: 72.7–99.9%) of Asian participants. There were no participants within the ANZDATA registry who had self-reported ethnicities in the ‘Other Ethnic Group’ category in the DOS65+ study.

All 227 DOS65+ participants had ethnicity information recorded in their hospital-based patient clinical records (Table 3). Hospital-based patient clinical records demonstrated a Cohen's kappa of 0.93 (95% CI 0.9, 1.0) when compared with the reference group. Self-reported DOS65+ ethnicity matched those recorded in the hospital-based patient clinical records for 98.1% (95% CI: 93.2–99.8%) of European participants; 92.0% (95% CI: 80.8–97.8%) of Māori participants; 98.0% (95% CI: 89.4–99.9%) of Pacific participants; 100% (95% CI: 92.6–100%) of Pacific participants; and 94.4% (95% CI: 72.7–99.9%) of Asian participants. There were no participants within the ANZDATA registry who had self-reported ethnicities in the ‘Other Ethnic Group’ category in the DOS65+ study.

Table 2: Ethnicity† data from DOS65+ and ANZDATA (n=195).

<table>
<thead>
<tr>
<th>Ethnicity† recorded in ANZDATA</th>
<th>European</th>
<th>Māori</th>
<th>Pacific</th>
<th>Asian</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reported DOS65+ ethnicity</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>European</td>
<td>81 (96.4)</td>
<td>0 (0)</td>
<td>1 (1.2)</td>
<td>0 (0)</td>
<td>2 (2.4)</td>
<td>84 (100)</td>
</tr>
<tr>
<td>Māori</td>
<td>2 (4.4)</td>
<td>42 (93.3)</td>
<td>1 (2.2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>45 (100)</td>
</tr>
<tr>
<td>Pacific</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>48 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>48 (100)</td>
</tr>
<tr>
<td>Asian</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>17 (94.4)</td>
<td>1 (5.6)</td>
<td>18 (100)</td>
</tr>
<tr>
<td>Total</td>
<td>83 (42.6)</td>
<td>42 (21.5)</td>
<td>50 (25.6)</td>
<td>17 (8.7)</td>
<td>3 (1.54)</td>
<td>195 (100)</td>
</tr>
</tbody>
</table>

1As per Level One ethnic group categories.
Notes: Concordance figures are bolded and shaded. Other category is not presented for DOS65+ as there were no DOS65+ participants for whom ANZDATA ethnicity information was available for who reported ‘other ethnic group’.

Table 3: Comparisons of ethnicities† as recorded for individuals in DOS65+ and hospital-based patient clinical records (n=227).

<table>
<thead>
<tr>
<th>Ethnicity† recorded in hospital-based patient clinical records</th>
<th>European</th>
<th>Māori</th>
<th>Pacific</th>
<th>Asian</th>
<th>Other†</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-reported DOS65+ ethnicity</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>European</td>
<td>103 (98.1)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (1.9)</td>
<td>105 (100)</td>
</tr>
<tr>
<td>Māori</td>
<td>3 (6.0)</td>
<td>46 (92.0)</td>
<td>1 (2.0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>50 (100)</td>
</tr>
<tr>
<td>Pacific</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>49 (98.0)</td>
<td>0 (0)</td>
<td>1 (2.0)</td>
<td>50 (100)</td>
</tr>
<tr>
<td>Asian</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (9.5)</td>
<td>18 (85.7)</td>
<td>1 (4.8)</td>
<td>21 (100)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (100)</td>
</tr>
<tr>
<td>Total</td>
<td>107 (47.1)</td>
<td>46 (20.3)</td>
<td>52 (22.9)</td>
<td>18 (7.9)</td>
<td>4 (1.76)</td>
<td>227 (100)</td>
</tr>
</tbody>
</table>

1As per Level One ethnic group categories.
*These four participants’ ethnicities were recorded as “not stated” or “not identifiable” in their hospital-based patient clinical records and were therefore grouped as ‘Other’ in our analyses.
Note: Concordance figures are bolded and shaded.
85.7% (95% CI: 63.7–97.0%) of Asian participants. One participant recorded as ‘Other’ in DOS65+ was recorded as European in hospital-based patient clinical records.

Discussion

This study investigated the accuracy of ethnicity data recorded in two different datasets compared to a reference dataset (DOS65+). The findings from this study showed high concordances suggesting that ethnicity misclassification is not common for these individuals and datasets. Cohen’s kappa scores for both datasets were high, supporting our finding of strong levels of agreement.

Although concordances between datasets were high, our study revealed some differences in ethnicity data collection between the datasets. Best practice in New Zealand currently recommends self-reported ethnicity, with the ability to report one or more ethnicities.4 Ethnicity is also increasingly recognised as context-specific and may change for an individual over time.21 Our study highlighted that ANZDATA, despite being a quality clinical registry, collects such information as ‘racial origin’ and currently has no facility to align with New Zealand national protocols, enable patients to self-report ethnicity or have a mechanism for recording more than one ethnicity. Importantly, in New Zealand, race has been discredited as a useful concept due to its historical uses and definitions (eg, primarily biological and genetic traits) and as such, ethnicity is a more appropriate and widely used measure.22 Based on our current study, the veracity and reliability of ethnicity data from ANZDATA, and hence its use in clinical audits, monitoring and research to address health inequities, would be enhanced by alignment with New Zealand standard protocols for ethnicity data collection.4

Our results compare favourably with other studies investigating ethnicity data accuracy in New Zealand. One compared self-reported ethnicity with ethnicity in National Health Index (NHI) records.10 Of those who self-reported Māori ethnicity, 71% were also recorded as Māori in the NHI records. Concordance rates for New Zealand European, Pacific, South Asian and Asian ethnic groups were 89%, 67%, 70% and 64%, respectively.10 Another compared ethnicity recorded in the New Zealand National Immunisation Register (NIR) with a Primary Health Organisation (PHO) register. Of those children recorded as Māori in the NIR, 63% were also recorded as Māori in the PHO register; 23% had been recorded as New Zealand European.11 New Zealand European, Pacific and Asian children, 83%, 77% and 81%, respectively, were recorded as such in the PHO register. In another study, it was found that 96% of patients’ self-reported ethnicity matched that recorded in the National Minimum Dataset (NMDS).23 There was similar concordance for Māori and New Zealand European; 96% for both groups.

It was concluded that due to a then recent implementation of government strategy to improve health data recording, the accuracy of ethnicity data recording in the NMDS had improved, which is encouraging. Finally, and most recently, a report published by Statistics New Zealand comparing New Zealand Census 2013 ethnicity data with ethnicity data recorded in the NHI dataset showed that Māori ethnicity is not recorded consistently between the two datasets; for total response aggregated ethnicity counts a ratio of 0.79 for the NHI dataset compared to the Census was observed and it was reported that over one-quarter of Māori in the Census are not recorded as Māori in the NHI dataset.24,25

There are limitations with our study. Firstly, the accuracy of ethnicity data recording is potentially more complex than is presented due to multiple ethnicities being reported in two datasets (DOS65+ and hospital-based patient clinical records) but not the third (ANZDATA). When data are grouped using the prioritisation method, there can be differences when participants report multiple ethnicities, eg, one self-reported ethnicity may be the one they primarily identify with, but it may have a lower prioritisation level (as per the guidelines)4 and therefore be ‘lost’ when categorising at Level One ethnicity codes only. That there is not a significant difference between concordance rates for different ethnic groups is reassuring. However, the sample size is small, resulting in relatively wide confidence intervals, which may mean we are underpowered to detect differences where these may, in fact, exist. Additionally, small sample size meant that analyses could not be carried
out at Level Two Statistics New Zealand ethnic group codes. Instead, Level 1 codes were only used, which may underestimate some ethnicity misclassification. This would lead to an overestimation of the reliability of the ethnicity data analysed. Finally, due to the relatively small number of dialysis patients in the study centres and the familiarity of health professionals with patients (as a consequence of the unique and longitudinal nature of dialysis care), the accuracy of recording ethnicity may be better in this cohort compared to other groups.

Our findings are encouraging and have positive implications for future nephrology health planning, provision and monitoring in New Zealand. The high level of agreement between the three datasets suggests that existing data sources can support analyses by ethnicity in clinical care and research. Despite this, and in line with other studies, it is recommended that the ANZDATA amend its ethnicity data collection methods to align with the current New Zealand Ethnicity Data Protocols and other nationally collected data sources to enhance the quality of ethnicity information and data linkage.

Competing interests:
Dr Derrett reports grants, personal fees and non-financial support from EuroQol Group outside the submitted work. Mr Page reports affiliation with Otago Medical Research Foundation—Lions Club of Dunedin South Summer Scholarship during the conduct of the study. Ms Walker reports grants from NZ Lotteries Health Research, grants from Baxter Health Care Research Programme, grants from University of Sydney APA Scholarship outside the submitted work. Mark Marshall is a full employee of Baxter Healthcare (Asia) Pte Ltd, Singapore.

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URL:
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The clear and present danger of carbapenemase-producing Enterobacteriaceae (CPE) in New Zealand: time for a national response plan

Matthew Blakiston, Helen Heffernan, Sally Roberts, Joshua Freeman

ABSTRACT

Antimicrobial resistance (AMR) in general poses a threat to the sustainability of modern healthcare, but a particularly urgent and serious threat is posed by a specific group of antibiotic-resistant bacteria known as carbapenemase-producing Enterobacteriaceae (CPE). CPE are resistant to nearly all antibiotics and include common pathogens such as Escherichia coli and Klebsiella pneumoniae. In New Zealand, the incidence of CPE has increased from three isolates in 2012 to 45 in 2016. The current epidemiology of CPE in New Zealand has similarities with the extended-spectrum β-lactamase-producing Enterobacteriaceae (ESBL-PE) epidemic in the early 2000s (just before ESBL-PE underwent a non-linear increase in incidence). Although to date in New Zealand, nearly all CPE have been imported from overseas, this situation appears to be changing, with evidence of secondary spread in both households and healthcare facilities over the last year. In this article, we argue that CPE should be regarded as the foremost AMR threat currently facing New Zealand, and highlight the need for a comprehensive national response plan, analogous to plans for other emerging transmissible infections, such as pandemic influenza and Ebola. We also make recommendations about the components of such a plan and advocate that CPE should be recognised as a key priority in New Zealand’s national AMR strategy, due to be published in May 2017.

Glossary

Enterobacteriaceae A family of gram-negative bacteria that are commensals of the human bowel but also cause opportunistic infections (includes Escherichia coli and Klebsiella pneumoniae)

β-lactam antibiotics A broad class of antibiotics based on a common chemical structure that includes all cephalosporins, penicillin-like antibiotics and carbapenems

Carbapenems An extremely broad spectrum subgroup of β-lactam antibiotics

Carbapenemase Enzymes that deactivate carbapenems

CPE Carbapenemase-producing Enterobacteriaceae

NDM New Delhi metallo-β-lactamase; a particular type of carbapenemase

OXA-48-like A particular group of carbapenemeses

NDM-PE Enterobacteriaceae that produce NDM carbapenemase

OXA-48-like-PE Enterobacteriaceae that produce OXA-48-like carbapenemase

ESBL Extended-spectrum β-lactamase—enzymes that deactivate broad spectrum cephalosporins but not carbapenems

ESBL-PE Enterobacteriaceae that produce ESBL

CTX-M A particular molecular group of ESBLs that have become predominant globally since the early 2000s

CTX-M-15 A specific CTX-M ESBL subtype that have become particularly widespread globally since the early 2000s

LTCF Long-term care facility
Antimicrobial resistance (AMR) is recognised as a serious and urgent threat to modern healthcare. Contemporary medical interventions, such as bone marrow and solid organ transplantation, complex surgical procedures and immune-suppressive therapies all rely heavily on the availability of effective antibiotics. Although AMR affects nearly all bacteria that cause human infections, specific bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), extended-spectrum β-lactamase-producing *Enterobacteriaceae* (ESBL-PE) and carbapenemase-producing *Enterobacteriaceae* (CPE) are particularly important threats. Among these, CPE arguably pose the most serious and immediate threat because *Enterobacteriaceae* (including *Escherichia coli* and *Klebsiella pneumoniae*) are leading causes of hospital- and community-acquired infections, and CPE are resistant to nearly all antibiotics, leaving treatment options extremely limited or non-existent.

Carbapenemases are enzymes that deactivate carbapenems—the most broad-spectrum β-lactam agents available—which are relied on for the treatment of infections caused by ESBL-PE and other resistant gram-negative organisms. Carbapenemase genes are usually carried on extrachromosomal genetic elements known as plasmids. These plasmids tend to carry multiple resistance genes that collectively confer resistance to nearly all antibiotics. Plasmids transmit between different species and strains of the *Enterobacteriaceae* family, further facilitating resistance spread.

Already in New Zealand, several cases of probable secondary spread of CPE in healthcare settings have occurred, including likely hospital spread of NDM-PE and transmission of OXA-48-like-PE in a long-term care facility (LTCF). Hospital transmission of another type of CPE (known as VIM) was also reported in 2015. In addition, the indirect pathways by which NDM-PE can find their way into the hospital environment is illustrated by a trauma patient admitted to an Auckland hospital who was incidentally found to be colonised with NDM-PE as a probable consequence of living with others who had recently travelled to the Indian Subcontinent. Nonetheless, to date in New Zealand, most cases of local transmission appear to be traceable to returned travellers or repatriated patients who are presumed to have been the index case.
Parallels between the emergence of CPE and ESBL-PE in New Zealand

The evolving epidemiology of CPE in New Zealand has many similarities with the evolution of the ESBL-PE epidemic in New Zealand during the early 2000s (and in particular the predominant ESBL type known as CTX-M and the most globally prevalent subtype known as CTX-M-15). Soon after 2001, when CTX-M-15 was first described in an isolate of *E. coli* from India, it underwent rapid global spread and is now endemic in most countries.

Non-linear increases in incidence

The increasing incidence of NDM-PE and OXA-48-like-PE in New Zealand is following a similar trajectory to ESBL-PE in the early 2000s. Over the six-year period 1998–2003, the number of clinical ESBL-PE isolates increased 31-fold: from seven in 1998 to 221 in 2003 (Figure 2).\(^9\) This increase was presumably associated with the emergence of CTX-M-15 (and to a lesser extent CTX-M-14). Since then, the incidence of ESBL-PE has continued to increase to the point where, in 2014, there were an estimated 5,748 clinical isolates, which equates to an annual incidence of 127 ESBL-PE infections per 100,000 population (H Heffernan, personal communication).

Figure 1: CPE in New Zealand, 2009–2016.

Figure 2: ESBL-PE in New Zealand 1998–2014.

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2. Clinical isolates from Middlemore Hospital in 2008 were calculated based on the proportion of clinical isolates in 2007 and 2009.
3. A change in survey practice occurred in 2013/2014, which may have affected the number of clinical isolates recorded.
Association with travel

CTX-M ESBL-PE and CPE also share a common association with international travel.\textsuperscript{11} In New Zealand (and Canada) during the mid-2000s, it was reported that CTX-M-15 was associated with international travel, and in particular travel to the Indian Subcontinent.\textsuperscript{12,13} A report from Auckland showed that recent travel to the Indian Subcontinent was highly associated with community-onset CTX-M-15-producing \textit{E. coli} genitourinary tract infection.\textsuperscript{12} Notably, the travellers hadn’t necessarily received healthcare during their trip. Since those early reports, community spread of CTX-M ESBL-PE has occurred worldwide, with low- and middle-income countries particularly affected.\textsuperscript{14} In India, China and Vietnam for instance, ESBL-\textit{E. coli} have been reported to account for 40–63\% of \textit{E. coli} from community-onset intra-abdominal infection.\textsuperscript{15} While in rural Thailand, the prevalence of asymptomatic community carriage of CTX-M ESBL-PE has been shown to be as high as 66\%.\textsuperscript{16} Furthermore, the current probability of healthy travellers acquiring ESBL-\textit{E. coli} when in Southern Asia (including the Indian Subcontinent) is 75\% (and 37\% to 49\% when in the rest of Asia or Northern Africa).\textsuperscript{17}

Widespread dissemination within the Indian Subcontinent

As occurred for ESBL-PE, CPE have disseminated widely within the Indian Subcontinent over a time frame measured in years rather than decades. In a Mumbai tertiary intensive care unit, for example, the prevalence of CPE in blood cultures increased from 0\% to 8\% between 2006 and 2009, presumably in association with the emergence of NDM-PE.\textsuperscript{18} A similar prevalence of NDM-PE (5–15\%) has been demonstrated among clinical \textit{Enterobacteriaceae} isolates from hospitals spread throughout India (with OXA-48-like enzymes detected in up to 8\% of isolates).\textsuperscript{19–21} More recently, a nationwide study of blood stream isolates in India found carbapenem resistance in 12\% of \textit{E. coli} and 60\% of \textit{K. pneumoniae}.\textsuperscript{22} In Rawalpindi, Pakistan in 2010, the rate of gastrointestinal carriage of NDM-PE among inpatients was found to be 27\%.\textsuperscript{23}

Within the Indian Subcontinent, the prevalence of asymptomatic CPE carriage is also high in the community. In New Delhi between 2011 and 2012, 7\% of outpatients and 11\% of previously non-hospitalised patients on admission were carriers of CPE.\textsuperscript{24} Among outpatients in Rawalpindi in 2010, the faecal carriage rate of NDM-PE was 14\%.\textsuperscript{23} Widespread contamination of the environment has also been reported, with 51 of 171 seepage samples (pools of water on streets or rivulets) and two of 50 tap water samples positive for NDM in New Delhi in 2010.\textsuperscript{25} Similar findings have been reported in Dhaka, Bangladesh, where 36 of 58 environmental water/sewage samples were positive for NDM in 2012.\textsuperscript{25} Following the pattern observed for CTX-M-15 ESBL-PE, secondary reservoirs of NDM-PE have rapidly become established worldwide, in areas such as SE Asia, China, Northern-Africa, the Middle East and the Balkans.\textsuperscript{27}

Association with \textit{E. coli}

CTX-M-15 ESBL-PE and NDM/OXA-48-like-PE also share a common association with \textit{E. coli}. In New Zealand to date, \textit{E. coli} has accounted for 59\% (64/108) of all NDM-PE and OXA-48-like-PE isolates, and in 2016 all 11 NDM-PE and OXA-48-like-PE from non-hospitalised travellers to the Indian Subcontinent were \textit{E. coli}.\textsuperscript{4} This is significant because \textit{E. coli} seems to have a particularly high propensity to spread in community settings compared to other \textit{Enterobacteriaceae} species.\textsuperscript{28} This raises concerns about the potential for CPE to spread in the community post importation to New Zealand, including in LTCFs. Evidence from New Zealand and overseas suggests that LTCFs have played a significant role in the spread of CTX-M-15-producing \textit{E. coli}.\textsuperscript{29,30} Early in the CTX-M epidemic, community-onset ESBL-PE infection in Auckland was associated with LTCF residence.\textsuperscript{29} Phylogenetic analysis in Ireland has also suggested CTX-M-15-producing \textit{E. coli} strains circulate between LTCFs and hospitals.\textsuperscript{30} Early indications suggest that NDM/OXA-48-like-producing \textit{E. coli} may follow a similar path (with evidence suggesting that transmission of OXA-48-like-PE has already occurred within a LTCF in New Zealand).\textsuperscript{4}
Conclusions and recommendations

Drawing on our national experience with ESBL-PE, it seems likely that importation of NDM-PE and OXA-48-like-PE (and other CPE) will continue to increase in New Zealand. It is conceivable that in the absence of effective interventions in high-prevalence areas, rates of travel-associated CPE acquisition will eventually reach levels currently seen with ESBL-PE. This is alarming because the consequences of CPE becoming endemic in New Zealand are more serious than for ESBL-PE. CPE have far fewer treatment options, and in some cases no antibiotic treatment options are available. Moreover, it is likely in the near future that CPE will become resistant to all known antibiotics with resistance to the last-line antibiotic colistin emerging in India, and the convergence of NDM and plasmid-mediated colistin resistance (MCR-1) reported in E. coli in SE Asia.\(^ {22,31} \) Urgent action is therefore needed to counter the threat CPE pose to our health system.

The World Health Organization (WHO) recently published its *Global Action Plan on Antimicrobial Resistance*, which sets out a framework of five broad strategic objectives to address AMR.\(^ {32} \) New Zealand, as a signatory to the WHO, is currently using this framework to develop its own national AMR strategy, due to be published in May 2017.\(^ {33} \) Within this strategy, we contend it is imperative that the issue of CPE be addressed specifically. Moreover, because of the seriousness and complexity of the CPE threat, New Zealand’s strategy must go further than recommending the development of national CPE guidelines. Rather, the strategy should highlight the need for a coordinated national response plan, analogous to response plans developed for other transmissible infectious disease threats such as pandemic influenza and Ebola. The value of having a coordinated national response to CPE is demonstrated by experience in Israel, where a particular CPE known as KPC was controlled effectively through coordinated and targeted national efforts.\(^ {34} \)

We also argue that parallels between the CPE and ESBL-PE epidemics in New Zealand provide opportunities to learn from experience. With this in mind, we propose a set of broad national-level interventions to mitigate the CPE threat. These measures are based on the understanding that CPE, like ESBL-PE, are transmissible pathogens that move between patients and across international borders, and that emergence of CPE in response to local antibiotic use in a country like New Zealand is extremely unlikely. The implication of this understanding is that national programmes to reduce total antibiotic use—while much needed—will be fundamentally inadequate to address the CPE threat in the absence of targeted infection control measures to reduce transmission.

We therefore propose the following high-level recommendations for action, to be included as core components of any coordinated national preparedness and response plan for CPE:

1. Raise awareness about the threat of CPE to the New Zealand health sector.

2. Develop a minimum set of national ‘healthcare biosecurity’ measures for New Zealand hospitals to identify CPE carriers and ensure they are managed with appropriate precautions during their hospital stay. These measures would include a set of minimum standards for laboratory testing for CPE and minimum criteria for actively screening at-risk patients for CPE colonisation when they are admitted to hospital. Currently at-risk patients would likely include all patients who have been hospitalised overseas or have travelled to high-prevalence areas within the preceding 6–12 months. Prioritisation and optimisation of general and routine transmission prevention measures, such as hand hygiene and environmental cleaning, should also occur concurrently. There should be a level of confidence that all New Zealand hospitals have reliable processes and systems in place to identify and respond to the introduction of CPE and prevent subsequent transmission.

3. Ensure that every district health board (DHB) has policies and plans in place, with clear roles and responsibilities for decision making and management, to deal effectively with the introduction and spread of CPE. This is a framework analogous to DHB preparedness for the
arrival of patients with Ebola or other exotic transmissible pathogens. The development and accurate implementation of any plan will require that, at DHB organisation level, there are appropriate resourcing, staffing and structural accountability arrangements to ensure that infection prevention services are optimised. The cost of investment in preventive efforts should be considered relative to the high expenditure and opportunity costs that would occur in association with a CPE outbreak.35

4. Establish appropriate processes and mechanisms to ensure that, in the event of secondary spread of CPE in healthcare settings, an adequately resourced public health investigation can be carried out. The goal of this investigation would be to maximise chances of containment and to identify human sources and/or environmental reservoirs of ongoing transmission. If there are insufficient resources or expertise within the affected healthcare facility, there should be mechanisms in place for mobilising appropriate external expertise and resources. One possible approach would be to make clusters of CPE and suspected secondary transmission of CPE notifiable to the Medical Officer of Health. Mandatory notification and investigation of CPE may also help raise the profile of CPE in healthcare organisations and encourage appropriate prioritisation.

5. Ensure that LTCFs in New Zealand are prepared and equipped to appropriately identify and manage patients colonised with CPE so that the risk of secondary spread is minimised. In parallel, an adequately resourced and tailored antimicrobial stewardship (AMS) programme that targets LTCFs should be developed. Structural factors, such as staffing levels and availability of expert infection prevention support, should also be considered as interventions that would reduce transmission risk. If changes to the Infection Control Standard are required to achieve this, then such changes should be made. The association between LTCFs and multidrug-resistant Enterobacteriaceae, and the frequent movement of patients between LTCFs and hospitals, support the need for a co-ordinated cross-organisational response plan to CPE.

6. Ensure that every New Zealand hospital has processes and systems in place to secure rapid access to last-line antibiotics required to treat CPE, such as colistin and tigecycline. Because healthcare-associated infections (HAI) with CPE carry such a high risk of harm, national guidance should also be in place (and locally prioritised) to minimise the risk of HAI developing among patients found to carry CPE. This could include more intensive infection prevention interventions in carriers to minimise the risk of HAI.

7. Ensure that, within a broader community AMS programme, there are focused initiatives aiming to discourage the use of antibiotics for travellers’ diarrhoea. The receipt of antibiotics, especially quinolones, for travellers’ diarrhoea is a significant avoidable risk factor for travellers becoming colonised with multidrug-resistant Enterobacteriaceae.17

Developing and implementing a national plan to mitigate the risk of CPE will require collaboration and coordination between a range of healthcare providers and a commitment of resources at both DHB and national level. Nonetheless, such efforts and investment should be regarded as essential in the face of such a serious and urgent public health threat. While ultimately these measures may only succeed in delaying CPE from becoming endemic in New Zealand, every year free of CPE ensures a safer healthcare system for our patients and buys a little more time for new treatment options and prevention technologies to become available.
Competing interests:
Nil.

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S pneumoniae purulent pericarditis in the setting of community-acquired pneumonia

Andrew Chatfield, Timothy Glenie, Sarah Fitzsimons, Krish Chaudhuri, Khang-Li Looi

A 47-year-old Tongan man presented with four days of fatigue, pleurisy and dyspnoea. Clinically, he was normotensive with no jugular venous distention, Kussmaul’s sign or pulsus paradoxus, but was febrile (39°C Celsius) with a raised white cell count 20x10⁹/L (normal 4–11) and CRP 500mg/L (normal <3). Electrocardiogram (ECG) demonstrated atrial fibrillation and widespread ST elevation (Figure 1A). Chest x-ray (CXR) showed a widened mediastinum (Figure 1B). Echocardiogram showed a 3cm pericardial effusion with echocardiographic signs of tamponade (Figures 1C and 1D). 700ml of frank pus was drained sub-costally (Figure 2). Blood cultures and aspirate grew Streptococcus pneumoniae sensitive to penicillin. Despite treatment, he had ongoing fever and re-accumulation of pericardial effusion found on transoesophageal echocardiogram. He underwent surgical subxiphoid pericardial washout with 1.8L pus drained; pericardial drain was left in-situ for 14 days with further 800ml drained (Figures 3A and 3B). A follow-up CXR five days after admission revealed left lower lobe consolidation. It was postulated that the pericardial effusion was a complication of pneumonia. Fourteen days after presentation he was febrile again. CXR showed a loculated left pleural effusion requiring drainage—500ml was drained (no growth). He completed 28 days IV benzyl-penicillin and was well at discharge.

Streptococcus pneumoniae is the most common cause of community-acquired pneumonia (CAP) in New Zealand, being responsible for 20–40% of cases.¹² Pacific peoples are at increased risk from CAP, compared to European.³ Age standardised rates of invasive pneumococcal disease (IPD) in Māori and Pacific peoples are consistently three times higher than that of Europeans.⁴ In the modern era, purulent pericarditis is uncommon, but high mortality persists (40%) even with early diagnosis and prompt treatment.⁵ Death is most often from cardiac tamponade, with or without septic shock and constrictive pericarditis.⁶ In the pre-antibiotic era, direct spread from an intrathoracic focus was the most common cause; however, in modern practice, only 22% of patients with purulent pericarditis had a recognised primary source.⁷ Penicillin remains the drug of choice for invasive pneumococcal infections in New Zealand, as 98.1% of isolates remain penicillin sensitive.⁷
Figure 1A: Electrocardiogram (ECG) showed atrial fibrillation with widespread ST elevation in most leads.

Figure 1B: Chest x-ray (postero-anterior [PA] view) showed enlarged heart and widened mediastinum.
**Figure 1C:** Transthoracic echocardiogram apical four-chamber view showing 2.5cm collection lateral to the left ventricle (red arrow).

**Figure 1D:** Transthoracic echocardiogram Doppler across mitral valve showing marked respiratory variation in mitral E velocity, suggesting early haemodynamic compromise.
Figure 2: 700ml frank pus drained subcostally on day of admission.
**Figure 3A:** Subxiphoid incision and pericardial window with pus freely draining (black arrow).

**Figure 3B:** 1,800ml of frank pus drained with free suction at time of pericardial window.
Competing interests:
Nil.

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Overt vitamin C deficiency or scurvy is considered a historical disease. However, scurvy is still reported in industrialised societies. In patients presenting with unexplained bleeding or bruising, muscle pain or poor wound healing, vitamin C deficiency may not be considered. The author reports an illustrative case history.

Case history

The patient is a 52-year-old man confined to a wheelchair. He presented to the dentists with decay in tooth 48. During the extraction, the crown fractured. Afterwards, he suffered severe pain and facial swelling requiring repeated courses of antibiotics and regular oral morphine. Four months later, an ulcer developed on the right lateral margin of his tongue. Various health professionals were consulted.

Fourteen months after the original tooth extraction, the author reviewed the patient. Physical examination showed right neck muscle tenderness. Internal and external palpation over the right angle of the jaw revealed tenderness. He had extensive periodontal disease. A right lateral border tongue ulcer was present. A CT scan showed an undisplaced right mandibular fracture anterior to the angle of the jaw.

Because of his poor dentition, the non-healing ulcer and an unexplained jaw fracture, a dietary history was taken. He lived mainly on takeaway foods. Fresh fruit and vegetable intake was minimal. On blood testing, his ascorbic acid level was <10µmol/L; his vitamin D level was 30nmol/L. Dietary changes together with vitamin C (250mg daily) and vitamin D (1.25mg monthly) supplementation were implemented. At three month review the ulcer and the pain had resolved. Five years later, he continues to do well.

Discussion

Scurvy is still present in modern industrialised countries. Risk factors for vitamin C deficiency include smoking, alcoholism, institutionalism and psychiatric illness. In a low-income/materially deprived population in the UK, 25% of men and 16% of women had low plasma vitamin C concentrations (<11µmol/L). In a US population survey, 12% had vitamin C levels indicative of deficiency (<11µmol/L). A Christchurch survey showed that 70% of healthy controls consumed less ascorbate than New Zealand Ministry of Health recommendations. Nearly 20% of 50 young adult Christchurch males had suboptimal vitamin C levels (<28μmol/l). Some authorities indicate that the optimal vitamin C level should be above 50µmol/l.

Scorbutic patients may present with vague symptoms of weakness, lassitude, irritability, arthralgia and myalgia. Classic changes of hyperkeratotic papules with corkscrew hairs and perifollicular haemorrhage are said to occur on the legs and buttocks. Oral complications are common. The gingivae often bleed with minor trauma. Anaemia is common because of blood loss, concomitant folate deficiency and altered iron absorption.

The author only assesses blood ascorbic acid levels after taking a dietary history, careful physical examination and review of previous blood investigations. A dietary history can be very revealing. The blood ascorbic acid level tends to reflect recent dietary intake. A serum level below 11µmol/L suggests scurvy. While laboratory investigations may not be necessary for diagnosis, they help confirm less typical cases. Special care needs to be taken with specimen handling. His low vitamin D may have also contributed to his poor dental health and jaw fracture. Further blood
tests were not performed because of the excellent clinical response to vitamin supplementation and dietary changes. The clinical presentation of a scorbutic patient will depend on a health professional’s area of specialisation. Vitamin C deficiency may need consideration in the differential diagnosis of patients who present with unexplained bleeding or bruising, poor dentition and poor wound healing. Vitamin C deficiency may be more prevalent in the community than is assumed.

References:
“The iron is hot” for alcohol-related policy changes in New Zealand

Benjamin Riordan

New Zealand has had a tricky relationship with alcohol-related policy change. We are infamous for lowering the Minimum Legal Purchasing Age in 1999 (from 20 to 18 years) and liberalising the drinking laws to accommodate the Rugby World Cup in 2015. In a recent New Zealand Medical Journal editorial, O’Brien and Chikritzhs (2017) criticised the New Zealand government’s current inaction regarding alcohol advertising and suggested that we should call on the government to explain their inaction. However, with an election looming, and with public perception strong, we can afford to be more optimistic and should instead call on the government to consider implementing alcohol-related policy changes that reduce inequities in alcohol-related harm (ie, increases in tax/price). In this letter, I outline a culmination of factors that signify that the iron may be hot for alcohol-related policy changes in New Zealand.

Despite the government’s tricky relationship with alcohol-related policy change, per-capita alcohol use in New Zealand actually declined by about 9% from 2010 to 2015 (2010=9.6 litres per capita vs 2015=8.7 litres per capita). But following this period of steady decline, per-capita alcohol use slightly rose in 2016 (to 8.9 litres per capita). Although 2016 per-capita alcohol use is still lower than 2010 alcohol use, the increase offers a justification to implement change, especially when taking into account the fact that hazardous drinking has increased every year since 2011 (2015/16=21% hazardous drinkers). Despite this increase in alcohol use and hazardous drinking, there may be support for more alcohol-related policy change. That is, more restrictive changes tend to be seen as more favourable by light/non-drinkers, older adults and women, and New Zealand is at a point where these groups are over-represented. For example, there are a high number of abstainers (ie, those who did not consume alcohol in the past 12 months; 2015/2016=20%), the median age of the population is high (and getting higher; 2013=38.0 years), and there are slightly more women than men (2013=51.3%).

It is also important to note that public perception of alcohol may be swinging toward the negative. Our closest neighbour, Australia, have viewed alcohol as the ‘drug of most concern’ since 2004, when it overtook heroin (see Callinan, Room, Livingston, 2014 for a summary of Australian policy attitudes). Although a similar study has not been conducted in New Zealand, New Zealand has just seen a number of media reports and public meetings focused on alcohol’s contribution to cancer. Given the link between awareness of the harms caused by alcohol and acceptance of alcohol-related policy change, policy change may have more support than ever.

Finally, public perception regarding restrictive policy changes appears to be favourable. Public perceptions and attitudes are critical in influencing a government’s decisions. These perceptions often contribute to why popular (less effective) policies are implemented at the cost of unpopular (more effective) policies (eg, education vs taxation). In New Zealand, the New Zealand Health and Lifestyles Survey has suggested that support for certain policy changes have remained favourable and stable from 2010–2014. When looking at the 7,006 who answered the survey in 2010, 2012 and 2014, 62% supported reducing hours alcohol could be sold (vs 20% who were opposed), 39% believed there were too many places where alcohol could be sold (vs 3% who believed there were too few), 80%
supported restrictions on alcohol advertising that is seen or heard by young people (vs 12% who opposed) and 66% supported restrictions on alcohol sponsorship of events young people attend (vs 18% opposed). Overall, the report reveals that between 2010 and 2014, the majority of New Zealand adults were for harsher restrictions on alcohol availability and advertising. Unfortunately, a key weakness from the survey is that there is no data regarding the increase in alcohol price for 2012 or 2014. But in 2010, 57% supported a price increase for cheap alcohol (vs 24% who opposed).9

Despite these promising results, favourable ratings for evidence-based policies may not last forever (see Callinan et al, 2014 for examples),7 therefore, it is critical that we attempt to implement policies while public opinion is favourable. While a number of factors may derail attempts for policy change (most notably the attempts from the alcohol industry), it may be critical to strike while the iron is hot.

Competing interests:
Nil.

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Mesh, graft or standard repair for women having prolapse surgery

The use of transvaginal mesh and biological graft material in prolapse surgery is controversial and has led to a number of enquiries into their safety and efficacy. Existing trials of these augmentations are individually too small to be conclusive. This report concerns two randomised trials conducted in multiple centres in the UK, which throw some light on the issue.

In one, 865 women were randomised to receive either a standard repair or a repair with non-absorbable polypropylene mesh augmentation. In the other, 735 women were randomised to receive either a standard repair or a repair with biological graft augmentation.

The researchers concluded after two years follow-up that augmentation of a vaginal repair with mesh or graft material did not improve women's outcomes in terms of effectiveness, quality of life, adverse effects or any other outcome in the short term, but more than one in 10 women had a mesh complication. Therefore, follow-up is vital to identify any longer-term potential benefits and serious adverse effects of mesh or graft reinforcement in vaginal prolapse surgery.

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Radiation with or without antiandrogen therapy in recurrent prostate cancer

Salvage radiation therapy is often necessary in men who have undergone radical prostatectomy and have evidence of prostate-cancer recurrence signalled by a persistently or recurrently elevated prostate-specific antigen (PSA) level.

This randomised trial conducted in many hospitals in Canada and the US questions whether antiandrogen therapy with radiation therapy will further improve cancer control and prolong overall survival. Seven hundred and sixty eligible patients were randomised to receive either antiandrogen therapy (24 months of bicalutamide at a dose of 150mg daily) or daily placebo tablets during and after radiation therapy. The primary end point was the rate of overall survival.

The patients who received the antiandrogen treatment were shown to have significantly higher rates of long-term survival and significantly lower incidence of metastatic prostate cancer and death from prostate cancer.


Medical student-led patient education prior to hospital discharge improves one-month adherence rates

Medication adherence has been described as the ‘key mediator between medical practice and patient outcomes’ because it can reduce hospital readmissions, improve clinical outcomes and prevent exacerbation of diseases.

In a previous study these researchers found that 40% of patients were not adherent to their medications one month after hospital discharge. They now report on a novel approach—pre-discharge education of patients by medical students. The intervention patients (or their caregivers) received a 10-20 minute education session with a medical student emphasising the importance of their adherence to their prescriptions.

Eighty patients were included in the study. They were randomly assigned to the education group and outcomes were compared with the non-intervention group. A significantly greater proportion of patients in the intervention group were adherent to their regular medications at one month compared with the control group (76.3% compared to 60.3%, *P*=0.037). Medical student-led patient education significantly improved medication adherence rates.

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URL:
It occurred to me that the accompanying X-ray photographs might be of some interest to readers, as they are, so far as I know, the first cases of Albee's bonegraft operation for tubercular disease of the spine in New Zealand. I have performed it three times in the last few months, and with success each time. Two of the cases were shown before the Canterbury Branch of the B.M.A., and the third is a private case, but equally successful. Case No. 1 is an antero-posterior view of the lumbar spine and graft. She was only 31 years, and had been incapacitated for 15 months, and could not walk, bend, run, jump, or lift without pain, and had to support herself when sitting with her hands. The graft was practically seven inches long and joined the five lumbar vertebrae together, the disease being limited to the second, third and fourth. The technique used was that of Albee. The second photograph shows the tibia of the same patient and the groove from which the graft was removed. As it was not taken till three months later, the bone has nearly closed in at the middle of the groove left. The functional result is all that could be desired and the patient is apparently cured of her disabilities. Case 2 was a soldier sent from Featherston camp, and a graft was put in the eighth, ninth and tenth dorsal vertebrae. He would have been able to be up at the end of the sixth week had he not developed appendicitis, which, being operated on, retarded his rising from bed for another week. The cure was also apparently perfect. The third case was that of a young girl, aged 19, whose sister had died from tubercular spinal disease some years before. I inserted a graft into the tenth, eleventh and twelfth dorsal vertebrae and she left the nursing home in less than seven weeks and went to her home. I have not seen her since, but when she left she was apparently quite well and I have heard that since that “she has never been so well in her life.” I have not got an X-ray photo of her to show as I took her photo antero-posteriorly, and the sternum prevented the graft from showing well, but I hope soon to get a lateral one.
L1–L5: Lumbar vertebrae.
R: 12th rib.
X Y Z: Albee bone graft, 7in. long.
100 YEARS AGO

F: Fibula.
T: Tibia.
X Y Z: Grove left by removal of graft seen in lumbar vertebrae of Case 1, and nearly closed in at Y, as three months have elapsed since removal of graft.
A1–A8: Vertebrae.
B1–B9: Ribs.
C: Liver shadow.
D1–D5: Vertebrae spines.
E: Shadow of scapula.
X Y Z: Albee bone graft from tibia, the lower end disappearing at X in liver shadow C.

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