

The  
**New Zealand  
Medical Journal**

Journal of the New Zealand Medical Association

Vol 131 | No 1476 | 8 June 2018



# Is it time for New Zealand to adopt alcohol policy that will reduce the harm from alcohol?

Changes in New Zealand's alcohol environment following implementation of the Sale and Supply of Alcohol Act (2012)

**Diagnosing pre-clinical dementia: the NZ Genetic Frontotemporal Dementia Study (FTDGeNZ)**

**Violence and aggression in the emergency department is under-reported and under-appreciated**

**The Matthew effect in New Zealand rural hospital trauma and emergency care: why rural simulation-based education matters**

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The  
**New Zealand  
Medical Journal**

**Publication Information**

published by the New Zealand Medical Association

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## Changes in New Zealand's alcohol environment following implementation of the Sale and Supply of Alcohol Act (2012)

Stephen Randerson, Sally Casswell, Taisia Huckle

The Sale and Supply of Alcohol Act was implemented during 2013, with the new aim of minimising harm from excessive consumption of alcohol. We assessed the impact of the Act on the drinking environment by reviewing public datasets and reports and interviewing alcohol regulatory staff. We found little evidence that the Act had affected the alcohol environment between 2013 and 2015, other than a small reduction in on-licence trading hours in New Zealand's main cities. The process of establishing local alcohol policies to protect health has been subverted by the appeals by the alcohol suppliers whose resources are greater than those of local authorities and health agencies.

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## The New Zealand PIPER Project: colorectal cancer survival according to rurality, ethnicity and socioeconomic deprivation—results from a retrospective cohort study

Katrina Sharples, Melissa Firth, Victoria Hinder, Andrew Hill, Mark Jeffery, Diana Sarfati, Charis Brown, Carol Atmore, Ross Lawrenson, Papaarangi Reid, Sarah Derrett, Jerome Macapagal, John Keating, Adrian Secker, Charles De Groot, Christopher Jackson, Michael Findlay

Colorectal cancer (bowel cancer) is one of New Zealand's most common and deadly cancers, and we have poorer survival than Australia. The PIPER project is the largest and most detailed study of bowel cancer undertaken in New Zealand. In the second of many publications from this project, we report differences in outcome between Māori, Pacific and non-Māori non-Pacific. We found Māori and Pacific people were more likely to die from bowel cancer than non-Māori mostly because their cancers were detected later, and they were much more likely to be diagnosed as an emergency than non-Māori. This suggests that earlier diagnosis for Māori and Pacific needs to be a focus to improve outcomes for these groups.

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## Crisis resolution: consumer, family and referrer perspectives on care

Frances A Carter, M Joan Taylor, Madeline J Weston, Teresa A Quigley, John H Beveridge, Robert AJ Green, Steve Duffy, Joseph M Boden

Almost by definition, needing help from a crisis resolution service is a highly stressful time for consumers, their families and potentially referrers. Overall, consumers, families and referrers reported high levels of satisfaction with crisis resolution. However, if consumers were dissatisfied with their care, they were more likely to be aged between 25–34 years. The present study was not able to explore the reasons why this might be the case. This study highlighted what matters to people when accessing help from crisis resolution. Not surprisingly, people emphasised the importance of effective treatment of sufficient duration, and staff manner (eg, being warm, understanding, reassuring and respectful). Some challenges for staff in delivering effective care in a crisis resolution context are discussed.

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## Violence and aggression in the emergency department is under-reported and under-appreciated

Sandra K Richardson, Paula C Grainger, Michael W Ardagh, Russell Morrison

Staff working in emergency departments are exposed to a constant level of violence and aggression. This includes verbal threats and harassment that have become seen as a normal part of the work environment, and in many cases there is a failure to report the full extent of aggression that occurs. When reporting is not provided, there is the potential for management and DHBs to misinterpret the level of violence in the workplace, and be unaware of the need to respond appropriately.

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## Holding a mirror to society? Progression towards achieving better sociodemographic representation among the University of Otago's health professional students

Peter Crampton, Naomi Weaver, Andrea Howard

This paper describes the sociodemographic characteristics of students accepted into eight health professional programmes at the University of Otago in 2016 and compares them with a similar 2012 paper to illustrate progress towards increasing diversity among health professional students. Between 2010 and 2016 there was: a marked increase in the proportion of Māori (124% increase) and Pacific students (121% increase) in health professional programmes, more pronounced in medicine and dentistry (increases of 179% and 133% respectively); an increase in the proportion of students from rural areas from 19.2% to 22.5%; an increase in the proportion of female students from 59.6% to 61.3%; and little overall change in the overall socioeconomic profile. The recent introduction of new affirmative categories will hopefully result in the future in an increase in socioeconomic diversity and in the number of refugee students.

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## Paediatric team handover: a time to learn?

Stephen Bradley, John P Egan, Marcus Henning

We interviewed 29 doctors and medical students who were involved in team handovers in New Zealand hospitals. At these handovers, children who were under the team's care were discussed, with the aim of ensuring that critical information was passed on from one team member to others. Team handover was described as an important time for learning to occur, and much of the learning was reported to occur opportunistically as patients' diagnoses and treatment were considered. In addition, participants also reported that discussion about patients allowed them to consider how they would manage future patients with similar problems. This study draws attention to the way that this important hospital meeting can also provide a time for learning.

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## The Matthew effect in New Zealand rural hospital trauma and emergency care: why rural simulation-based education matters

Marc Gutenstein, Sampsa Kiuru

Rural hospitals treat patients with trauma and health emergencies, as these problems occur all around New Zealand, and are sometimes more common in rural areas. Rural hospital teams are at a disadvantage when compared with the large urban university hospitals, as they are less experienced, less specialised, have less backup help on hand and get less training for these emergencies. High fidelity simulation using mannequins and real patient scenarios can help train teams to perform better in emergency situations. Simulation is used all around the world in many different occupations, and in many countries has been funded specifically for emergency medical training. Until recently in New Zealand, simulation training has only been available at main university hospitals (this is the 'Matthew Effect' where the already successful urban teams become more successful, and the disadvantaged rural teams become more disadvantaged). To remedy the situation we should offer high fidelity simulation to rural medical services in New Zealand.

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# Lynch syndrome: much progress but many questions remain

John Keating

**F**inding and correcting mismatched nucleotide base pairs in newly formed DNA strands during cell division is the role of the four mismatch repair (MMR) genes and their encoded proteins. This mechanism follows on from the proofreading exonuclease function of DNA polymerase that acts as the initial check on the fidelity of replication of the over three billion nucleotides in human DNA.

MMR deficient colorectal cancers (dMMR CRCs) account for 15% of the colorectal cancer burden.<sup>1</sup> As a consequence of defective MMR function these tumours exhibit multiple abnormal repeats of mono and dinucleotides at characteristic sites throughout the genome (microsatellites) and are thus said to show microsatellite instability or be MSI high (MSI or MSI-H). In the majority of cancers that are microsatellite unstable and that show loss of expression (LOE) of one or more of the MMR proteins on immunohistochemistry, the cause is an acquired loss of MMR function in the tumour from hypermethylation induced inactivation of the corresponding gene.<sup>2</sup> MLH1 and PMS2 LOE is the usual pattern and can be confirmed as an acquired event by testing the MLH1 gene promoter directly for methylation or indirectly by confirmation of the v-600e mutation in the BRAF gene, which is usually present in this setting.<sup>3</sup> In less than a third of patients with a CRC with LOE a dominantly inherited germline mutation in one of the four MMR genes MLH1, MSH2, MSH6 and PMS2 is the cause. This group of patients has Lynch syndrome (LS). Additionally, an inherited mutation in the EPCAM gene can silence the expression of an otherwise normal MSH2 gene leading to LS. Lynch syndrome predisposes to a range of tumours with colorectal and endometrial being the most important numerically, but less commonly ovarian,

small bowel, urological, gastric and small bowel tumours are encountered. The picture is further complicated by patients who have LOE of an MMR protein in their tumour without evidence of hypermethylation, but in whom no pathogenic mutation can be identified on sequencing of the corresponding gene. Such patients are referred to as being “Lynch like” or having “possible Lynch” but in practice are screened along the lines of patients having a confirmed germline mutation as they carry a similar risk of cancer to LS patients. Somatic mutation in the MMR genes is responsible for a proportion of these cases while others remain unexplained.

The great majority of the population with LS are unaware that they carry the condition in part due to a lack of robust tumour testing.<sup>4</sup> Recent population-wide genome studies have revealed that LS is surprisingly common with an incidence of 1 in 226, making it among the commonest inherited cancer predisposition genes.<sup>5</sup> These data suggest that ascertainment bias may have overestimated the cancer risk for mutation carriers. This is especially true for PMS2 carriers who have a much lower cancer penetrance in contrast to MLH1 and MSH2. Mutation in one of the latter two genes carries a risk of CRC to the age of 70 of 34 to 47%. The risk of CRC in all four genes is higher in men than women for reasons that are unclear. Also unclear are the factors responsible for the huge variation in risk between carriers of the same mutated gene, with some having a risk close to the population risk and others being at very high risk.

Another fundamental question in LS-associated CRC is the nature of the precursor lesion. Until recently it was assumed that a dMMR adenoma was the precursor lesion, however, isolated dMMR crypt foci have been shown to occur in LS patients and it

is posited that these may proceed directly to cancer without the development of an intermediate adenoma.<sup>6</sup> The distinction is important as more frequent colonoscopy may not reliably prevent CRC if the latter is an important mechanism. Recent data from a prospective multinational screening programme for LS patients demonstrates that colorectal cancer still occurs frequently but is associated with very few deaths.<sup>7</sup>

The current New Zealand Familial Gastrointestinal Cancer Service (NZFGCS) recommendations for cancer surveillance in Lynch syndrome are for yearly colonoscopy from age 25 to 75 for mutation carriers, or 10 years younger than the earliest CRC in the family. Upper gastrointestinal endoscopy is now recommended as a one-off examination at age 35 for MLH1 and MSH2 carriers with eradication of *H. pylori* if identified. Examination should be performed to the distal duodenum with repeat examination if there are significant findings such as extensive intestinal metaplasia. Gynaecological consultation and consideration of screening is advised for women from the age of 30 with the option of hysterectomy and oophorectomy on completion of their family. There is no evidence to support routine urological screening.

Patients with LS who develop CRC and undergo an extended colonic resection as opposed to a segmental resection have a significantly lower risk of developing a metachronous cancer.<sup>8</sup> In patients with a CRC in whom LS is suspected based either on the family history or the age of diagnosis it is therefore important to request immunohistochemistry on the tumour biopsy taken at colonoscopy to allow informed preoperative discussion of the relative merits of the extent of surgical resection.

Aspirin use reduces the incidence of sporadic CRC, and long-term follow-up of LS patients in a randomised controlled trial of aspirin has demonstrated a significant reduction in CRC risk.<sup>9</sup> Further dosing studies are underway to determine whether smaller doses than the 600mg a day used in the initial trial are equally effective. The results of these dosing trials are some years away. Aspirin use is, however, currently advised for proven mutation carriers, especially for the high cancer penetrance genes MLH1 and MSH2.

The defective DNA mismatch repair in LS CRC leads to the generation of frameshift peptides that are recognised by the immune system as foreign and as such are accompanied by a prominent immune response.<sup>10</sup> This marked immune response is thought to be an important factor in the better prognosis in LS-associated CRC compared to sporadic disease. Important differences in treatment response are exhibited by dMMR CRCs.<sup>11</sup> Mismatch repair deficient CRCs are poorly responsive to 5FU-based chemotherapy, indeed in the adjuvant setting, chemotherapy results in a worse survival in stage two disease and only a marginal benefit in stage three disease.<sup>11</sup>

Perhaps the most important recent finding is the responsiveness of advanced dMMR CRCs, either germline or acquired, to pd-1 inhibition.<sup>12</sup> This is not observed in MMR proficient CRC. The timing and combination of Pd-1 inhibitors, either alone or in combination, as well as their integration into conventional chemotherapy schedules for advanced disease is a source on multiple ongoing trials. What is clear is that these uncommon tumour syndromes look set to continue to further our knowledge of fundamental tumour biology.

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**Competing interests:**

Nil.

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<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2018/vol-131-no-1476-8-june-2018/7579>

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# Is it time for New Zealand to adopt alcohol policy that will reduce the harm from alcohol?

Jennie Connor

In this issue of the Journal Randerson et al<sup>1</sup> provide some indicators of the impact of the 2012 Sale and Supply of Alcohol Act on the alcohol environment in New Zealand. Key words in the results are “slight reduction”, “slight increase”, “delayed”, “weakened” and “no impact”. This recent law followed from, firstly, an extensive review by the New Zealand Law Commission covering harm from alcohol, existing alcohol legislation, and national and international evidence on how to reduce harm from alcohol, which was carried out in 2008–10<sup>2</sup> and secondly, the dismissal of the Law Commission’s main policy recommendations by the government of the time when drafting the new law.

Under the same administration, in August 2015, New Zealand adopted the only alcohol policy we have, “National Drug Policy 2015 to 2020”.<sup>3</sup> With the tagline “Minimise alcohol and other drug-related harm and promote and protect health and well-being”, this document does not recognise that alcohol is a legal drug and the other substances that are included are not. It does not reference the facts that alcohol is produced, distributed and retailed by huge supranational corporations and that they have sophisticated marketing capability and immense budgets. It does not describe any cost-effective strategies to “Minimise alcohol...harm”, and it does not cover tobacco. There are many nice ideas in this policy document but there is nothing that will have more than a trivial impact on harm from alcohol at a population level.

Evidence of the potential benefits of reducing alcohol consumption is everywhere, in New Zealand<sup>4,5</sup> and internationally. The United Nations’ focus on reducing non-communicable diseases and

improving mental health (NCDs), has led to inclusion of a focus on alcohol within the Sustainable Development Goals (SDGs) established in 2016. This recognises the multiple social and economic impacts of alcohol in addition to the effects on the health of drinkers and others in their communities. However, adequate regulation of the alcohol industry will be required.<sup>6</sup> The challenge this poses is evident in the recent report from the WHO Independent High-level Commission on NCDs, titled “Time to Deliver”, which lays out the urgent need to make good on the words and promises of the international community to implement policy to improve NCDs and mental health. They point to four main risk factors: tobacco use, harmful use of alcohol, unhealthy diets and physical inactivity,<sup>7</sup> and emphasise that poverty and other social determinants of health affect both the NCDs and also these major risk factors. For at least three of the four, there are major corporate interests that need to be addressed.

Evidence for effective population-level strategies to respond to the burden of harm from alcohol is well-established and expanding, providing the basis for the World Health Organization’s Global Strategy to Reduce the Harmful Use of Alcohol<sup>8</sup> and summarised by experts for wide application.<sup>9</sup> These are consistent with our own Law Commission’s recommendations from 2010. Economic benefits from implementing sound alcohol policies in New Zealand are inevitable, from reductions in the burden of harms on public services and from recouping some of the costs of harm via tax incomes. In the UK it was recently estimated that a 10% increase in alcohol excise tax would raise GDP by £850m a year and create 17,000 new jobs.<sup>10</sup>

**So what should we do now?**

For a long time, one of the major barriers to healthier alcohol policy has been the power of alcohol industry actors (big corporations, trade associations, and retailers) to influence politicians and affect the development of policy,<sup>11</sup> often by promoting the use of ineffective strategies. More recently we have been confronted by the possibility that trade treaties will be a deterrent to independent policy on alcohol, through fear of litigation when the policies restrict trade in any way.

Our current government is confident that the new version of the TPPA, known as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), will not provide any obstacles to adopting policy to improve health,<sup>12</sup> and surely they will no longer allow alcohol industry interference when the health and welfare of the country is at stake. After all, Transparency International has rated us first equal with Denmark as the world's least corrupt country.<sup>13</sup>

The Government has a full and challenging agenda, addressing a range of social and infrastructure issues that have been deferred

or neglected, some that were anticipated and some that have arisen without notice. Processes for the public to have input into the resulting consultations have been straightforward and open, albeit with fairly short timelines. Professionals and NGOs with concerns about alcohol use in New Zealand are having a busy time participating in all of the opportunities that have arisen, given the cross-cutting impacts of alcohol. In the last few months there have been submissions to the Tax Working Group (on alcohol pricing policy that will simultaneously reduce harm from alcohol and require alcohol industry to pay for some the externalities of their trade), on the draft Government Policy Statement on Land Transport 2018 (on reducing alcohol-related road traffic injury in order to be able to consider Vision Zero<sup>14</sup> as a goal), to the Mental Health and Addiction Inquiry (an area where the size and modifiability of alcohol's contribution is well established), as well as a proposed amendment to the Sale and Supply of Alcohol Act to close a loophole.

Wouldn't we be better served by a systematic, evidence-based and ambitious approach to alcohol policy in New Zealand?

**Competing interests:**

Nil.

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**URL:**

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# Changes in New Zealand's alcohol environment following implementation of the Sale and Supply of Alcohol Act (2012)

Stephen Randerson, Sally Casswell, Taisia Huckle

## ABSTRACT

**AIM:** To assess the impact of the Sale and Supply of Alcohol Act 2012 (SSAA) on the alcohol environment from 2013 to 2015.

**METHOD:** A mixed methods study incorporating key informant interviews and administrative data to assess changes between 2013 and 2015. Perceptions of the alcohol environment, policy enforcement and policy compliance were thematically analysed and quantitative ratings summarised. Concurrent changes to drink driving law were included.

**RESULTS:** The SSAA led to a slight reduction in very late night availability in urban centres via the national 4am limit for on-licensed premises trading, which had strong compliance and enforcement. A slight increase in the perceived difficulty of obtaining licences was attributed to increased public opposition, licensing procedures and expanded application criteria. Proposed local alcohol policy (LAP) limits on trading hours and premise locations were delayed and weakened by extensive legal appeals from alcohol retailers. Only five LAPs were in force by 2015. No impact on number of premises, supply to minors or marketing was identified. Reductions in drink drive behaviour and increased availability of lower-strength beer were attributed to the lower legal blood alcohol limit for driving.

**CONCLUSION:** Maximum trading hours were the only element of the SSAA found to create a swift change in the alcohol environment, by slightly reducing availability in main cities. LAPs and new licence criteria may gradually constrain future availability, but the strength of LAPs has been muted by alcohol industry appeals. Introducing national, evidence-based policy measures would assist the SSAA to achieve its aim of minimising harm more swiftly, as would measures to protect the LAP development process from alcohol industry influence.

Alcohol is a leading preventable cause of premature mortality, disability and social harm.<sup>1</sup> In New Zealand, 5.4% of all premature deaths have been attributed to alcohol, and the Māori mortality rate is 2.5 times that of non-Māori.<sup>2</sup> The economic cost of alcohol-related harm was estimated at \$5.3 billion per year in 2005.<sup>3</sup> Research towards reducing harm has identified aspects of the alcohol environment that influence consumption, including alcohol availability, marketing, price and enforcement of alcohol controls. Most of these

factors may be modified by alcohol policy at relatively low cost to reduce harm.<sup>4</sup>

Between 1989 and 2000, alcohol policy in New Zealand was liberalised and began to lag behind most other OECD countries with regard to effective measures to reduce harm.<sup>5</sup> These changes were associated with increased traffic crash injuries among 15 to 19 year-olds,<sup>6,7</sup> and in 2010, the New Zealand Law Commission reported the Sale of Liquor Act 1989 had no health focus, had liberalised alcohol availability and concluded that it should be replaced.<sup>8</sup>

In response, the Government developed the *Sale and Supply of Alcohol Act 2012* (SSAA), which introduced minimisation of harm from excessive or inappropriate consumption of alcohol as a key objective. However, the SSAA made little or no change to the most cost-effective policy areas for reducing harm, including alcohol taxation, the minimum purchase age and control of alcohol marketing.<sup>4,9</sup> The SSAA established two measures to constrain alcohol availability: default trading hour limits of 8am to 4am for on-licences and 7am to 11pm for off-licences, and a provision enabling territorial authorities (TAs) to develop a Local Alcohol Policy (LAP) through public consultation. LAPs may limit outlet locations and density, set alternative maximum hours of trade and were central to the Government's intention to improve community input to licensing decisions through the SSAA.<sup>10</sup>

New risk-based licence fees and small changes to licensing procedures may also affect availability. Notably, the SSAA introduced a requirement to consider the impact of alcohol outlets on amenity and good order near their location, and made one-way door policies legally enforceable.

The SSAA extended existing social supply regulations to prohibit supply to minors in private settings, unless the alcohol is supplied responsibly and by either the guardian of the minor, or someone who believes they have the consent of a guardian. The SSAA also defined intoxication in primary legislation. With regard to alcohol marketing outside premises, discounts over 25% were prohibited under the SSAA. Inside supermarkets and grocery stores alcohol displays were to be limited to a single area.

The present study aims to improve our understanding of the impact of the SSAA by documenting perceived changes in the alcohol environment before and after its implementation. These include changes in enforcement of existing regulations amended by the SSAA, and changes in compliance. No studies to date have assessed multiple aspects of the alcohol environment in New Zealand across this time period. Findings may support improvements to the law and its implementation, and will support interpretation of results from studies of consumption

behaviour and harms, specifically data collected as part of the International Alcohol Control (IAC) study.<sup>11</sup>

Enforcement and compliance are important because the alcohol environment is not only affected by the law, but also by how it is implemented.<sup>12-15</sup> Responsive regulatory theory indicates that policy compliance interacts with attitudes towards a policy, and with how a policy is enforced formally and informally.<sup>16,17</sup> Accordingly, regular enforcement has yielded significant improvements in compliance; for example, enforcement of purchase age regulations can deter sales of alcohol to minors, thereby reducing availability of alcohol to young people.<sup>18,19</sup>

## Method

Data were gathered for 2013 and 2015 to identify changes over time. Although implementation of the SSAA began in 2013, changes to marketing and promotion, maximum trading hours, social supply and supply to intoxicated persons did not come into force until 19 December 2013, or later in the case of LAPs.

Data collection utilised the Alcohol Environment Protocol (AEP) (previously called the Policy Analysis Protocol), a standardised way to assess alcohol environments and policy implementation across countries. This tool was developed as part of the IAC study into alcohol use and related behaviour.<sup>11</sup> The protocol documents policy, enforcement, compliance and aspects of the alcohol environment, specifically: number of alcohol licences, hours of sale, alcohol marketing, restrictions on purchase, supply to minors and intoxicated persons and drink driving. Items were added in 2016 regarding LAPs, ease of obtaining an alcohol licence and amenity and good order criteria. Drink driving was assessed because the maximum blood alcohol concentration (BAC) for drivers aged 20 years and older was reduced from .08 to .05 by the Land Transport Amendment Act in December 2014.

Key informant interviews with police, liquor licensing inspectors and public health officers were the main source of data. All informants were employed in alcohol regulatory roles in 2013 and 2015, which involved monitoring licensed envi-

ronments, enforcing alcohol regulations, checking licence conditions and reviewing alcohol licence applications. Interviews were conducted in early 2014 and early 2016 with 36 informants, 26 of whom were interviewed on both occasions. Informants worked in eight urban areas (populations greater than 30,000) and 11 'non-urban' areas across New Zealand. Many worked across multiple urban and rural locations. Additionally, five drink-drive enforcement officers were interviewed in 2016 regarding drink-drive enforcement only.

Key informants rated physical aspects of the alcohol environment, regulatory enforcement (monitoring and prosecution together) and compliance on 10-point scales. The reasons for ratings were requested. In 2016, items regarding change in numbers of premises and hours of trade were added to compensate for a flaw in alcohol licence records after 2014. Ordinal logistic regression was used to test the difference in ratings between the years. Qualitative comments were thematically analysed, whereby similar responses were grouped

into themes and the number of respondents mentioning each theme counted. To complement key informant perceptions, quantitative information was collected from the Ministry of Justice's 2013 alcohol licence data, Police enforcement statistics and Ministry of Transport survey results.

## Results

### Perceived changes to availability 2013 to 2015

#### Overall availability

There was little change in the very high levels of alcohol availability reported by key informants in 2013 and 2015, although a slight reduction was noted in urban areas (Table 1). No change was seen in the total number of licensed premises. However, many informants noted the new drink driving limit had led to increases in supply and sale of low-alcohol and mid-strength beer across a wider range of brands, and an increase in premises focusing their business on food and entertainment. Perceived levels of enforcement and compliance with alcohol regulations in general remained high.

**Table 1:** Changes in the New Zealand alcohol environment 2013 to 2015.

	Policy change	2013 rating	2015 rating	Change	SSAA contribution to change
<b>All regulations</b>					
Enforcement <sup>1</sup>		9	9	None	
Compliance <sup>2</sup>		8	8	None	
<b>Availability</b>					
<i>Overall</i>					
Availability in urban areas <sup>3</sup>		10	9	↓*	Partial
Availability in non-urban areas <sup>3</sup>		8.5	8	None	
Number of outlets <sup>3</sup>	No	-	-	None	
<i>Trading hours</i>	Yes				
Enforcement of licensed hours		9.5	10	None	
Compliance with licensed hours		9.5	9.5	None	
Change in licensed hours <sup>8</sup>		-	-	↓	Yes
Change in operating hours <sup>8</sup>		-	-	↓	Partial
One-way door enforcement	Yes	8.5	10	↑*	Yes
One-way door compliance		9	9	None	

**Table 1:** Changes in the New Zealand alcohol environment 2013 to 2015 (continued).

<i>Licensing process</i>	Yes				
Difficulty of obtaining new licence <sup>3</sup>		-	-	↑	Yes
Use of amenity and good order criteria in licence decisions <sup>4</sup>	New element	-	7		
<b>Supply to minors</b>					
Purchase age enforcement	No	9	9	None	
Purchase age compliance		8	8	None	
Ease of purchase by a minor <sup>5</sup>		3	3	None	
Social supply enforcement	Yes	4	4	None	
Social supply compliance		4	5	↑	Possible
Ease of obtaining via social supply <sup>5</sup>		8	8	None	
<b>Supply to intoxicated persons</b>					
Enforcement	No				
Compliance		7	7	None	
Ease of purchase if intoxicated <sup>5</sup>		6	6.5	None	
<b>Point-of-sale marketing</b>					
Enforcement	Yes				
Compliance		8	6.5	↓*	Unclear
Extent inside on-licensed premises <sup>6</sup>		5	5	None	
Extent inside off-licensed premises <sup>6</sup>		8	10	↑*	Unclear
Single area condition enforcement	New	-	7.5		
Single area condition compliance		-	5.5		
<b>Drink driving</b>					
Enforcement of BAC limit	Yes				Land Transport Amendment Act
Compliance with BAC limit		-	-	↓ 7	
		-	-	↑ 7	Yes

<sup>1</sup> Enforcement ratings are the median response on a scale from 1 (not enforced) to 10 (always enforced).

<sup>2</sup> Compliance ratings are the median response on a scale from 1 (completely ignored) to 10 (complete compliance).

<sup>3</sup> Median response on a scale from 1 (completely unavailable) to 10 (completely available).

<sup>4</sup> Median response on a scale from 1 (not at all) to 10 (in all cases).

<sup>5</sup> Median score on a scale of 1 (not at all easy) to 10 (very easy).

<sup>6</sup> Median score on a scale of 1 (nowhere) to 10 (everywhere).

<sup>7</sup> Ministry of Transport data.

<sup>8</sup> Change assessed retrospectively in 2016 only.

\* p<0.05.

### Trading hours and one-way doors

Inconsistencies in administrative data after 2014 prevented comparisons of 2013 and 2015 alcohol licence hours. Most key informants perceived slight reductions in licence hours due to the maximum trading hours specified in the SSAA, but not in all regions. Some reported their region had already established earlier closing times via local agreements or policies.

Operating hours were different to licensed hours. Informants noted that some premises rarely opened to the extent of their licence: “Businesses do like to keep their maximum trading hours for special occasions like the holiday season”. They reported a slight reduction in operating hours between 2013 and 2015 for off-licensed and on-licensed premises. This was most frequently attributed to weak economic conditions,

followed by risk-based licence fees, with several informants reporting that licence holders applied for shorter licence hours to reduce the licence fee. Only three informants (two from major cities) cited the SSAA's maximum trading hours as a reason for shorter operating hours. Outside the larger cities, the economic base was often reported as insufficient to allow premises to open to the new maximum hours. Four informants stated the lower blood alcohol limit caused on-licence premises to close earlier. Perceived enforcement and compliance with trading hour limits remained very high from 2013 to 2015.

Perceived enforcement of one-way door policies increased from 2013 to 2015. In 2013, the one-way door policy agreements reached between regulatory agencies and local premises were described as "toothless", as no formal sanctions could be applied. By 2015, the SSAA had made the policies legally enforceable, and there were fewer very low ratings of compliance.

### Licensing process changes

There was strong agreement among informants that it had become slightly more difficult to obtain a new licence, particularly for off-licences under the SSAA. The most frequently mentioned reason was increased public opposition to new outlets (other than licensed cafes and restaurants), with comments that public awareness of the licensing process was heightened by implementation of the Act, the new grounds for opposition, media stories and advice from agencies. Public opposition was seen to have the greatest effect before a District Licensing Committee (DLC) hearing took place, with some applications withdrawn at this stage. Conversely, it was described as challenging for the public to participate in DLC hearings effectively without significant support. Other perceived impacts of the SSAA on licensing were an increased focus on alcohol-related harm due to involvement of public health officers in the evaluation of applications; the amenity and good order criteria; and extended application forms requiring host responsibility and venue safety plans.

In 2015, informants perceived the new amenity and good order criteria were being taken into account in just over half of all decisions to grant a licence. The criteria

were also used to argue for suitable trading hours. The most common barrier to using the criteria to oppose a new licence was difficulty gathering sufficient evidence, partly due to available resources: "[Agency] haven't been able to show a difference in crime rates... it's harder to keep track in smaller townships (which) don't have the resources to monitor or report on these things". Others suggested the standard of proof sought by DLCs was unreasonably high: "There was alcohol-related rubbish and broken glass all over a park that had a bottle store near it. [The agency] took this to the DLC who then asked how they knew that the broken glass and rubbish came from the bottle store even though it was right next to the park".

### Local alcohol policies

Only five LAPs were in force by the end of 2015, although 32 of 67 territorial authorities had produced a draft or provisional policy by this time (pers. comm. Jackson, 2016). Appeals were the most commonly reported impediment to developing an LAP. Some local authorities halted or deferred developing a LAP until appeals in other districts had been decided. Other difficulties cited were finding a compromise between the commercial goals of businesses and alcohol-related harm in the community; opposition from business interests, including the hospitality industry and supermarket chains; and time and cost.

### Perceived changes in supply practices

#### Supply to minors

It was reported to be easy for minors to access alcohol through social supply in both 2013 and 2015. Social supply regulations were perceived to have relatively poor compliance and to be almost "unenforceable", both before and after the changes introduced by the SSAA. The most commonly mentioned difficulty was that social supply typically occurs in private and is rarely reported, so is hard to detect. A lack of public concern was believed to compound this issue, and regulatory staff also had difficulty finding witnesses prepared to give evidence: "The (new) definition is hard to enact as it relies on others bringing these issues to police attention, which doesn't happen that often due to the public not really perceiving social supply as a problem".

In contrast, the alcohol purchase age was reported to have very strong enforcement via use of controlled purchase operations. Compliance with the purchase age was high and it was seen as difficult to purchase alcohol when underage.

### Supply to intoxicated persons

Informants believed it was moderately easy to purchase alcohol while intoxicated in 2013, and this did not change in 2015. Likewise, perceived compliance with the law on supply to intoxicated persons remained middling in 2013 and 2015. Descriptions ranged from reasonable compliance in a majority of premises to overt non-compliance: *“Bar staff will turn a blind eye if they think they can get away with it, which many still do”*. Enforcement was reported to be lower than for most regulations investigated, often due to insufficient staffing or low priority. Some shifts in enforcement attitudes and approach were evident. In 2013, four informants reported intoxication on licensed premises was somewhat tolerated: *“Even within [agency name], there has been quite an accepted attitude that people go to the pub to get intoxicated”*. Others noted a reactive approach: *“It is enforced when and if it comes to our attention, like if a licensee phones us or the intoxicated person brings the attention to themselves”*. No comments of this type were provided in 2015, and some proactive efforts to educate licensees were mentioned. When offences were detected, enforcement responses were usually graduated over two levels—first, providing education and further monitoring, and second, formal applications to a judicial authority for fines or licence suspensions.

Subjectivity in assessing intoxication was commonly reported to hinder enforcement and prosecution in 2013. In 2015, after the definition of intoxication was added to the SSAA, only one informant described the definition as *“vague and easy to get around if businesses have the money to do so”*, while three informants commented that a problem for enforcement was that *“the process for determining intoxication is left with the bar staff to determine”*.

### Perceived changes in point-of-sale marketing

Ratings of the extent of advertising inside off-licensed premises rose to ‘everywhere’

in 2015, whereas no change was reported in on-licensed premises. In 2015, informants provided slightly lower ratings of both enforcement and compliance with point-of-sale restrictions than in 2013, however, only 16 informants rated this item in 2013. Although two informants reported the SSAA had made enforcement easier by banning specific types of promotion, several low ratings of enforcement in both years were attributed to insufficient resources for monitoring.

In supermarkets and grocery stores where a single area condition applied, enforcement was reported to be moderately extensive, but compliance was viewed as middling (relatively few premises would have been subject to the condition because it was applied upon licence issue or renewal, and this process was halted nationally from late 2014 to 2016 by court proceedings).

### Perceived changes in drink-driving enforcement and compliance

Between 2013 and 2015, the annual total number of breath tests conducted reduced by 12%, from 2.90 to 2.56 million.<sup>20,21</sup> In the same period, there was a 24% reduction in apprehensions of drivers with a BAC of .08,<sup>22</sup> and 35% of drivers reported drinking less before driving after the law change.<sup>23</sup> Drink driving enforcement officers also reported a slight improvement in compliance after the law change, finding lower breath alcohol levels in general and that more people were deciding not to drink at all before driving in order to *“stay safely under the limit”*. The informants believed the overall extent of enforcement operations and resourcing was no different after 2014; this may have been due to the high volume of ongoing operations, or it is possible that less change occurred in their districts.

## Discussion

### Changes in perceived enforcement and compliance with alcohol regulations

Little change was reported in the overall extent of enforcement of pre-existing alcohol regulations between 2013 and 2015, and resources for enforcement did not increase. Some changes were seen in the focus of enforcement, with assessment of licence applications placing a greater

emphasis on harm and increased attention on host responsibility practices in licensed premises. In addition, new elements of the SSAA, namely one-way doors and single alcohol area conditions (although few of the latter existed), were perceived as being well enforced.

The results identify trading hours, one-way door restrictions and the purchase age as the most extensively enforced regulations in each year, with associated high levels of compliance. As with drink-driving enforcement, these restrictions had formalised monitoring programmes such as controlled purchase operations, or were inherently simple to assess, such as closing times. Despite new definitions in the SSAA, social supply and supply to intoxicated persons remained among the least well-enforced of the regulations investigated and had the lowest perceived compliance in both 2013 and 2015.

Data available to 2014 indicate that intoxication offences were seldom penalised. In 2014, seven enforcement applications were made to the Alcohol Regulatory Licensing Authority (ARLA) for supply to intoxicated persons, alongside 28 applications for allowing intoxicated people to remain on licensed premises.<sup>24</sup> The informants reported insufficient prioritisation of resources to enforcement was a persistent challenge. Comments that “the process for assessing intoxication was left to bar staff to determine” may need examination, as they imply limited monitoring, and possibly uncertainty over the regulatory procedure. In addition, supply to an intoxicated person seems unlikely to be witnessed, as regulatory inspections were generally conducted in uniform.

Enhanced enforcement methods could improve compliance with intoxication regulations. Compared to recommended strategies for increasing responsible alcohol service,<sup>25,26</sup> the SSAA lacks low-level penalties for intoxication offences that can be applied when initial education efforts and monitoring fail. Introducing smaller on-the-spot fines would enable swifter and more frequent enforcement, avoiding lengthy applications to ARLA for licence suspensions or large fines. A well-publicised programme of plain-clothes inspections could also improve the impact of present monitoring efforts.

The implementation of the lower maximum BAC for drivers highlighted the role that stronger legislative limits, when well-promoted and effectively enforced, can play in changing risky behaviour. After the .05 BAC limit was implemented, and even though breath testing volumes reduced, the public continued to believe that the odds of being tested for drink driving were high<sup>23</sup> and drink driving apprehensions at the .08 BAC level fell. Likewise, our informants found more people were choosing to drink less (or not to drink) before driving to avoid breaking the new limit. This outcome was likely supported by news of the law change, and the ongoing strategy of keeping perceptions of enforcement high by using media campaigns to publicise breath testing operations, with checkpoints directed to both targeted and high visibility locations.<sup>27</sup>

### Changes in alcohol availability and promotion

A slight reduction in on-licensed premises' operating hours in main cities was the main impact of the SSAA on alcohol availability identified in this study. Specifically, new default maximum trading hours reduced the operating hours of bars and night clubs that traded after 4am in city entertainment districts. The extent of change was limited by the very late hours restricted; national alcohol licence data for 2013 indicated only 6% of on-licensed premises (almost entirely in urban areas) would be impacted by 4am closing. This change may have contributed to the slight reduction in overall alcohol availability reported for urban areas.

We did not identify any other wide-reaching changes in alcohol availability by 2015 resulting from the SSAA. The small reduction perceived in off-licensed premises operating hours was more often attributed to a lack of business than the SSAA's default trading hours. Although 2013 records showed 29% of premises would have their maximum off-licence closing time reduced under 11pm closing, it is uncertain how extensively this affected actual operating hours. More than half of the potentially affected premises were located in rural areas, where informants more frequently reported outlets did not trade to the full extent of their licensed hours. It is also unknown how many premises reduced their hours in response to risk-based licence fees. The introduction of risk-based fees

in the Australian Capital Territory was not believed to affect trading hours in a significant number of premises.<sup>28</sup> Further, the fees seem too low to motivate a business to significantly cut profitable hours of trade.

LAPs have significant potential to restrict trading hours, outlet density and location, but too few were in force in 2015 to affect the alcohol environment nationally. Appeals against LAPs deterred and delayed their implementation. Although medical officers of health and police mounted several appeals, appeals from off-licence alcohol suppliers were more widespread, and most commonly resulted in the relaxation or removal of restrictions from LAPs.<sup>29</sup> In light of the substantial commercial conflict of interest which alcohol suppliers have with the SSAA's aim of minimising harm from the excessive consumption of alcohol,<sup>30</sup> steps to protect the LAP development process from their influence appear desirable. This could facilitate policies which are more likely to reduce alcohol-related harm, and reduce development time and cost.

Despite observations that obtaining alcohol licences had become slightly more difficult, the prevalence of licensed premises was not perceived to have changed from 2013 to 2015. This is consistent with the very minor change in total alcohol licence numbers from 2007 to mid-2014.<sup>31</sup> Total alcohol available for consumption in New Zealand fell by 5.3% from 2013 to 2015,<sup>32</sup> but the contribution of the SSAA to this fall is unknown.

Two areas for improving the alcohol licensing process were identified. First, better processes to support public participation in DLC hearings would assist the government's aim of giving community members more say in licensing decisions. Second, the difficulties proving the impact of a licence on amenity and good order suggest a more pragmatic standard for assessing these criteria is needed, consistent with the harm minimisation goals of the Act.

Perceptions of youth access to alcohol did not change between 2013 and 2015. Notably, access via social supply was seen to remain easy, although the informants reported limited opportunities to observe social supply in practice. A recent study found fewer suppliers reported supplying friends

under 18 years after 2013 (30% in 2013 and 22% in 2015).<sup>33</sup> Publicity surrounding the new law may have created some change, but this may not be sustained without continued monitoring, which is reportedly difficult. As such, community efforts are likely to remain important to encouraging greater compliance.

We found little evidence that new marketing restrictions in the SSAA had affected the extent of advertising inside outlets, but this may be related to the slow introduction of single alcohol areas. Perceptions of low compliance with single alcohol area conditions may have been due to delayed implementation, as the SSAA allows additional time for outlets to reconfigure their displays to meet the conditions.

In contrast, the lower BAC limit introduced by the Land Transport Amendment Act was observed to quickly deliver considerable changes to both drink-driving behaviour and on-licensed environments, including greater availability and sale of low-alcohol beer and a stronger focus on food and entertainment in on-licensed premises.

Limitations in the study include, first, the self-report nature of the enforcement and compliance ratings. Second, retrospective ratings of change over time may have been affected by the respondents' personal expectations surrounding these changes. Lastly, some changes in practices concerning regulation and compliance may have begun prior to implementation of the SSAA, potentially limiting the extent of change seen after 2013.

In conclusion, we found the SSAA had little impact on the alcohol environment between 2013 and 2015, other than a small reduction in on-licence trading hours in urban centres. The impact of LAPs was delayed and muted by litigation, particularly from alcohol suppliers. Regulations with systematic and objective monitoring processes were associated with higher compliance, but resourcing remained a challenge to enforcement. This highlights the continued relevance of effective national policy measures with lower monitoring costs, such as increases to alcohol taxation and the purchase age and restricting alcohol advertising, as originally recommended by the Law Commission in 2010.<sup>8</sup>

**Competing interests:**

All authors report grants from the Health Research Council of New Zealand during the conduct of the study.

**Acknowledgements:**

This research was funded by the Health Research Council of New Zealand (#12/448 and #14/494). We acknowledge the experience of the regulatory personnel interviewed for this study and thank them for their participation. We also thank Martin Wall, Lanuola Asiasiga, Mirinia McVay, Jolyon Sutherland, Thomas Graydon-Guy and Phil Donovan from the SHORE & Whariki Research Centre for their contributions.

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# The New Zealand PIPER Project: colorectal cancer survival according to rurality, ethnicity and socioeconomic deprivation—results from a retrospective cohort study

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## ABSTRACT

**AIM:** To investigate differences in survival after diagnosis with colorectal cancer (CRC) by rurality, ethnicity and deprivation.

**METHODS:** In this retrospective cohort study, clinical records and National Collections data were merged for all patients diagnosed with CRC in New Zealand in 2007–2008. Prioritised ethnicity was classified using New Zealand Cancer Registry data; meshblock of residence at diagnosis was used to determine rurality and socioeconomic deprivation.

**RESULTS:** Of the 4,950 patients included, 1,938 had died of CRC by May 2014. The five-year risks of death from CRC were: Māori 47%; Pacific 59%; non-Māori-non-Pacific (nMnP) 38%. After adjustment for demographic characteristics, comorbidity and disease stage at diagnosis, compared to nMnP the relative risk (RR) for Māori was 1.1 (95%CI: 0.8–1.3) and for Pacific 1.8 (95% CI: 1.4–2.5). We found no differences in risk of death from CRC by rurality, but some differences by deprivation.

**CONCLUSIONS:** Disparity in outcome following diagnosis with CRC exists in New Zealand. Much of this disparity can be explained by stage of disease at diagnosis for Māori, but for Pacific peoples and those in deprived areas other factors may influence outcome. Further analyses of the PIPER data will explore the impact of any differences in management.

Survival differences following diagnosis with colorectal cancer (CRC) appear to stem from variation in the underlying disease biology, timeliness of diagnosis, treatment and follow-up.

Previous research undertaken in New Zealand has shown disparities in survival following CRC, with people living in independent urban areas, Māori (New Zealand's

indigenous people), and those living in areas with greater socioeconomic deprivation having poorer survival.<sup>1–6</sup> New Zealand has a significant population of Pacific people, a heterogeneous group with a history of migration to New Zealand. The main Pacific ethnicities contributing to the Pacific population in New Zealand are Samoan, Cook Islands Māori, Tongan, Niuean, Fijian and

Tokelauan.<sup>7</sup> There is limited information on CRC outcomes for Pacific people living in New Zealand.

The timeliness of diagnosis can be inferred by the stage at diagnosis, presentation to the emergency department (ED) and presentation with obstruction. Stage at diagnosis is the strongest prognostic factor for CRC.<sup>8</sup> Māori patients,<sup>1,2</sup> Pacific patients,<sup>9</sup> patients living in independent urban areas and those living in areas of greater socioeconomic deprivation are more likely to present with metastatic disease. These differences in late-stage presentation will largely reflect inequity in access to and/or from primary care. However, survival disparities have been shown to exist within categories of disease stage at diagnosis, suggesting that at least some of the survival differential may be due to variation in treatment delivery.<sup>1,2,3</sup>

Emergency presentation has been found to be associated with higher perioperative mortality and poorer long-term survival.<sup>10</sup> Colorectal cancer presenting with bowel obstruction is also associated with a poor prognosis.<sup>11</sup> Hill et al<sup>4</sup> found higher proportions of Māori compared with non-Māori colon cancer patients presented with obstruction or perforation (prevalence ratio: 1.37; 95% CI: 1.01–1.85) and higher proportions of Māori also underwent emergency surgery (prevalence ratio: 1.35; 95% CI: 1.00–1.83). Data about Pacific colorectal patients' outcomes according to presentation are currently lacking; however, it is worth noting that a New Zealand study of lung cancer found a higher proportion of Pacific people presented via the ED.<sup>12</sup>

Identifying the factors contributing to the survival differences is important to help identify opportunities for equitable service delivery and to improve outcomes for New Zealand patients. The PIPER study (Presentations, Investigations, Pathways, Evaluation and Rx) was carried out to investigate patterns of presentation to secondary care, diagnosis, staging, treatment and follow-up, and to investigate the impact of any differences by rurality, ethnicity or deprivation on cancer survival. Here we: i) describe the disease characteristics at diagnosis; ii) compare the mode of presentation to secondary care and survival outcomes by rurality, ethnicity and deprivation; and iii) determine whether or not these differences

remain after adjusting for demographic and disease characteristics at diagnosis.

## Methods

The methods for the PIPER project have been previously described.<sup>13</sup> Briefly, data from clinical records were linked to data from the New Zealand National Databases for all patients diagnosed with CRC (ICD-10-AM codes C18-C20) in 2007–2008. We included all patients with a first confirmed diagnosis of adenocarcinoma of the colon or rectum who were resident in New Zealand at the time of diagnosis, and who presented, were diagnosed and received treatment for their primary CRC in New Zealand. Date of diagnosis was defined as the date of the first pathological report confirming CRC (where pathology was available). Colorectal cancer mortality data was complete up to 23 May 2014 (the latest date for which cause of death was coded in the New Zealand Mortality Collection at the time of data extraction) and 'all cause' mortality to 23 May 2016 (three months before the date of extraction).

Date of birth, sex and ethnicity were obtained from the New Zealand Cancer Registry (NZCR). Prioritised ethnicity was coded as Māori, Pacific and 'non-Māori-non-Pacific' (nMnP).<sup>13,14</sup> Rurality<sup>15</sup> and NZDep2006 deprivation level (a geographic area-based measure of deprivation coded 1–10 from areas of least to highest deprivation)<sup>16</sup> were assigned based on the meshblock of residence at time of diagnosis.<sup>17</sup> Rural residence included rural areas with moderate urban influence, rural areas with low urban influence, highly remote/rural areas and independent urban communities.<sup>19</sup> The latter are communities which are not dependent for employment on a nearby main urban area. Non-rural residence included main urban areas, satellite urban communities and rural areas with high urban influence.<sup>19</sup>

Comorbidity was assessed using the C3 index, calculated from hospitalisation discharge data from the National Minimum Data Set (NMDS) from the five years before diagnosis of colorectal cancer. The C3 index is a cancer-specific index of comorbidity with higher scores indicating higher comorbidity.<sup>19</sup> Site of primary tumour was obtained, in preferential order, from the operation note, anatomical pathology report,

colonoscopy report, radiology report or from clinic notes. T, N, and M stage were obtained from the anatomic pathology report, or if not available, in preferential order from the radiology report, outpatient clinic letter and clinical notes. For this paper, information from CT scans up to eight weeks after surgery was also used for assigning stage at diagnosis. For analysis, stage was reduced to six categories: Stage I, II, III/N1, III/N2, localised (NOS) or Stage IV. If the primary tumour site, grade or stage were unknown from PIPER data collection, NZCR data were used. The majority of the localised (NOS) patients with rectal cancer underwent neoadjuvant chemoradiation, so no surgical samples were available for staging at diagnosis. Grade, lymphovascular invasion, mucinous or synchronous tumour data were obtained from the pathology report, or if not there, from clinical notes. The two key performance indicators (KPIs) for presentation to secondary care were i) presentation to ED (collected as method of referral) and ii) presentation with obstruction. Lower proportions meeting these KPIs indicate better care.

Relative risks and 95% confidence intervals comparing proportions were estimated using log-Poisson regression with robust standard errors to account for the binary data.<sup>21</sup> Cumulative incidence of death from colorectal cancer at five years after diagnosis was estimated using methods for competing risks, with death from other causes as a competing risk and censoring follow-up at 23 May 2014 for those still alive.<sup>21-23</sup> Overall survival was compared using Kaplan-Meier survival curves with log rank tests. Risk of death from CRC was compared using cause-specific hazard ratios estimated using the method of Fine and Grey.<sup>24</sup> The relationship between continuous variables and outcome was explored using fractional polynomials; a linear relationship was used unless this indicated otherwise. Regression models considered were as follows: i) Model 1 = unadjusted; ii) Model 2 = adjusted for site of initial tumour; iii) Model 3 = Model 2 + age and sex; iv) Model 4 = Model 3 + stage at diagnosis; v) Model 5 = Model 4 + tumour grade, type and presence of lymphovascular invasion at diagnosis (and presentation where relevant); vi) Model 6 = Model 5 + comorbidity. Not all

model results are presented here. Multiple imputation with chained equations was used to account for missing data in the regression models.<sup>25,26</sup> The imputation models included all the variables in the final regression models plus the failure indicator and the Nelson-Aalen cumulative hazard.<sup>27</sup> Statistical analyses were carried out in STATA version 14.<sup>27</sup> Ethical approval for this project was granted by the Multi-Region Ethics Committee (reference number MEC/12/EXP/022).

## Results

There were 5,612 patients with colorectal cancer registered on the NZCR between 1 January 2007 and 31 December 2008. Of these, 662 patients were excluded because they were: non-colorectal primary (103), non-adenocarcinoma morphology (136), recurrent disease (45), not diagnosed in 2007 or 2008 (124), not resident in New Zealand, diagnosed or treated outside New Zealand (53), had no clinical records available (196) or no pathology or radiology to confirm diagnosis (5). Rurality was unknown for 130 patients, ethnicity for 91 and deprivation for 159.

Overall, 52% of the cohort were male, the median age was 73 years (interquartile range 64 to 80 years) and the percentage of patients living in rural areas was 26%. There were 209 Māori patients and 58 Pacific patients. Demographic characteristics by rurality, prioritised ethnicity and NZDep are shown in Table 1. Of the 209 patients recorded as identifying as Māori on the Cancer Registry, six were also recorded as identifying as Pacific (these were counted as Māori for the purposes of our analysis). Māori patients were relatively more likely than non-Māori-non-Pacific (nMnP) to be from rural areas than urban areas. Pacific patients were much more likely to be living in urban areas than rural areas. Both Māori and Pacific patients were more likely to be living in areas of higher deprivation than nMnP. The comorbidity scores tended to be higher for Māori patients and Pacific patients than for nMnP, and also increased with higher deprivation levels.

In our study cohort, there were differences in disease characteristics by rurality, ethnicity, and deprivation (Tables 2A and 2B). For Māori patients, the primary tumour site

**Table 1:** Comparison of demographic characteristics and comorbidity by rurality, ethnicity and deprivation.

	Rurality at diagnosis				Ethnicity						Deprivation quintile (NZDep2006)										Total			
	n=4,820				n=4,859						n=4,792													
	Urban		Rural		Māori		Pacific		nMnP		1		2		3		4		5					
	n=3,543		n=1,277		n=209		n=58		n=4,592		n=972		n=973		n=1,080		n=977		n=790			n=4,950		
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
<b>Age at diagnosis (yrs)</b>																								
<40	65	(1.8)	13	(1.0)	8	(3.8)	6	(10.3)	67	(1.5)	23	(2.4)	14	(1.5)	11	(1.0)	16	(1.7)	14	(1.8)	81	(1.6)		
40-49	152	(4.3)	42	(3.3)	17	(8.1)	5	(8.6)	176	(3.8)	52	(5.5)	40	(4.2)	41	(3.9)	25	(2.6)	31	(4.0)	206	(4.2)		
50-59	395	(11.1)	145	(11.4)	46	(22.0)	11	(19.0)	487	(10.6)	118	(12.4)	120	(12.6)	101	(9.5)	95	(9.9)	91	(11.6)	560	(11.3)		
60-69	836	(23.6)	357	(28.0)	69	(33.0)	17	(29.3)	1,119	(24.4)	269	(28.3)	246	(25.8)	243	(22.9)	233	(24.2)	175	(22.3)	1,231	(24.9)		
70-79	1,172	(33.1)	434	(34.0)	49	(23.4)	10	(17.2)	1,551	(33.8)	303	(31.9)	297	(31.2)	384	(36.3)	330	(34.2)	260	(33.2)	1,639	(33.1)		
>=80	923	(26.1)	286	(22.4)	20	(9.6)	9	(15.5)	1,192	(26.0)	186	(19.6)	235	(24.7)	279	(26.3)	265	(27.5)	213	(27.2)	1,233	(24.9)		
<b>Sex</b>																								
Female	1,747	(49.3)	589	(46.1)	101	(48.3)	22	(37.9)	2,245	(48.9)	427	(43.9)	491	(50.5)	534	(49.4)	490	(50.2)	377	(47.7)	2,339	(48.5)		
Male	1,796	(50.7)	688	(53.9)	108	(51.7)	36	(62.1)	2,347	(51.1)	545	(56.1)	482	(49.5)	546	(50.6)	487	(49.8)	413	(52.3)	2,551	(51.5)		
<b>Rurality</b>																								
Urban					139	(68.1)	55	(94.8)	3,280	(73.3)	795	(81.8)	725	(74.5)	787	(72.9)	657	(67.2)	556	(70.4)	3,543	(71.6)		
Rural					65	(31.9)	3	(5.2)	1,196	(26.7)	177	(18.2)	248	(25.5)	293	(27.1)	320	(32.8)	234	(29.6)	1,277	(25.8)		
Unknown					5		0		116		0		0		0		0		0		130	(2.6)		
<b>Ethnicity</b>																								
Māori	139	(4.0)	65	(5.1)							17	(1.8)	19	(2.0)	26	(2.5)	52	(5.4)	89	(11.4)	209	(4.2)		
Pacific	55	(1.6)	3	(0.2)							2	(0.2)	6	(0.6)	5	(0.5)	20	(2.1)	25	(3.2)	58	(1.2)		
nMnP	3,280	(94.4)	1,196	(94.6)							932	(98.0)	927	(97.4)	1,028	(97.1)	892	(92.5)	670	(85.5)	4,592	(92.8)		
Unknown	69		13								21		21		21		13		6		91	(1.8)		
<b>Comorbidity</b>																								
0	1,734	(48.9)	630	(49.3)	89	(42.6)	28	(48.3)	2,254	(49.1)	541	(55.7)	509	(52.3)	532	(49.3)	460	(47.1)	309	(39.1)	2,448	(49.5)		
>0-<1	595	(16.8)	218	(17.1)	39	(18.7)	7	(12.1)	779	(17.0)	172	(17.7)	174	(17.9)	172	(15.9)	148	(15.1)	144	(18.2)	831	(16.8)		
1-<2	476	(13.4)	168	(13.2)	30	(14.4)	10	(17.2)	615	(13.4)	106	(10.9)	117	(12.0)	155	(14.4)	139	(14.2)	121	(15.3)	658	(13.2)		
>=2	738	(20.8)	261	(20.4)	51	(24.4)	13	(22.4)	944	(20.6)	153	(15.7)	173	(17.8)	221	(20.5)	230	(23.5)	216	(27.3)	1,013	(20.5)		

was the descending colon for 48% compared with 36% for Pacific and 37% for nMnP. For Pacific patients, the site of the primary tumour was the rectum for 40%, compared with 29% for Māori and 24% for nMnP. For nMnP patients a higher percentage had a tumour in the ascending colon (31%) compared with Māori (17%) and Pacific patients (21%). There were no marked differences in stage at diagnosis between urban and rural patients. However, stage varied by ethnicity; the percentages with metastatic disease at diagnosis were 35% for Māori, 31% for Pacific and 23% for nMnP. Comparisons within localised stage are difficult due to the differences in primary treatment for tumours in the colon versus rectum. Many patients with rectal cancer receive neoadjuvant chemoradiation therapy, so pathological T and N stage are unknown at diagnosis. There were differences in degree of tumour differentiation (grade) by rurality and ethnicity, with rural and nMnP patients having the higher percentages with

poorly or undifferentiated tumours. Differences by deprivation were less clear, but patients living in areas of high deprivation were slightly more likely to have tumours in the descending colon, well or moderately differentiated tumours and metastatic disease. Mucinous vs non-mucinous adenocarcinoma, lymphovascular invasion and perineural invasion were not documented in available clinical notes for a large percentage of patients (21%, 28% and 43% respectively), so our ability to assess the impact of these factors was limited.

### Presentation key performance indicators

Overall 31% of patients presented directly to the ED. The percentages were very similar for urban and rural patients (Table 3). Māori patients were the most likely to present to ED (45%) followed by Pacific (35%) then nMnP (30%). The differences were attenuated after controlling for demographic characteristics and disease variables (such

**Table 2A:** Comparison of disease characteristics at diagnosis by rurality and ethnicity.

	Rurality of residence at diagnosis					Ethnicity				
	n=4,820					n=4,859				
	Urban		Rural		Māori		Pacific		nMnP	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
<b>Tumour site</b>										
Ascending colon	1,106	(31.2)	364	(28.5)	35	(16.7)	12	(20.7)	1,439	(31.3)
Transverse colon	277	(7.8)	105	(8.2)	12	(5.7)	2	(3.4)	370	(8.1)
Descending colon	1,304	(36.8)	499	(39.1)	101	(48.3)	21	(36.2)	1,697	(37.0)
Colon (NOS)	54	(1.5)	10	(0.8)	5	(2.4)	2	(3.4)	60	(1.3)
Rectum	856	(24.2)	309	(24.2)	61	(29.2)	23	(39.7)	1,086	(23.6)
<b>Stage pre-chemoradiation</b>										
I	289	(8.3)	137	(10.9)	10	(4.9)	2	(3.4)	404	(8.9)
II	734	(21.0)	263	(20.9)	30	(14.6)	6	(10.3)	956	(21.1)
III N1	410	(11.7)	179	(14.2)	29	(14.1)	7	(12.1)	556	(12.3)
III N2	243	(6.9)	61	(4.8)	11	(5.3)	3	(5.2)	290	(6.4)
Localised (NOS)	1,007	(28.8)	319	(25.3)	55	(26.7)	22	(37.9)	1,284	(28.3)
Metastatic	817	(23.3)	302	(23.9)	71	(34.5)	18	(31.0)	1,046	(23.1)
Unknown	43		16		3		0		56	
<b>Tumour grade</b>										
Well	587	(19.6)	118	(10.9)	26	(14.7)	16	(31.4)	676	(17.5)
Moderate	1,784	(59.7)	712	(66.0)	122	(68.9)	25	(49.0)	2,358	(60.9)
Poor	580	(19.4)	242	(22.4)	29	(16.4)	8	(15.7)	792	(20.5)
Undifferentiated	39	(1.3)	7	(0.6)	0	(0.0)	2	(3.9)	45	(1.2)
Unknown	553		198		32		7		721	
<b>Mucinous tumour</b>										
Yes	382	(13.8)	137	(13.5)	15	(9.8)	6	(16.2)	490	(13.6)
No	2,389	(86.2)	878	(86.5)	138	(90.2)	31	(83.8)	3,117	(86.4)
Unknown	772		262		56		21		985	
<b>Lymphovascular invasion</b>										
Yes	866	(33.6)	236	(26.9)	53	(38.7)	16	(47.1)	1,042	(31.8)
No	1,712	(66.4)	641	(73.1)	84	(61.3)	18	(52.9)	2,239	(68.2)
Unknown	965		400		72		24		1,311	

\*All patients (both rectal and colon cancer) who had neo-adjuvant chemotherapy are classified as localised or metastatic.

**Table 2B:** Comparison of disease characteristics at diagnosis by deprivation.

	Deprivation quintile (NZDep2006)										
	n=4,792										
	1		2		3		4		5		
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	
<b>Tumour site</b>											
Ascending colon	312	(32.1)	289	(29.7)	352	(32.6)	291	(29.8)	215	(27.2)	
Transverse colon	68	(7.0)	88	(9.0)	89	(8.2)	69	(7.1)	65	(8.2)	
Descending colon	342	(35.2)	359	(36.9)	394	(36.5)	385	(39.4)	316	(40.0)	
Colon (NOS)	9	(0.9)	17	(1.7)	12	(1.1)	8	(0.8)	18	(2.3)	
Rectum	250	(25.7)	237	(24.4)	245	(22.7)	232	(23.7)	194	(24.6)	
<b>Stage pre-chemoradiation*</b>											
I	88	(9.2)	90	(9.4)	111	(10.4)	82	(8.5)	52	(6.7)	
II	182	(19.0)	195	(20.3)	227	(21.3)	225	(23.3)	164	(21.0)	
III N1	119	(12.4)	127	(13.2)	127	(11.9)	125	(12.9)	87	(11.2)	
III N2	68	(7.1)	61	(6.3)	73	(6.9)	55	(5.7)	47	(6.0)	
Localised (NOS)	275	(28.6)	278	(28.9)	281	(26.4)	257	(26.6)	225	(28.8)	
Metastatic	228	(23.8)	211	(21.9)	246	(23.1)	222	(23.0)	205	(26.3)	
Unknown	12		11		15		11		10		
<b>Tumour grade</b>											
Well	138	(16.5)	148	(18.2)	166	(18.2)	136	(16.4)	114	(17.4)	
Moderate	509	(60.9)	494	(60.8)	562	(61.5)	500	(60.5)	416	(63.4)	
Poor	179	(21.4)	160	(19.7)	176	(19.3)	184	(22.2)	119	(18.1)	
Undifferentiated	10	(1.2)	11	(1.4)	10	(1.1)	7	(0.8)	7	(1.1)	
Unknown	136		160		166		150		134		
<b>Mucinous tumour</b>											
Yes	100	(12.8)	99	(13.0)	117	(13.5)	104	(13.5)	97	(16.6)	
No	681	(87.2)	665	(87.0)	749	(86.5)	666	(86.5)	486	(83.4)	
Unknown	191		209		214		207		207		
<b>Lymphovascular invasion</b>											
Yes	231	(32.3)	229	(32.6)	226	(29.3)	230	(32.8)	178	(32.7)	
No	484	(67.7)	473	(67.4)	546	(70.7)	472	(67.2)	366	(67.3)	
Unknown	257		271		308		275		246	(31.1)	

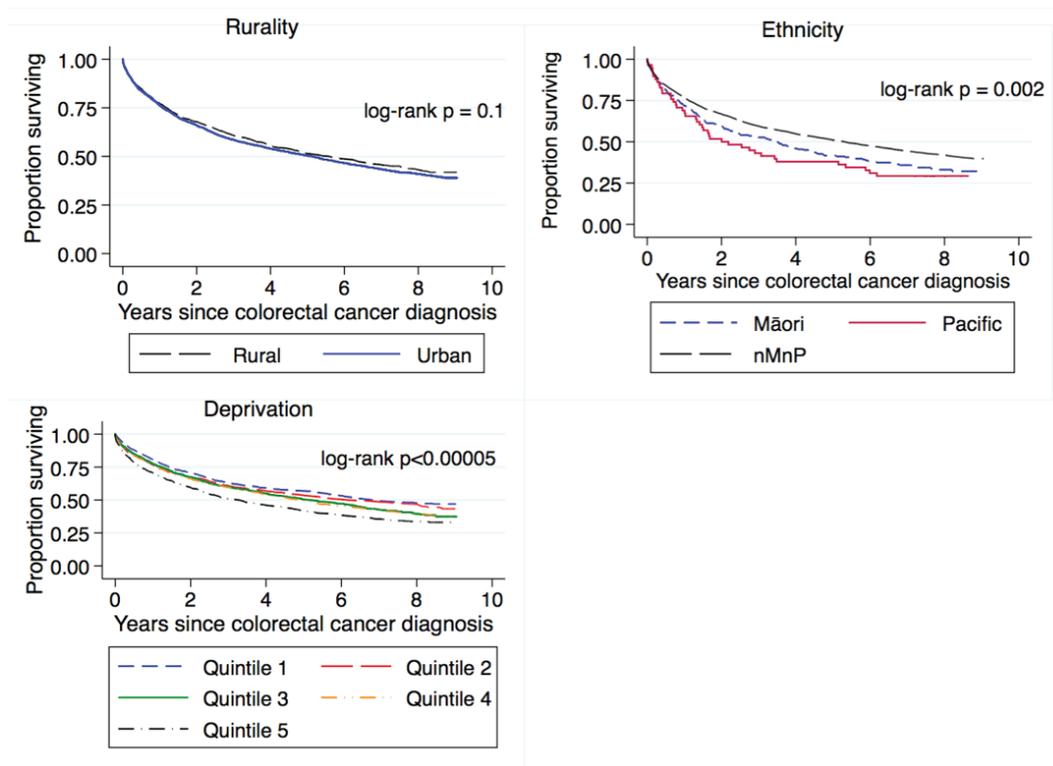
\*All patients (both rectal and colon cancer) who had neo-adjuvant chemotherapy are classified as localised or metastatic.

**Table 3:** Comparison of presentation to secondary care by ethnicity, rurality and deprivation. KPIs are presentation directly to ED and presentation with obstruction.

	Presentation			Adjusted for tumour site			Adjusted for confounders below*		
	n	(%)	(95%CI)	RR	(95%CI)	p-value	RR	(95%CI)	p-value
<b>Presentation to ED</b>	1,417	(30.6)	(0.29, 0.32)						
Urban	1,041	(30.9)	(29.4, 32.5)	1.0	reference		1.0	reference	
Rural	376	(30.4)	(27.9, 33.0)	1.0	(0.9, 1.1)	0.9	1.0	(0.9, 1.1)	0.4
<b>Deprivation quintile</b>									
Māori	87	(44.6)	(37.8, 51.7)	1.6	(1.3, 1.8)	<0.0005	1.5	(1.2, 1.7)	<0.0005
Pacific	20	(34.5)	(23.5, 47.6)	1.3	(0.9, 1.8)	0.1	1.2	(0.8, 1.6)	0.4
nonM-nonP	1,307	(30.4)	(29.0, 31.7)	1.0	reference		1.0	reference	
Urban Māori	53	(40.8)	(32.6, 49.4)	1.4	(1.1, 1.7)	0.001	1.3	(1.1, 1.6)	0.006
Rural Māori	34	(52.3)	(40.2, 64.2)	1.9	(1.5, 2.4)	<0.0005	1.8	(1.4, 2.2)	<0.0005
Pacific	20	(34.5)	(23.4, 47.6)	1.3	(0.9, 1.8)	0.1	1.2	(0.8, 1.6)	0.4
Urban nonM-nonP	963	(30.9)	(29.3, 32.5)	1.0	reference		1.0	reference	
Rural nonM-nonP	339	(29.3)	(27.8, 32.0)	1.0	(0.9, 1.1)	0.6	1.0	(0.9, 1.1)	0.8
<b>Deprivation quintile</b>									
1	246	(27.1)	(24.3, 30.0)	1.0	reference		1.0	reference	
2	266	(28.9)	(26.0, 31.9)	1.1	(0.9, 1.2)	0.4	1.1	(0.9, 1.2)	0.4
3	315	(30.5)	(27.7, 33.3)	1.1	(1.0, 1.3)	0.1	1.1	(1.0, 1.3)	0.1
4	297	(31.3)	(28.4, 34.3)	1.2	(1.0, 1.3)	0.04	1.1	(1.0, 1.3)	0.1
5	283	(37.0)	(33.6, 40.5)	1.4	(1.2, 1.6)	<0.0005	1.3	(1.1, 1.5)	<0.0005
<b>Presentation with obstruction</b>									
Total	892	(19.3)	(18.2, 20.5)						
Urban	606	(17.8)	(16.6, 19.1)	1.0	reference		1.0	reference	
Rural	286	(23.4)	(21.2, 25.6)	1.3	(1.2, 1.5)	<0.0005	1.3	(1.2, 1.5)	<0.0005
<b>Deprivation quintile</b>									
Māori	46	(23.5)	(18.0, 29.9)	1.2	(0.9, 1.5)	0.3	1.1	(0.8, 1.4)	0.6
Pacific	10	(17.2)	(9.5, 29.3)	1.0	(0.6, 1.7)	0.9	0.9	(0.5, 1.7)	0.8
nonM-nonP	838	(19.3)	(18.2, 20.6)	1.0	reference		1.0	reference	
Urban Māori	28	(21.1)	(14.9, 28.8)	1.1	(0.8, 1.5)	0.6	1.0	(0.7, 1.4)	0.9
Rural Māori	18	(29.5)	(19.4, 42.2)	1.6	(1.1, 2.4)	0.03	1.4	(0.9, 2.2)	0.09
Pacific	10	(17.2)	(9.4, 29.3)	1.1	(0.6, 1.9)	0.8	1.0	(0.6, 1.8)	0.97
Urban nonM-nonP	566	(18.0)	(16.7, 19.4)	1.0	reference		1.0	reference	
Rural nonM-nonP	264	(23.0)	(20.7, 25.6)	1.3	(1.1, 1.5)	<0.0005	1.3	(1.1, 1.5)	<0.0005
<b>Deprivation quintile</b>									
1	160	(17.4)	(15.1, 20.0)	1.0	reference		1.0	reference	
2	168	(18.1)	(15.8, 20.7)	1.0	(0.8, 1.2)	0.8	1.0	(0.9, 1.2)	0.7
3	209	(20.2)	(17.8, 22.7)	1.1	(0.9, 1.4)	0.2	1.2	(1.0, 1.4)	0.1
4	185	(19.5)	(17.1, 22.1)	1.1	(0.9, 1.3)	0.4	1.1	(0.9, 1.3)	0.4
5	169	(22.0)	(19.2, 25.1)	1.2	(1.0, 1.5)	0.03	1.2	(1.0, 1.5)	0.04

\* Adjusted for location of primary tumour, age at diagnosis, sex, stage at diagnosis, grade, mucinous tumour, lymphovascular invasion and comorbidity. Missing data were imputed for all the regression models.

**Figure 1:** Overall survival after diagnosis with colorectal cancer by rurality, ethnicity and deprivation (unadjusted).



as stage and grade) at diagnosis, but Māori patients (particularly rural Māori) and those in the highest quintile of deprivation were still significantly more likely to present directly to ED. The overall percentage of patients presenting with obstruction was 19.3%. Patients from rural areas were significantly more likely to present with obstruction than those from urban areas (RR 1.3; 95% CI: 1.2–1.5). There was no evidence of a difference by ethnicity, but we also examined the risk for urban and rural Māori separately. While the risk ratio (relative to urban nMnP) was higher for rural than urban Māori the confidence intervals were wide. Those living in the quintile of highest deprivation were more likely to present with obstruction (RR 1.2; 95%CI: 1.0–1.5). Adjustment for confounding made little difference to the patterns for deprivation.

**Overall survival**

For overall survival, follow-up was complete to 23 January 2016, giving 7–9 years of follow-up. The total number of deaths from any cause was 2,871. The overall five-year survival for the complete

cohort of CRC patients was 51%, 95% CI (50–53%). Comparisons by stage of disease are shown in Appendix 1.

Comparisons of overall survival by rurality, ethnicity and deprivation are shown in Figure 1. There were no differences by rurality, but there were differences by ethnicity and deprivation. The five-year overall survival was 42% (95% CI: 35–48%) for Māori, 37% (95%CI: 26–50%) for Pacific patients and 51% (95% CI: 50–52%) for nMnP. Median survival was 3.5 years (95% CI: 2.2–4.5 years) for Māori, 2 years (95% CI: 1.3–5.1 years) for Pacific patients and 5.3 years (95% CI: 4.9–5.7 years) for nMnP.

**Risk of death from colorectal cancer**

Follow-up for cause-specific death was complete to 23 May 2014, giving 5–7 years of follow-up. The overall five-year cumulative incidence of death from CRC was 37.8% (95% CI: 36.4–39.1%) (Table 4). We found no evidence of a difference in risk of death from colorectal cancer by rurality (p=0.6) (Figure 2). The cumulative incidence for Pacific patients was 58.6% (95%

Figure 2: Cumulative incidence of death from colorectal cancer by rurality, ethnicity and deprivation.

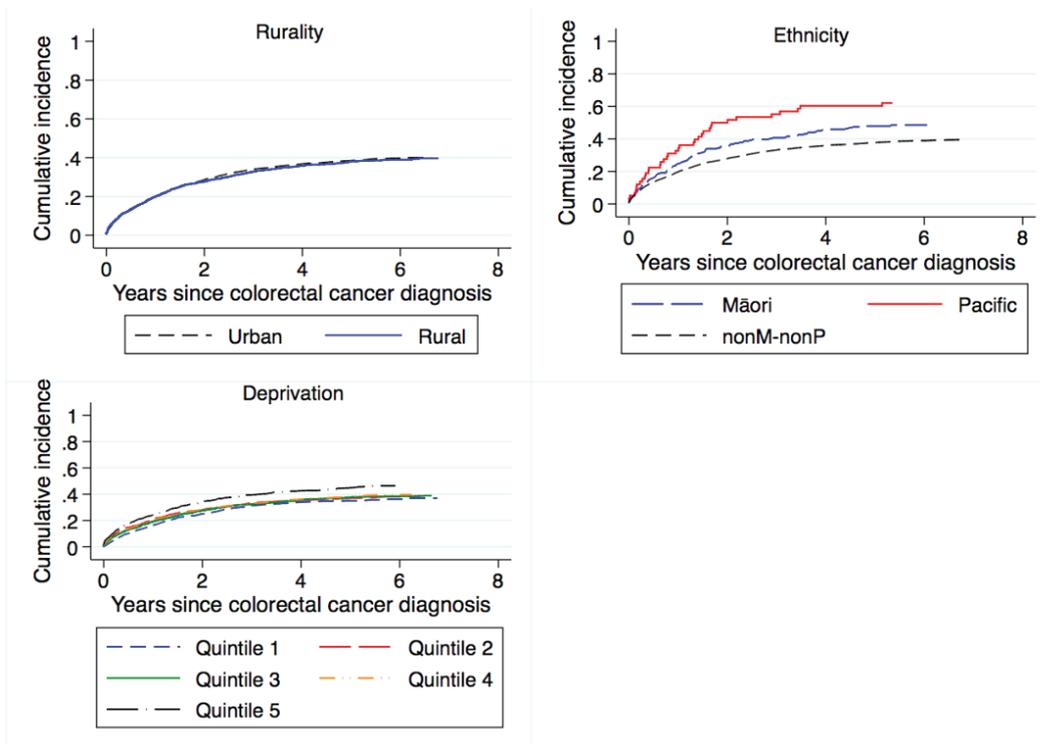


Table 4: Comparison of risk of death from colorectal cancer by rurality, ethnicity and deprivation.

	Deaths from CRC (n)	Five-year cumulative incidence		Adjusted for tumour site			Adjusted for age, sex, tumour site and stage			Adjusted for age, sex, disease and comorbidity*		
		Risk (%)	(95% CI)	RR	(95%CI)	p-value	RR	(95%CI)	p-value	RR	(95%CI)	p-value
Overall	1,938	37.7	(36.4, 39.1)									
Urban	1,411	38.4	(36.8, 40.0)	1.0	reference		1.0	reference		1.0	reference	
Rural	500	38.0	(35.3, 40.6)	1.0	(0.9, 1.1)	0.6	1.0	(0.9, 1.2)	0.5	1.0	(0.9, 1.1)	0.7
Māori	101	47.4	(40.4, 53.9)	1.3	(1.1, 1.6)	0.006	1.1	(0.9, 1.4)	0.2	1.1	(0.8, 1.3)	0.6
Pacific	36	58.6	(44.9, 70.0)	1.9	(1.4, 2.7)	<0.0005	2.0	(1.5, 2.7)	<0.0005	1.8	(1.4, 2.5)	<0.0005
nMnP	1,799	37.8	(36.3, 39.2)	1.0	reference		1.0	reference		1.0	reference	
Urban Māori	68	47.5	(39.0, 55.5)	1.3	(1.0, 1.6)	0.06	1.2	(0.9, 1.5)	0.2	1.1	(0.8, 1.4)	0.7
Rural Māori	33	50.8	(38.1, 62.1)	1.5	(1.0, 2.1)	0.04	1.1	(0.7, 1.6)	0.6	1.1	(0.8, 1.5)	0.6
Pacific	36	58.6	(44.9, 70.0)	1.9	(1.4, 2.7)	<0.0005	2.0	(1.5, 2.7)	<0.0005	1.9	(1.4, 2.5)	<0.0005
Urban nMnP	1,306	38.4	(36.7, 40.1)	1.0	reference		1.0	reference		1.0	reference	
Rural nMnP	466	37.7	(35.0, 40.5)	1.0	(0.9, 1.1)	0.7	1.1	(0.9, 1.2)	0.4	1.0	(0.9, 1.2)	0.6
Deprivation quintile												
1	355	34.8	(31.9, 37.9)	1.0	reference		1.0	reference		1.0	reference	
2	372	36.9	(34.0, 40.0)	1.1	(0.9, 1.3)	0.2	1.3	(1.1, 1.4)	0.002	1.3	(1.1, 1.5)	0.002
3	416	37.6	(34.7, 40.5)	1.1	(0.9, 1.3)	0.2	1.1	(1.0, 1.3)	0.1	1.1	(1.0, 1.3)	0.1
4	387	38.2	(35.1, 41.2)	1.1	(1.0, 1.3)	0.1	1.1	(1.0, 1.3)	0.1	1.1	(1.0, 1.3)	0.2
5	366	44.8	(41.3, 48.1)	1.4	(1.2, 1.6)	<0.0005	1.3	(1.1, 1.5)	0.001	1.3	(1.1, 1.5)	0.004

\* Adjusted for location of primary tumour, age at diagnosis, sex, stage at diagnosis, grade, mucinous tumour, lymphovascular invasion and comorbidity. Missing data were imputed for all the regression models.

CI: 44.9–70.0%), for Māori patients 47.4% (95% CI: 40.4–53.9%), and for nMnP 37.8% (95% CI: 36.3–39.2%). After adjusting for demographic variables and disease variables at diagnosis the relative risk of death from CRC for Māori relative to nMnP was attenuated from 1.3 to 1.1 and was no longer statistically significant ( $p=0.5$ ). The observed relative risk for rural Māori patients was higher than that for urban Māori patients, however the difference was not statistically significant. For Pacific patients, the crude relative risk of 1.9 remained high after adjustment for confounding (RR 1.8; 95% CI: 1.4–2.5;  $p<0.0005$ ). Patients living in areas with NZDep2006 scores in the most deprived quintile had a 40% higher risk of death from CRC than those in the least deprived quintile. The RR was only slightly reduced by control of confounding. We also found that after control for confounding by age, sex, tumour site and stage, those living in areas of moderate deprivation (deciles 3 and 4) were 30% more likely to die from CRC than those in the least deprived deciles.

## Discussion

In this study we have found clear evidence that among people diagnosed with colorectal cancer the risk of death from their cancer differs by ethnicity and deprivation, but found no evidence of a difference by rurality. Pacific patients had the worst outcomes, with a five-year cumulative incidence of death from CRC of 59%, and a risk two-fold higher than that for nMnP. This increased risk in Pacific patients was not explained by differences in measures of disease at diagnosis, although the numbers were small and the confidence interval correspondingly wide. Māori patients also had a higher risk of death from CRC than nMnP, with a five-year cumulative incidence of 47%, and a risk 30% higher than nMnP. Much of the increased risk for Māori was explained by differences in measured disease at diagnosis. For deprivation, an increased risk was present for the most deprived quintile (40% higher risk than the least deprived) and this increase was attenuated only slightly by adjusting for confounding. Furthermore, adjustment for confounding revealed a higher risk in deprivation deciles 3 and 4 compared to the least deprived.

Our study included all patients registered on the NZCR diagnosed in 2007 and 2008, hence gives a full picture of the experience of the colorectal cancer population across New Zealand. The data collection from clinical records from both public and private hospitals meant we had extended information regarding the disease at diagnosis, including more accurate information on stage and grade than was available from the National Collection databases. This increased our ability to distinguish factors affecting timeliness of diagnosis from those affecting treatment after diagnosis.

However, the data collection was retrospective, which limited available data to those collected for clinical purposes. Several variables including smoking, aspirin use, family history, body mass index, diet, performance status and perineural invasion were not consistently recorded in notes. There was very little information on CEA at diagnosis, tumour budding or on currently known genetic biomarkers such as MSI (approximated by MMR status by IHC assessment), K- & N-RAS and BRAF. Information on other potentially explanatory factors such as diet is not recorded in clinical notes. Our measure of comorbidity was based on hospital discharge data, so is likely to underestimate comorbidity, especially in those who experience greater barriers in accessing health services. As a consequence, uncontrolled confounding may explain some of the difference in risk of death from colorectal cancer between groups.

Our measures of ethnicity, rurality and deprivation relied on routinely collected data. The ethnicity classifications from the Cancer Registry are updated continuously, and have been demonstrated to be accurate in this age group compared with self-report census data.<sup>28</sup> In order to make the comparisons in this paper we used prioritised ethnicity, although we could have used total ethnicity categories, where Māori and Pacific are categorised within either or both ethnic groups with which they identify (so groups are not mutually exclusive). In fact this decision only affected six patients, so is unlikely to have had an important impact on the results. Further papers are planned looking separately at the experiences of Māori and of Pacific people with colorectal

cancer. The measures of rurality, and deprivation used were based on mesh block of residence at diagnosis in this paper, and as such may not fully capture the circumstances of individuals. More detailed information was beyond the scope of this study, but future papers may explore the impact of changing residence if numbers allow.

Disentangling the differing impacts of late stage presentation and treatment after entering secondary care on risk of CRC death is not straightforward. Some variables such as age and comorbidity act on both sections of the path. For the presentation KPIs, presentation to ED and presentation with obstruction, Māori patients were still more likely to present to ED after controlling for confounding, but we found no difference for Pacific patients. Hill et al also found a higher proportion of Māori with colon cancer (compared with non-Māori) underwent emergency surgery, although the difference in that study was not statistically significant.<sup>3</sup> We did not measure emergency surgery directly, and it is possible that presentation to ED is a poor surrogate for this as patients with greater socioeconomic deprivation may present to ED rather than a GP. There was little difference in the proportion presenting with obstruction by ethnicity, suggesting that acute presentation is a poor surrogate for obstruction and more likely to reflect engagement with primary care and/or diagnostic pathways. People living in rural areas were more likely to have presented with obstruction than those in urban areas. This difference was not explained by our measures of demographic and clinical characteristics, but did not appear to translate to worse outcomes. Furthermore, controlling confounding by stage at diagnosis is difficult for rectal cancer. Many patients receive neoadjuvant chemoradiation (CRT), and reliable TNM stage is not available until surgical and histological examination following CRT. Because of the heterogeneity of pre-operative treatment strategies for rectal cancer, we used stage as known before any treatment for this paper, so could only classify rectal cancer stage as localised versus metastatic. The impact of chemoradiation will be addressed in a future paper. Given the relatively high proportion of Pacific patients with rectal cancer, some

confounding by disease stage at diagnosis is likely to remain at this point.

Our results suggest that much of the poorer survival outcome for Māori patients results from delays in diagnosis; the largest attenuation in relative risk (from 1.4 to 1.1) occurred with adjustment for disease stage (data not shown). However, the confidence interval includes up to a 20% decrease and a 30% increase in risk compared with non-Māori-non-Pacific, so it is still possible that differences in outcome due to differences in treatment after diagnosis may occur. It is likely that there is residual confounding by stage, smoking status, comorbidity and BMI, but it is difficult to know the extent of this. In contrast, a study of patients diagnosed between 1996 and 2003, which also used clinical record data, Hill et al found worse survival for Māori patients, which was not explained by either demographic characteristics or disease at diagnosis including stage at diagnosis. They found evidence of differences in both access to and quality of care for Māori patients which explained about a third of the survival disparity.<sup>3</sup> For Pacific patients, post-diagnosis differences in care are likely to be influencing survival, although here as well we cannot rule out residual confounding. For patients with rectal cancer, which is more common in Pacific patients, stage at diagnosis is not well defined for those having neo-adjuvant chemoradiation, so we were unable to control fully for this confounding. Differences in outcome may also reflect underlying differences in tumour biology. We found differences in tumour location and grade by ethnicity, and while we were able to control for the two measures in the analysis there may be other aspects of tumour biology that affect outcome that we have not accounted for. We also note that the overall number of Pacific patients in this study is small. The KPIs relating to treatment and management will be explored in further papers and may identify areas for improvement for both Māori and Pacific patients.

We did not find any evidence of disparity in survival outcomes by rurality. This is consistent with findings from other New Zealand studies including a recent study in New Zealand breast cancer patients.<sup>2,29</sup> Similarly a study of colorectal cancer patients

in South Australia found no difference in survival for patients living in rural vs urban areas.<sup>30</sup> In contrast, a large study in the US using SEER data found evidence of small differences in outcome by population density, with people from large metropolitan areas and rural areas having the worst outcomes.<sup>31</sup> It is worth noting that the underlying impact of rurality and remoteness may vary between countries depending on the extent of remoteness and the way in which health services are organised. It is plausible that those living in the most remote areas of New Zealand are less likely to have timely access to cancer care, but a study including more people from remote areas would be required to address that. We also considered using distance of travel to the treatment centre as a measure of rurality, but excluded this due to the complex relationship with socioeconomic status and the small numbers living substantial distances from a cancer treatment centre. Differences in outcome due to variations in surgical procedure volume have been demonstrated in the US,<sup>32</sup> but the observed differences were small, and this study would not have been large enough to detect them.

Patients living in areas with the greatest deprivation experienced worse survival outcomes after colorectal cancer diagnosis. Some of this can be explained by late stage presentation, but differences still occur. Again, it is likely that there is residual confounding by smoking status, comorbidity and BMI. Both Māori and Pacific patients are more likely to live in the high deprivation areas. However, numbers were too small in this study to explore separate roles of deprivation and ethnicity. We also found, unexpectedly, that outcomes were worse for

patients in the second decile of deprivation than in areas of least deprivation. The cause of this is unclear, but given the number of comparisons in this paper some false positive findings would not be surprising.

International comparisons of CRC-specific outcomes after diagnosis are complicated by a number of factors, including differences in screening practices<sup>33</sup> and differences in statistical methods. However, Beckman et al in a study in South Australia found a five-year cumulative incidence of death from CRC of 32% using similar statistical methods to ours in a population wide linkage study (as compared to our 38%).<sup>30</sup> Our results are also consistent with findings from other studies, which have shown higher cause-specific or relative mortality in New Zealand than in Australia.<sup>34</sup>

## Conclusions

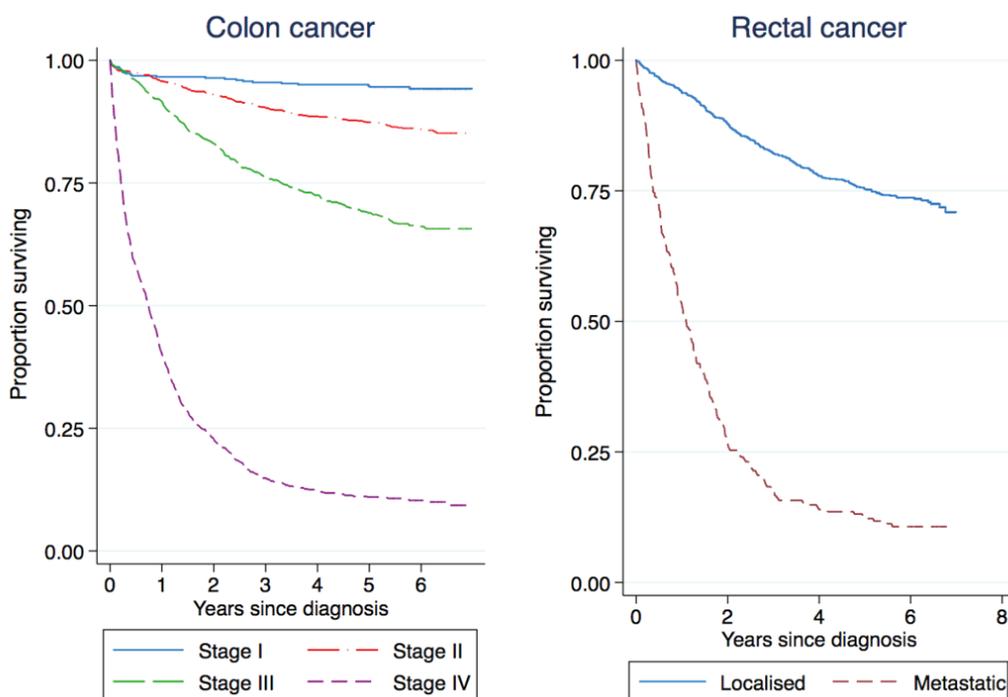
Disparity in outcomes following diagnosis of CRC exists in New Zealand. Māori and Pacific patients and those residing in the most deprived areas are at increased risk of death. The increased risk of death from CRC is significantly worse for Pacific patients. Some of the differential in survival is likely to be due to factors affecting presentation to secondary care, as evidenced by the later stage at presentation and presentation to ED. Improving access to early detection, through both screening and reducing barriers to existing care, is therefore important for reducing inequity. However, particularly for Pacific patients, the differential persists after taking into account disease at presentation, indicating that differences in management after diagnosis also impact on survival. Further analyses of the PIPER data will explore where these differences occur.

## Appendix

### Survival by stage for patients with colon and rectal cancer.

Among the 3,713 patients with colon cancer, stage was unknown for 41 and known as localised only for 433. Based on those with known stage, the five-year overall survival percentages were (Figure 1A): stage I 80%, 95% CI (76–84); stage II 71%, 95% CI (70–74); stage III N1 63%, 95% CI (59–67); stage III N2 50%, 95% CI (44–56); stage IV 6%, 95% CI (5–8). Among the 1,195 with rectal cancer, stage was unknown for 17. At diagnosis patients were classified as localised or metastatic only (due to the varied use of neoadjuvant chemoradiation in many of those with localised disease). The five-year overall survival percentages for patients with rectal cancer were (Figure 1B): localised 65%, 95% CI (62–68); metastatic 10%, 95% CI (7–15).

**Appendix Figure 1:** Overall survival after diagnosis with colorectal cancer by stage at diagnosis.



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**Competing interests:**

The authors disclose that the work included in this publication received funding from the Health Research Council of New Zealand and the Ministry of Health. Dr Sarah Derrett discloses reimbursement of costs to attend Bowel Cancer New Zealand meetings outside of the submitted work. There are no other conflicts of interest to declare.

**Acknowledgements:**

This work was funded by a partnership grant (Findlay 11/764) from the Health Research Council of New Zealand and the Ministry of Health. The authors would like to sincerely thank Dr Wendy Stevens and Dr Dale Bramley for advice and support during project set-up, the regional Data Managers, the medical records staff across New Zealand hospitals and private practice staff, and the Ministry of Health Analytical Services team.

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# Crisis resolution: consumer, family and referrer perspectives on care

Frances A Carter, M Joan Taylor, Madeline J Weston, Teresa A Quigley, John H Beveridge, Robert AJ Green, Steve Duffy, Joseph M Boden

## ABSTRACT

**AIM:** To systematically assess the service satisfaction of consumers, their families and referrers with crisis resolution (CR).

**METHODS:** Consecutive consumers discharged after receiving CR over a five-week period were potentially eligible for participation, together with their family and referrer (broadly defined). Structured telephone interviews were conducted and involved forced-choice questions assessing global satisfaction and satisfaction with specific aspects of care, plus two open-ended questions.

**RESULTS:** Participants were 75 consumers, 22 family and 16 referrers. High levels of satisfaction were seen for all participants for both global (86–96%) and most specific aspects of care (>75%). If consumers were dissatisfied with their overall care, they were significantly more likely to be aged 25–34 years of age. High levels of agreement among raters were found for global satisfaction ( $\geq 85\%$ ) and most specific aspects of care (>70%), which provides some level of reassurance for staff. Open-ended questions showed that having effective treatment of sufficient duration and staff manner were most important to participants.

**CONCLUSION:** High levels of satisfaction and agreement were found among consumers, family and referrers with CR. Open-ended questions identified which issues matter the most to key stakeholders, which may have implications for service evaluation tools.

Crisis resolution (CR) teams are now an established part of the mental health services in many parts of the world.<sup>1</sup> Typically, CR teams aim to provide 24-hour access, rapid assessment, intensive short-term treatment and care of people at home where possible.<sup>2</sup>

Almost by definition, needing help from a CR team is a highly stressful time for consumers and their families. These situations may also be difficult for referrers, such as general practitioners, trying to organise urgent and appropriate help for people in crisis. Studies have evaluated the effectiveness, impact and service satisfaction of CR teams among consumers.<sup>3–6</sup> However, few recent studies have examined the service satisfaction of family<sup>3,7</sup> and referrers,<sup>8</sup> despite the importance of partnerships with these people being recognised.<sup>1,9</sup> Importantly, no known studies have reported the service satisfaction of all

three key stakeholders (consumers, family and referrers) for the same case. Gaining more than one perspective on service satisfaction may provide insights on areas of agreement and disagreement among people who use CR.

The present study sought to systematically assess the service satisfaction of consumers, their families and referrers who have recently used crisis resolution services.

## Method

### Clinical context

In Christchurch (Canterbury, New Zealand), the Specialist Mental Health Services were re-configured in 2014 and the way that help was provided to people with urgent mental health needs was changed. The new model of care involved a CR function being built into the existing four Specialist Mental Health teams which

cater for separate geographical areas within Canterbury. For each of these teams, CR means providing 24-hour access, seeing consumers where they want to be seen (such as in their own home) where feasible, providing a high level of integration between inpatient and outpatient care, and minimising meeting new staff and unnecessary assessments. Prior to the present study, only anecdotal evidence existed about how the people who use CR experience it.

## Participants

Consecutive consumers recently *discharged* from CR over a five-week period in 2015 (last week of October 2015 until the end of November 2015) were recruited. For participation in the study, consumers were required to meet the following criteria.

### Inclusion criteria:

- Had face-to-face contact with CR within the previous six weeks;
- Discharged from being a CR 'case' within the past seven days;
- 18–65 years;
- Contact information available;
- Currently residing in New Zealand;
- Able to adequately participate in telephone interview (eg, sufficient English language);
- Able to provide informed consent (eg, not too unwell);
- Consent given.

### Exclusion criteria:

- Consumer refused contact with mental health services;
- Consumer opted out of being contacted about the study;
- Participation in the study deemed to be potentially distressing, unhelpful or harmful to the consumer.

'Family' was broadly defined to include any people who had been involved in the consumer's recent care with CR in a non-professional capacity (eg, partner, friend, Pastor, neighbour who facilitated involvement with CR and/or supported the consumer).

'Referrer' was broadly defined to include any people who had been involved in the consumer's recent care with CR in a professional capacity (eg, general practitioner,

psychiatrist or counsellor who facilitated involvement with CR and/or worked alongside CR).

## Design

As part of our 'no surprises' approach, consumers were made aware of the study at the outset of their contact with CR in a range of ways (eg, information sheet placed in their consumer pack and flyers placed in waiting rooms). However, they were not approached about the possibility of participation in the study until **discharge** from the service (ie, when they were not in current crisis). At discharge from CR, consumers were given the opportunity to opt out of being contacted about the study by their treating clinician, and via a letter from the clinical liaison (M Joan Taylor). Also, if clinicians felt concerned that participation may be potentially distressing, unhelpful or harmful to the consumer (see exclusion criteria), then they contacted the clinical liaison and made her aware of this, and these consumers were not approached about the study.

Consumers who met inclusion and exclusion criteria for the study were then phoned by the research coordinator (Madeline Weston), and verbal consent was sought for participation in a brief, structured telephone interview with her. At the completion of the interview, consumers were asked if there had been a family member or a referrer who had been involved in their care during their recent involvement with CR, and if they agreed to them being contacted and interviewed. These people were then contacted, and verbally consenting participants completed a brief, structured telephone interview with the research coordinator.

## Measures

Brief structured interviews were conducted with participants over the telephone. Structured questions were asked, and the interviewer took care to ensure that the participant fully understood the questions before a rating was sought from the participant. Questions were designed to assess global satisfaction with care and satisfaction with specific aspects of care, and were developed following an examination of the literature on treatment satisfaction and discussions with staff around the aims

**Table 1:** Structured interview questions for consumers.

<b>Thinking about your recent experience with CR...</b>	
1	Would you recommend CR to family and friends if they needed similar care or treatment? yes / no / unsure
2	Overall, how would you rate the care that you received from CR? good / ok / bad
3	How easy was it for you to access CR (eg, find out how to contact them, get someone on the phone and make an appointment)? easy / ok / difficult
4	Were you seen and helped quickly enough by CR? yes / maybe / no
5	Were you given a choice about where you were seen (at least some of the time)? yes / no / unsure / not applicable
6	Were you asked if you wanted your family involved in your care? (eg, maybe to attend appointments with you, or for staff to talk with them)? yes / no / unsure / not applicable
7	How straightforward was it for you to meet with staff, tell your story and develop a plan? straightforward / ok / complicated
8	Were your needs met by CR (either by them, or did they suggest somebody else who could help)? yes / maybe / no
9	How respected did you feel by CR staff? well respected / adequately respected / poorly respected
10	How could CR be improved?
11	What was especially helpful or good about the care you received from CR?

of the re-configured service (eg, seeing consumers where they want to be seen, such as in their own home, where feasible). Nine forced-choice questions and two open-ended questions were asked. A deliberate attempt was made to word questions using plain English, and to keep ratings simple and straightforward. Table 1 shows the questions that were asked. Consumers and family were asked all 11 questions. Referrers were asked the first four questions, plus an additional question addressing communication. Consumers were also asked brief demographic questions assessing age category, ethnicity and gender.

### Analysis

A low rate of missing data was found ( $\geq 95\%$  participants answered each question). Summary variables were calculated for some measures due to low numbers in some response categories (eg, New Zealand European: yes/no). Percentages were

rounded to whole numbers using Swedish rounding, to avoid spurious specificity. 'Not applicable' ratings were excluded from the analyses. For agreement analyses, only participants who provided a definitive response were included (ie, people who said that they were 'unsure' were excluded), and positive response categories such as 'good' and 'ok' were combined to ease analysis. Analyses were primarily descriptive. Chi-square tests were conducted to see if any demographic variables (age category, ethnicity and gender) were associated with dissatisfaction on items assessing global satisfaction and specific aspects of care. Data were analysed using the statistical package, SPSS (version 22.0; Armonk, NY: IBM Corp).

For open-ended questions, themes were identified among responses, and the frequency with which these were reported was calculated. More formal analyses were not conducted for open-ended questions.

### Ethical approval

This study was approved by the University of Otago Human Ethics Committee (Health). HD15/023

## Results

### Recruitment

Figure 1 summarises the recruitment of participants for the study. The response rates were 61% for consumers (75/123), 76% for family (22/29) and 76% for referrers (16/21).

### Description of participants

The 75 consumers were roughly evenly split by gender (female = 51%; male = 49%). They were most likely to be aged 18–24 years, although all age categories up to 64 years were represented (18–24 years = 34%; 25–34 years = 24%; 35–44 years = 19%; 45–64 years = 23%). Most consumers identified as being New Zealand European (81%), with the next most common ethnic groups being Māori (14%), ‘other’ (10%), Chinese (1%), Indian (1%), and Samoan (1%). The demographic characteristics of the sample were broadly consistent with people who use CR. (Taylor J, pers. comm., 2016).

The 22 family members were most likely to be the consumer’s partner (n=11) or mother (n=8), followed by father (n=1), sibling (n=1) or friend (n =1).

The 16 referrers were most likely to be the consumer’s general practitioner (n =13), followed by counsellor (n=2) and psychiatrist (n=1).

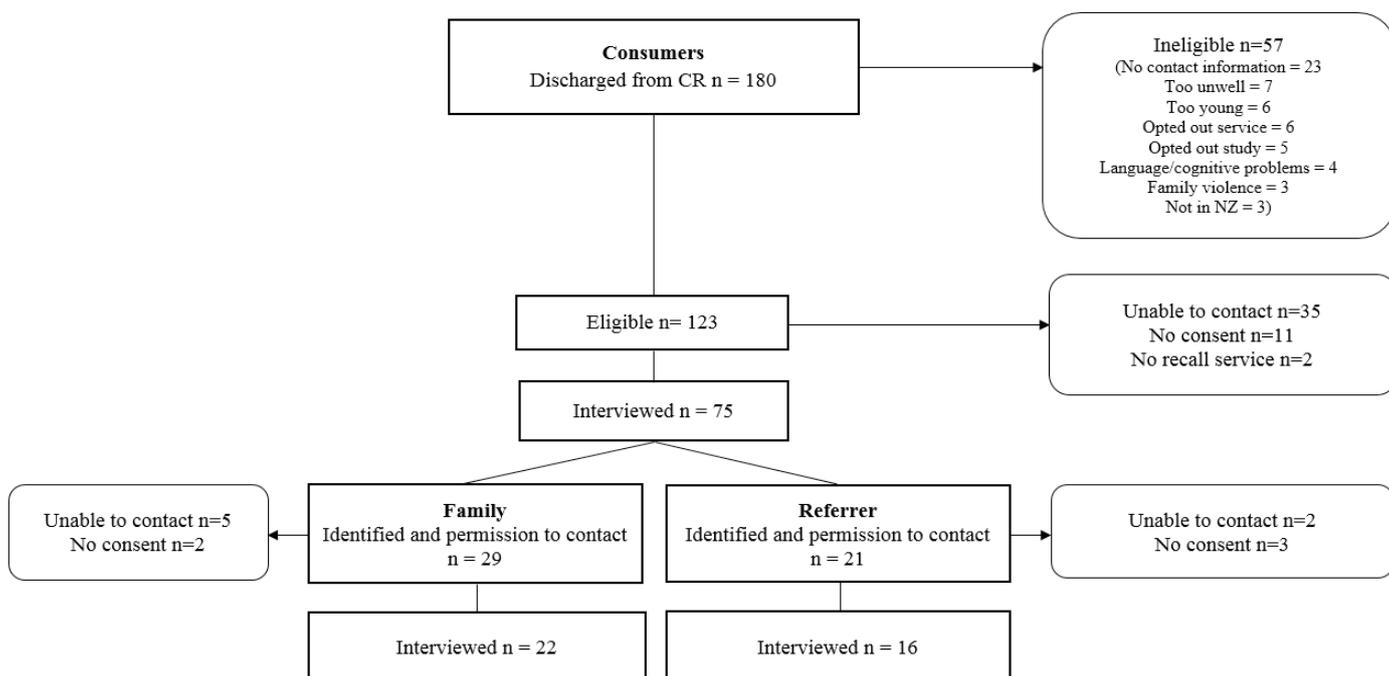
### Forced-choice questions

Table 2 shows the responses of consumers, family and referrers who answered forced-choice questions assessing both global satisfaction and satisfaction with specific aspects of care, plus the agreement among raters.

### Predictors of dissatisfaction

Consumers aged between 25-34 years were significantly more likely to rate their care as being ‘bad’ (overall rating) than people in other age categories (Chi-square value =9.6, df =1, p=.002). Out of the 74 consumers who answered this question, 18 were aged between 25-34 years, and 3 of these consumers said that their care had been ‘bad.’ No other consumers in any age category rated their care as being ‘bad’. No other demographic variables such as ethnicity or gender were significantly associated with dissatisfaction on either of the two global measures of service satisfaction. No demographic variables among consumers were significantly associated with dissatisfaction on any items assessing satisfaction with specific aspects of care.

Figure 1: Schematic summarising participant recruitment.



**Table 2:** Consumer, family and referrer responses to forced-choice structured interview questions, plus agreement among raters.

	RATERS									AGREEMENT
	Consumer (n=75)			Family (n=22)			Referrer (n=16)			AMONG RATERS*
<b>Global satisfaction</b>										
Recommend	Yes	88%		Yes	86%		Yes	88%		85%**
	No	8%		No	14%		No	6%		
	Unsure	4%		Unsure	0%		Unsure	6%		
Overall rating	Good	77%	96%	Good	64%	91%	Good	67%	94%	91%**
	OK	19%		OK	27%		OK	27%		
	Bad	4%		Bad	9%	ϕ	Bad	6%		
<b>Specific aspects</b>										
Access	Easy	48%	86%	Easy	41%	88%	Easy	73%	91%	85%**
	OK	38%		OK	47%		OK	18%		
	Difficult	14%		Difficult	12%		Difficult	9%		
Quickly enough	Yes	81%	88%	Yes	68%	77%	Yes	73%	93%	76%**
	Maybe	7%		Maybe	9%		Maybe	20%		
	No	12%	ϕ	No	23%	ϕ	No	7%		
Choice where seen	Yes	61%		Yes	40%		Not asked			58%***
	No	33%		No	30%					
	Unsure	6%	ϕ	Unsure	30%	ϕ				
Family involvement	Yes	77%		Yes	71%		Not asked			71%***
	No	15%		No	19%					
	Unsure	8%	ϕ	Unsure	10%	ϕ				
Straightforward	Straight-forward	61%	86%	Straight-forward	55%	83%	Not asked			88%***
	OK	25%		OK	28%					
	Complicated	14%	ϕ	Complicated	17%	ϕ				
Needs met	Yes	70%	81%	Yes	62%	81%	Not asked			76%***
	Maybe	11%		Maybe	19%					
	No	19%		No	19%					
Respected	Well	75%	93%	Well	82%	91%	Not asked			91%***
	Adequately	18%		Adequately	9%					
	Poorly	7%		Poorly	9%	ϕ				
Communication	Not asked			Not asked			Good	62%	81%	----
							OK	19%		
							Bad	19%		

\* For all agreement analyses, only participants who provided a definitive response were included (ie, people who said they were ‘unsure’ were excluded), and positive responses such as ‘good’ and ‘OK’ were combined.

\*\* Agreement indicates percentage agreement among consumer, family and referrer (n=34).

\*\*\* Agreement indicates percentage agreement between consumer and family, as referrers did not rate these questions (n=22).

ϕ For each cell where this symbol is used, one participant did not answer this question. In cells without this symbol, all participants answered the question.

### Open questions

Consumers were less likely to comment on how the service could be improved (51% commented), than on what had been good or helpful about the service (75% commented). Family and referrers were roughly equally likely to comment on these two questions (65-69% commented on both). Table 3 shows comments that were made about how the service could be improved and what was

especially helpful or good about the service (grouped according to themes identified), plus how frequently these comments were made by whom. These show that people were most likely to comment on the manner of staff (specific desirable attributes are described) and the treatment that had been received. A diverse range of other specific suggestions were also made. These findings will be discussed in the following section to avoid repetition.

**Table 3:** Summary of how frequently comments were made by consumers, family and referrers.

<b>Suggestions for improvement</b>				<b>What was especially helpful or good</b>			
<b>Staff manner</b>	<b>C</b>	<b>F</b>	<b>R</b>	<b>Staff manner</b>	<b>C</b>	<b>F</b>	<b>R</b>
Be less rehearsed/protocol-like/impersonal	5			Treated as an individual	1	1	
Be warmer, more approachable and more interested	3	2	1	Friendly, nice, empathetic	5	2	1
Be less rushed, less dismissive, less interrogative and listen better	5			Patient and understanding	3	1	
Be more respectful and less judgemental	4		1	Respectful	2		
Be more optimistic (about prognosis)	1			Positive and reassuring	4		
<b>Other staff issues</b>				<b>Other staff issues</b>			
Improve security for staff	4	1		Highly educated and qualified staff	2		
Provide more staff (and more government funding for this)	2	3	2				
Provide more consistency among staff	4	1					
<b>Access to service</b>				<b>Access to service</b>			
Increase publicity about existence of service	2			Grateful for the existence of the service	1	1	
Make clearer how to contact the service	2		1	Straightforward to find out who to contact			1
Make it easier to get right person on phone/reduce time “on hold”	2	1		Able to get help quickly and easily	7		3
Be more willing to see consumer in person versus talking on phone	1			Free	2		
Update contact information in pamphlet	1	1		Able to be seen somewhere close to home	1		
Reduce confusion about where to park	1			Good “infrastructure”	1		
Educate emergency service about the service as an option	1						
Simplify how to make an appointment		1					
Allow people to decline help/leave service more easily	1						
Provide help for people who are at risk but also intoxicated			1				
<b>Where seen</b>				<b>Where seen</b>			
Give home visit option more often	2	3		Gave the option of a home visit	2		
Put less pressure on to be seen at home	1						
Provide a more private waiting area	1						

**Table 3:** Summary of how frequently comments were made by consumers, family and referrers.

<b>Interventions provided/facilitated</b>	<b>C</b>	<b>F</b>	<b>R</b>	<b>Interventions provided/facilitated</b>	<b>C</b>	<b>F</b>	<b>R</b>
Provide treatment and follow-up for longer before discharge	8	5	1	Helpful to have somebody to talk to and to provide support	13		
Make it easier to get help without it needing to be a crisis/emergency	2	2	1	Effective treatment provided	8	1	4
Provide better/more respite options	1	3		Good follow-up from service prior to discharge	6		1
Assess difficulties more broadly and in more depth (not just current risk)	2	1		At discharge, helpful information given about re-contacting service and other options for help	1	1	1
Provide management plans that are more practical	1	1		Management plan was good	3	1	1
Give medication more readily	1			Help getting on 'correct' medication useful	1	1	
				Grateful to be given a 'minder' in hospital	1		
				Emergency department organised initial care well		1	
<b>Involvement of family</b>				<b>Involvement of family</b>			
Reduce pressure on consumer to involve family	2			Respected choice not to involve family	1		
Involve family more		4					
Be more careful about getting permission to talk to family	1						
<b>Communication/liaison/records</b>				<b>Communication/liaison/records</b>			
Return phone calls more promptly and reliably	3		1	Phone calls monitoring how things were going	1		
Improve communications with consumer	3			Good communication with consumer		1	
Improve communications with GP	1		2	Good communication with GP			1
Improve electronic access to consumer's records	1		2	Good communications among staff at service			
				Providing GP with letters including educative information		1	1
Consumer should be able to reply to the texts that the service sends them	2			Helping consumer to make appointment with GP			1
Keep more complete consumer records	1	1		Giving the opportunity to ask questions	1		1
<b>Transport</b>				<b>Transport</b>			
Help with transport home from initial assessment when distressed	1			Offered help with transport to appointments		2	
Improve punctuality of the transport provided		2					

C = Consumer  
 F = Family  
 R = Referrer

## Discussion

The present study sought to systematically assess the service satisfaction of consecutive consumers discharged from CR over a five-week period, plus family and referrers. The response rates for the study (61–76%) compare favourably with other similar studies, where response rates of less than 30% have been reported.<sup>3</sup>

High levels of satisfaction (86–96%) were reported by consumers (n=75), family (n=22) and referrers (n=16) on two forced-choice questions assessing global satisfaction with the service. If consumers were dissatisfied with their care on these global questions, they were significantly more likely to be aged 25–34 years.

The majority of participants (>75%) responded positively to questions assessing most specific aspects of care (exceptions were about being given a choice about where seen and involvement of family). These findings are broadly consistent with other studies that have examined satisfaction with CR (separately) among consumers, family or referrers.<sup>7,8</sup>

A unique feature of the present study was that the views of all three key stakeholders were assessed, which enabled agreement among them to be calculated. A high level of agreement was found among participants on global satisfaction ( $\geq 85\%$ ) and on most specific aspects of care (>75%). The exception was for choice about where seen. Overall, these findings provide some level of reassurance that consumers, family and referrers tend to broadly agree about service satisfaction from CR.

For the open questions, consumers were more likely to comment on what had been good or especially helpful about CR, than about how the service could be improved. Family and referrers commented roughly equally on these questions. The themes that were identified as being important were: staff issues, access to the service, where consumers were seen, the interventions provided or facilitated, involvement of family, communication/liaison/records issues and transport). For example, it was especially important to participants that the consumer received effective treatment of sufficient duration, and that staff were warm, interested, empathetic, respectful,

not rushed or dismissive, that they listened well, treated people as individuals and were positive and reassuring.

Not all of the issues that were raised by participants related to the well-being of consumers. Despite the fact that study participants were in the midst of managing their own or a family member's mental health crisis, five participants (four consumers and one family member) commented that they had felt concerned about the safety of staff, and they suggested improved security for staff. One of these participants was a consumer who has been physically aggressive themselves in the context of being acutely unwell, and they were deeply troubled by this when their mental state improved.

Other challenges for staff were identified. For example, five consumers suggested a less rehearsed/protocol like/impersonal approach. However, assessing consumers in a systematic way covering all key areas such as current risk, without them feeling that they are simply being put through a protocol, may not always be easy to achieve. Also, some seemingly opposing comments were received from participants. For example, four participants (all family) said they wanted **more** opportunities for the consumer to be seen at home and/or to have family more involved, but three participants (all consumers) said that they wanted to be put under **less** pressure to have family involved or wanted more care taken to get permission for this. These findings highlight that it might be difficult sometimes for staff to get it right for everyone.

A diverse range of other issues were also raised, especially with regard to suggestions for improving the service. For example, a consumer who had had a panic attack while waiting to be seen suggested a more private waiting area be available, and a GP saw the need for more assistance to be available when consumers had a mental health problem, but were also intoxicated, and family did not feel equipped to manage these volatile situations.

Overall, many of the present findings have implications for funding (ie, sufficient funding is needed), and for how staff are trained, supported, supervised and kept safe. Also, it would seem important that service evaluation tools incorporate ques-

tions that assess how people experience staff (eg, warmth). Future research should re-evaluate the impact of demographic variables on service dissatisfaction with a larger sample size.

The key limitation of the study was the relatively small number of family (n=22) and referrers (n=16), which precluded formal statistical comparisons due to low power. The small sample size and low power may also have impaired our ability to detect differences on analyses involving demographic variables. At the same time, while only three demographic variables were examined (age, ethnicity and gender), tests were performed for all 10 survey questions. The use of multiple comparisons may have increased the chances of a spurious finding (only one statistically significant finding was obtained).

Not all consumers who had recently been discharged from the service were eligible for participation (eg, those who were too

unwell), so some consumer groups will be under-represented in the present study. Also, it is possible that evaluations of CR within a different service delivery context may find that different issues are raised by participants about what is helpful and unhelpful. Finally, an important perspective that is missing from the current research is the view of staff. Future research could valuably focus on what staff think helps them to feel supported, effective and safe in their role.

## Conclusion

High levels of satisfaction and agreement were found among consumers, family and referrers with CR. If consumers were dissatisfied with overall care, they were most likely to be aged 25–34 years. Open-ended questions identified which issues matter the most to key stakeholders, which may have implications for service evaluation tool.

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### Competing interests:

All authors were employed by the Canterbury District Health Board (CDHB) during the conduct of the study. The current project was in part funded by a Summer Studentship grant from the University of Otago.

### Acknowledgements:

Andrea Bartram set up the research data base and provided supervision around data management, Vicki Dent and Warren Campbell-Trotter monitored consumer data bases for adverse events relevant to recruitment, Joseph Boden provided statistical advice and Virginia McIntosh provided comment on an early draft of the manuscript.

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# Violence and aggression in the emergency department is under-reported and under-appreciated

Sandra K Richardson, Paula C Grainger, Michael W Ardagh, Russell Morrison

## ABSTRACT

**AIM:** To examine levels of reporting of violence and aggression within a tertiary level emergency department in New Zealand, and to explore staff attitudes to violence and reporting.

**METHOD:** A one-month intensive, prospective audit of the emergency department's violence and aggression reporting was undertaken and compared with previously reported data.

**RESULTS:** There was a significant mismatch between the number of events identified during the campaign month and previously reported instances of violence and aggression. The findings identified that failure to report acts of violence was common.

**CONCLUSIONS:** Reports of violence and aggression in the emergency department underestimate the true incidence. Failure to report has potential impacts on organisational recognition of risk and the ability to develop appropriate policy responses.

Incidents of violent and aggressive behaviour are well recognised in health-care, with the emergency department (ED) setting acknowledged as an area of particular risk.<sup>1-3,16</sup> Despite this, such incidents continue to increase.<sup>4-5</sup> Equally concerning is the apparent acceptance of this by clinicians with the expectation this is 'part of the job' and almost an apprenticeship into the 'real' nature of emergency medicine.<sup>4,6-7</sup> While the rhetoric is clear around official policies, with approaches such as 'zero tolerance' advocated, the practice reality often reveals a lack of willingness to report or follow through with complaints.<sup>8,9</sup> For staff working in ED, the culture is often one that encourages individual 'toughness', whether in a positive sense relating to resilience, or in a less constructive manner where it can lead to indifference and/or emotional burnout.<sup>10-11</sup>

The Australasian College for Emergency Medicine (ACEM) defines acts of violence as "physical assault, verbal abuse, threats and aggressive behaviours" and advocates for a

'zero tolerance' approach to violence.<sup>14</sup> ACEM recognises that such incidents are under-reported, and that EDs; "...have the highest incidence of violence in healthcare and up to 90% of emergency department staff have experienced some type of violence in their careers".<sup>14</sup> In New Zealand, the 2011 report on Workplace Violence<sup>15</sup> identified that the health sector had the highest rate of assaults and violence. This study noted that the rate of physical assault and attempted assault was 28.9% among employees in the health sector, while the rate of violence of all types was 55.3%. The greatest risk factors for violence included patients with alcohol and drug use, prejudice and/or harassment and mental instability/distress. Additional contributors were high workloads and time pressures, with the suggestion that work-related stress "increases the perceived risk of violence in the workplace".<sup>15</sup> Considerable work has been done looking at the impact of alcohol in relation to ED violence.<sup>3,8,16</sup> While there remains the need for additional focus in this

area, this study did not specifically consider the attributes or contributing factors related to the aggressor. There is an expectation, underpinned by national health and safety legislation, that healthcare organisations will provide a safe and secure environment for their workers, patients and members of the public. This is often expressed through implicit or explicit policies advocating a 'zero tolerance' for violence.<sup>14-17</sup> Achieving this in practice and moving from rhetoric to reality depends on a number of factors. One necessary element is the willingness of staff to report all incidents that breach accepted standards of behaviour.

Many of the existing reports of violence in EDs use retrospective survey methodology and rely on self-reporting and self-assessment of incident impact. Because of variation in measurement, the exact prevalence is difficult to determine. Variations are: use of different timeframes ranging from defined periods such as 'within the past three months', to 'whole of work life exposure', and different measurement tools. However, there is evidence that violence is prevalent within the ED setting in Australasia and other regions.<sup>9,12,13,18</sup> Hospitals in New Zealand routinely use a number of measures and reporting systems for incidents of violence or aggression in the workplace.

Members of the Senior Medical and Nursing Team (n=29) working in the study ED became aware of a discrepancy between the district health board measures of violence and aggression levels in the ED compared to the departmental perception. The board had expressed its understanding that violence levels had reduced, and that this was indicative of a falling level of risk. Their understanding arose from a fall in reported incidents via the Health and Safety reporting system, from a total of 78 in 2011 to 29 in 2013. Anecdotal perceptions were that levels of aggression and violence experienced by staff remained high and were probably increasing.

This study aimed to demonstrate the extent of the discrepancy between the organisational and departmental perceptions of violence and aggression, and to explore staff experiences of, and attitudes to, violence in the ED.

## Methods

The setting was the ED of a major New Zealand tertiary level teaching hospital. The ED sees in excess of 90,000 presentations per annum, of all ages and all specialities. To identify the extent of the problem, a focused, prospective audit of the incidence of violence and aggression, as identified by ED staff, took place during May 2014. It took the form of a one-month campaign, "*May—it's not ok*", encouraging staff to report all relevant events. May was chosen to complement the annual ED and national quality improvement programmes, increasing the likelihood of staff participation by not conflicting with any other departmental initiatives. By setting a single-month duration, it could be repeated on a regular basis in the future, maintaining seasonal consistency.

The local options for seeking ethical approval deemed this study as an audit of existing practice, with no use of patient-identifiable data. As such, formal ethics approval was not available. Approval was given by the ED nursing and medical clinical managers and support was obtained from the hospital's quality department.

### Data collection

Standard reporting practice at the time of the audit was via a paper form completed by the staff witnessing or experiencing the incident, known colloquially as an 'incident form'. This would then be given to the shift manager who followed up within the department and then sent the paper form to the Quality Facilitator of Risk, for entry into the hospital database. If an injury was sustained, a second form would be completed and sent to Health and Safety. Whenever Security were involved, their staff completed their own incident reporting form, the content of which was entered into their own database.

The audit tool was a paper form designed for ease of completion. It was used in parallel with the standard paper reporting process described above. The audit form asked for demographic details of the staff member (professional group and sex), length of time the reporting individual had been at work prior to the event (to gauge staff fatigue levels), date and time; incident

**Table 1:** Potential participants.

Potential participants	Total	Nursing staff	Medical staff	Clerical staff	Hospital assistants
Number	N=234	n=120	n=64	n=35	n=15
Gender		92% female	45% female	97% female	80% female

location and incident description. The incident description requested a category using set options, which included: verbal abuse, verbal threat, physical threat, physical assault and sexual assault. Incidents could be linked to multiple categories. Free text allowed qualitative data to be generated for better understanding of the event. These categories related to those used in the standard formal reporting document to enable comparisons. Because this study was focusing on staff reporting and perceptions, descriptors of the perpetrators were not collected.

Core senior staff acted as champions for the process, encouraging colleagues to respond to the campaign. These champions were members of the senior nursing and medical teams who volunteered to support the programme by ensuring that staff were reminded at the start of each shift to report all violence or aggression incidents. No specific education was provided to these staff members other than an outline of the audit process. These staff also checked that there were sufficient audit forms available and collected them each day.

Data were collected by the staff members experiencing the incidents. Completed forms were put into bright orange boxes in every treatment area. An advertising campaign via handover messages, a prominent noticeboard and a departmental newsletter article was conducted prior to and during the month.

### Data analysis

The formal reporting of incidents by staff via the pre-existing reporting format was compared to other departmental records of violence, including health and safety documentation, clinical shift reports and matching of anonymised ED security reports of incidents.

Simple descriptive statistical analysis was applied to the numerical data. Data

were presented graphically in relation to times of the day and days of the week, and percentages used to illustrate narrative reporting. Not all of the forms were fully completed, with elements of data missing, for example the time of day or location. All available data were used, and where a smaller data set was present this is indicated within the findings.

Qualitative data were categorised according to the standard reporting codes and analysed using deductive thematic analysis. The narrative responses were typically brief, on average one sentence and only presented core factual elements. Using the pre-existing categories was deemed more useful than creating new categories, although it was identified that further information could be generated in future audits. The free text descriptions of each incident were reviewed, placed under the participant selected headings, and reviewed by two researchers to assess for relevance to the category. No descriptions were identified as not matching the selected category, although in four cases an additional category of verbal abuse was identified from the textual description and added.

## Results

### General findings

There were 7,896 patient presentations during the audit month. One hundred and seven forms were completed. Although the participants were aware that the audit was supplementary data gathering, and were encouraged to complete standard reporting forms, no standard reports were submitted.

Potential participants were the 234 ED staff, these being nursing, medical, clerical and hospital assistants as described in Table 1. The actual respondent numbers and demographics are summarised in Table 2, with the majority of respondents being nurses and female.

**Table 2:** Actual participants.

Actual participants	Total	Nursing staff	Medical staff	Clerical staff	Hospital assistants
Number	N=107	n=88; 82%	n=14; 13%	n=3; 3%	n=2; 2%
Gender	86% female	90% female	57% female	100% female	100% female

**Table 3:** Study findings.

Study findings			
Total patient presentations May 2014		7,896	
Completed Violence and Aggression audit report forms May 2014		107	
Submitted standard incident forms May 2014		0	
Security service reports May 2014		21	
Reports by day of the week (N=107)		Reports by time of day (N=92)	
Monday	n=13 (12%)	0001–0400	n=24 (26%)
Tuesday	n=10 (9%)	0401–0800	n=20(22%)
Wednesday	n=6 (6%)	0801–1200	n=10 (11%)
Thursday	n=12 (11%)	1201–1600	n=12 (13%)
Friday	n=27 (25%)	1601–2000	n=12 (13%)
Saturday	n=31 (29%)	2001–0000	n=13 (14%)
Sunday	n=8 (8%)		
Reports by location of incident (N=78)		Length of time since shift commenced (N=56)	
Waiting room	n=8 (10%)	Range	30mins–10hrs
Triage	n=6 (8%)	Mean	4.6 hours
Ambulatory	n=5 (6%)	Median	4.5 hours
Workup	n=5 (6%)	Mode	7.5 hours (n=4)
Emergency observation	n=9 (12%)		
Monitored/resuscitation	n=42 (52%)		
Telephone call	n=3 (4%)		
Type of violence and aggression reported (N=160)			
Verbal abuse	n=98 (61%)		
Verbal threat	n=22 (14%)		
Physical threat	n=21 (13%)		
Physical assault	n=19 (12%)		

Data was collected regarding day of the week, time and location where each incident occurred. The most common day for occurrences was Saturday (n=31; 29%), time of event was recorded on 92 reports; with 52 events occurring between 2200–0600 (57%), and the most common location being the monitored/resuscitation area (37% of the 72 completed reports) (see Table 3). During this study month the majority of patients were seen in the resuscitation area (3,220) and ambulatory areas (2,941). Afterhours the resuscitation area was busier than other areas. This workload distribution might explain in part why the resuscitation area was the most severely affected area. A further factor contributing to this was that multiple reports were generated in relation to two incidents, where several staff were affected; something more likely to occur in this area.

## Study findings

### Verbal abuse and verbal threat (n=98)

This was both generalised and targeted at individuals, with common features including swearing and use of offensive language; screaming and shouting; aggressive and threatening verbal expressions and inappropriate sexual content. An example from this category included the following: “*Verbal abuse started immediately—very strong language directed to myself calling me a “f\*\*king ho and ugly bitch.” This verbal abuse continued till patient was collected by police and tx [transferred] to their custody at 1845 (1hr 45 later)*”. While staff were the most common targets of abusive behaviour, other patients were also affected, as evidenced in the following comment: “*Pt [patient] being loud and abusive in WR [waiting room]*”

while waiting for assessment—made another *pt awaiting assessment cry*". Examples of verbal threat (n=22) included: "*Pt [patient] swearing and verbally aggressive—threatening to "kill us all" ...*".

### Physical assault and threat

Physical assault (n=19) and physical threats (n=19) involved aggressive, agitated and combative behaviour, typically involving attempts to hit the staff member and linked to intoxication or cognitive impairment associated with acute illness or disease progression. The physical assaults described included spitting, scratching, punching, hitting, kicking and pinching, with two suggestive of risk of blood and body fluid exposure. Examples from this category included: "*Pt with dementia lashing out*"; "*verbally abused and hit in face*"; "*pinched on breast*"; "*pills spat in face*"; "*water tipped over myself also*".

### Comparison to previous data

The data were compared to previous data from the standard health and safety reporting forms. All the incidents described in the audit data met the hospital's criteria for formal reporting. Given this, all 107 events should have been reported within that single month. This is in marked contrast to the total of 29 reports originating from the ED for the entire 2013 year.

Other records of potential violent incidents from May and June 2013 (the year prior to this study) were examined to identify whether the 2013 data had also been under-representative of the true incidence of violence and aggression (as suggested by the May 2014 findings). While there were no incident forms submitted during those months, security service data identified that assistance from security services for management of violent situations had occurred in both May (n=23) and June (n=44). This implies that standard reporting of the situations should have occurred. Given that many incidents of violence and aggression occur within the ED that do not require intervention from security; it is reasonable to assume that the actual incidence of events was higher than each of these recorded numbers. Thus, many events may well have occurred but were not formally recorded using the standard reporting systems.

## Discussion

This study shows that the perception that ED had low levels of violence was incorrect and the perception was due to low levels of reporting. This gives rise to concern and questions as to why staff would fail to report incidents, and how this might be addressed. This is congruent with the national and international literature which identifies that staff are often reluctant to report such events.<sup>4,5,8,9,20,21</sup> While this study was designed to identify the presence, rather than elicit specific rationale for failing to report, suggested reasons from the literature<sup>4,9,20-22</sup> for this include:

- Acceptance of verbal abuse and aggression as a normal part of the ED workplace environment
- Concern of reporting reflecting poorly on the abilities of the staff involved
- Empathy regarding the patient/accompanying persons' reasons for anger or aggression (whether due to an organic cause or circumstances)
- Insufficient time to record events in a timely and appropriate manner due to workload pressures

Anecdotal feedback from staff was supportive of these, in particular that the absence of a serious physical injury negated the need to report and that the effort required to do so outweighed any potential benefit. These are barriers to achieving a realistic assessment of the degree and nature of violence and aggression within an ED environment, making it difficult to develop targeted responses.

### Implications of reluctance to report

In keeping with the barriers to reporting suggested in the literature, ED staff in this study reported the need for management to recognise the impact of high workloads, and the low priority staff had traditionally assigned this process—typically reporting only if there were physical injuries, or if the perpetrator was felt to have been acting in a deliberately inappropriate way.

### Normalisation and appearances of coping ability

The most commonly cited rationale for not reporting violent incidents in the ED setting remains the perception that this is simply part of the job.<sup>8,9</sup> The presence of

such behaviour becomes an expectation of the role; in some ways, it becomes a rite of passage to have experienced workplace violence. Staff conversations become almost competitive in describing extremes of exposure to, and experiences of, violence, rather than expressing concern and intention to report. This normalisation of violence has led to increased rationalisation and acceptance of behaviours, resulting in reduced overall awareness, as violence simply blends into the background of a busy ED. ED staff often use ‘black humour’, a well-known technique for managing otherwise intolerable situations,<sup>23</sup> but the tendency to trivialise potentially dangerous situations can further minimise their significance.<sup>24</sup>

### Understanding of clinical or situational contributors

Other reasons for failing to report include an awareness of the patient’s condition and possible impaired responsibility for their actions. While the concept of assigning levels of ‘blame’ to a perpetrator’s actions is not part of any formalised process, many staff appear to (subconsciously) decide that if a patient is ‘acting out’ as a result of their condition (for example dementia, confusion, delirium) and are perceived to have no control or understanding of their actions, then such behaviour should be ‘excused’. There appears to be a culture of ‘no blame’ associated with certain types of violence and aggression,<sup>8,9,25</sup> and an associated perception that reporting such incidents is somehow harmful or disrespectful to the patient. Again, the risk of such responses is that it not only hides the true extent of any problem but also serves to excuse, and by default validate the behaviour as well as the individual.

The exception to this is in relation to situations where the person is seen as acting out for reasons related to a condition that is self-created—most typically as a result of intoxication from alcohol or drugs. However, this study did not collect data on the individuals who were responsible for the acts of aggression, focusing solely on the perceptions of the staff. It was determined that future iterations of the audit would look at ways to collect a wider range of information, while still seeking to keep the audit form as simple and time limiting as possible.

### No change expected

Other factors associated with a failure to report include the belief that reporting will not result in any significant change or improvement<sup>12,22</sup> and may be seen as indication of weakness or poor management of the situation.<sup>29</sup> Where there is no or minimal follow up or where outcome reporting is delayed, there is little incentive for staff to complete the processes associated with reporting.

Dissatisfaction and disillusionment with organisational responses and a sense that reported offenders are not held to account is also suggested as a barrier to staff compliance.<sup>17,26</sup> Associated with this is the concern that only certain types of incident are valued, and that there is no benefit from reporting in the absence of a physical injury or near-miss threatening situation. This sense of prioritisation is evident in the literature, for example where verbal abuse is typically dismissed as unimportant.<sup>8,9</sup> This fails to recognise the impact that verbal abuse, either alone or in combination with other forms of aggression, has on staff retention, satisfaction and workplace culture. A culture where verbal abuse is tolerated has the potential to impact on factors such as the quality of patient care delivered, emotional distress and compassion fatigue among staff.<sup>28</sup> Martin et al<sup>29</sup> reviewed a range of literature examining the impact of verbal aggression and noted that stress from repeated experiences was associated with “...complaints such as depression, panic disorder, and post-traumatic stress disorder, but also could be related to physical ailments such as hypertension...” and that “... verbal abuse is one of the strongest factors that contributes to dissatisfaction and high rates of attrition in nurses”.

### Subsequent developments in the study site

Given that audit is cyclical and intended to influence practice, the “*May—it’s not ok*” campaign has been re-run since its initial introduction. It has provided an opportunity for discussion around the implications of failing to report, and a forum for feeding back to staff the possible outcomes of this, including the board level misinterpretation of incidence rates.

The significance of risk recognition and evidence generation, utilising mechanisms that are meaningful to those not directly involved in a situation or setting were able to be emphasised. In addition, further practical steps have been taken.

These include the establishment of a permanent working group to monitor issues of violence and aggression in the ED, a review of existing ED responses and how these could be strengthened, and planning for future initiatives. While there is not sufficient room to expand on these here, a further article describing these and comparing the subsequent patterns of staff reporting and further data generated is being developed.

## Limitations

Education about the definitions of aggression, particularly coding of verbal abuse, was not given. This was because the participants' current perceptions were being sought. However, it is possible that individuals categorised events differently.

Poor reporting was demonstrated. The normal reporting format was a paper form, with a second partner form if an injury was sustained. This study did not examine reasons for poor reporting and it is possible that the mechanism for reporting is a disincentive to report, over and above the reasons discussed. If so, that barrier to reporting would have a greater local relevance and less generalisability. Further targeted data collection is required to understand the reason for staff reluctance to report incidents.

This was an initial process, to determine the extent of staff perception of violence

within the department—as such, and in order to encourage participation, a limited data collection process was used. This meant that data related to other aspects, such as the aggressor, were not collected. This was identified as an area to consider and more comprehensive data collection was undertaken in subsequent audits.

## Conclusion

The findings of this study confirmed that violence and aggression continue to be an issue within the target ED, and in line with other reported studies, failure to report is a significant factor. What may not be recognised, however, is that this has the potential to influence an organisation's culture and understanding and therefore policy development; the potential is for lack of recognition of the true extent of risk to staff and public. What is equally important is the need to develop strategies to address the concerns of staff around the relevance and utility of reporting systems. Without staff 'buy in' the true nature of the problem remains hidden and the impact in terms of staff morale, attrition and reduced quality of care is unrecognised or misattributed.

There are no simple answers to managing violence and aggression. The first step, however, is to identify a realistic baseline, identifying whether existing systems for measuring risk are accurately capturing the reality of ED work and are user-friendly. A simple, targeted timeframe allows for a focused response and a greater likelihood of compliance. If this compliance illustrates a dissonance with routine capture of data, it suggests the need for more focused research and greater exploration of the underlying issues.

**Competing interests:**

Nil.

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<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2018/vol-131-no-1476-8-june-2018/7584>

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# Holding a mirror to society? Progression towards achieving better sociodemographic representation among the University of Otago's health professional students

Peter Crampton, Naomi Weaver, Andrea Howard

## ABSTRACT

**AIM:** 1) To describe the sociodemographic characteristics of students accepted into eight health professional programmes at the University of Otago in 2016. 2) To provide an update on an earlier (2012) paper to illustrate progress towards increasing diversity within the health professional student cohort.

**METHODS:** Student data were obtained from the University of Otago's central student records system. Data were obtained in anonymous, summary form. New Zealand population data were obtained from Statistics New Zealand. Descriptive statistics were calculated.

**RESULTS:** Between 2010 and 2016 there was: a marked increase in the proportion of Māori (124% increase) and Pacific students (121% increase) in health professional programmes, more pronounced in medicine and dentistry (increases of 179% and 133% respectively); an increase in the proportion of students from rural areas from 19.2% to 22.5%; an increase in the proportion of female students from 59.6% to 61.3%; and little overall change in the overall socioeconomic profile.

**CONCLUSION:** Between 2010 and 2016 there was an overall increase in diversity in the health professional student body, with strong growth in Māori, Pacific and rural students. The recent introduction of new affirmative categories will hopefully result in an increase in socioeconomic diversity and in the number of refugee students.

The benefits to society of having a socio-demographically diverse health workforce are well documented and are based, in part, on the observation that the sociodemographic characteristics of health professional students influence future career choices in terms of place of practice and types of populations served,<sup>1-3</sup> leading to better health outcomes for diverse populations. Also well documented are the challenges of achieving sociodemographic representation in health professional student cohorts.<sup>4-6</sup>

In 2012 the University of Otago's Division of Health Sciences implemented a policy mechanism to ensure all of its health professional programmes produced graduates that would be equipped to meet the needs of society.<sup>7</sup> Recognising that those needs were diverse, the *Mirror on Society* selection policy was developed to ensure that the student intake was diverse so that, as much as possible, it would reflect the ethnic and socioeconomic realities of the communities which students would go on to serve.

The sociodemographic profile of students in 2010, prior to the introduction of the *Mirror on Society* policy, was reported in a previous study.<sup>7</sup> Six years on, this paper provides an update on the University's progress towards increasing diversity within the health professional programme student cohorts.

## Methods

### Health Professional Programmes

All students (domestic and international) accepted into eight health professional programmes in 2016 were included in the study (Table 1).

### Data sources

Student data were downloaded from the University of Otago's central student records system (which contains routinely collected data). Data were obtained in anonymous, summary form. The coding of data and methods for analysis were consistent for the two time points used in this study (2010 and 2016).

University student data are a mix of verified and unverified fields. Age and sex are verified by the sighting of birth certificates, and data are complete for these fields. Self-reported ethnicity data are complete, and home area statistics are unverified with 0.3% missing for the student population.

Home area data were analysed only for domestic students (not international). Home area statistics are collected by the University in a student's first year of study only, and are derived from the contact address provided by students when they first enrol.

Student citizenship was classified into the following categories: New Zealand citizens; New Zealand permanent residents; Tokelau/Niue/Cook Island citizens; Australian citizens; international citizens.

For University purposes, based on the allocation of funding by the Tertiary Education Commission, domestic students are those students who are New Zealand Citizens or New Zealand Permanent Residents, or citizens of Tokelau, Niue, Cook Islands or Australia.

New Zealand population data were sourced from 2013 and 2016 estimates provided by Statistics New Zealand.

### Ethnicity classification/definitions

When students enrol at the University of Otago they can nominate up to three ethnicities they identify with; these ethnicities are self-declared. Students can change which ethnicities they associate with at any point in time. Ethnic groups were aggregated into the following four categories: Māori; Pacific; Asian; New Zealand European and Other.

As students can nominate more than one ethnicity, the sum of ethnicities in the student population is greater than 100% of students. The 'Asian' category, as used in the New Zealand health sector, includes students from East, South and Southeast Asia but excludes people from the Middle East and Central Asia. This category has acknowledged shortcomings because of the ethnic diversity within the category.

The 'New Zealand European and Other' category includes students who identified as New Zealand European plus students who

**Table 1:** Eight professional programmes included in the study.

Professional programme	School-leaver entry pathway	Tertiary entry pathway
Bachelor of Dental Surgery (BDS)		✓
Bachelor of Dental Technology (BDentTech)	✓	✓
Bachelor of Medical Laboratory Science (BMLSc)		✓
Bachelor of Medicine and Bachelor of Surgery (MB ChB)		✓
Bachelor of Oral Health (BOH)	✓	✓
Bachelor of Pharmacy (BPharm)		✓
Bachelor of Physiotherapy (BPhty)		✓
Bachelor of Radiation Therapy (BRT)	✓	✓

did not fall into any of the other categories. The proportion of New Zealand European within the 'New Zealand European and Other' category was approximately 96% for the University population and 94% for the Health Sciences population. 'Other' includes students who identified as Middle Eastern, Latin American and African.

### Rural classification

For the purposes of admission, the University uses Statistics New Zealand's Urban/Rural Profile Classification to construct a definition of rural. More detailed information is available at: <http://www.otago.ac.nz/healthsciences/students/professional/medicine/index.html>.

### Socioeconomic deprivation

Socioeconomic deprivation was measured using the NZDep2013 (NZDep) index of socioeconomic deprivation for small areas.<sup>8</sup>

NZDep is an area-based measure combining nine variables from New Zealand's five-yearly census that reflect eight dimensions of deprivation. Each NZDep index is created for small areas built from one or more contiguous meshblocks. Meshblocks, containing around 90 people, are the smallest geographical units defined by the central government statistics agency, Statistics New Zealand. The small areas were constructed with, as far as possible, at least 100 people usually resident. The NZDep indexes were created from the proportions of people in each census-specific small area with each of nine characteristics related to deprivation.

The NZDep scale runs from 1 to 10 where, for example, a value of 10 indicates that the meshblock is in the most socioeconomically deprived 10% of small areas in New Zealand. At a national level, the number of people in each NZDep category is roughly equal.

In order to link the student and NZDep datasets, the meshblock associated with the home residence of students was attached to individual records in the University's student dataset (domestic students only). The corresponding NZDep value for each domestic student's home address was then added.

### School socioeconomic scores

The Ministry of Education uses a school rating scale to indicate the extent to which it draws its students from low socioeconomic communities. Decile 1 schools are the 10%

of schools with the highest proportion of students from low socioeconomic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students. A school decile does not indicate the overall socioeconomic mix of the students attending a school or measure the standard of education delivered at a school. It is not possible to calculate decile information for students who went to correspondence school or an overseas school.

## Results

### Geographic location of home area

Auckland is home for 34.4% of the New Zealand population; in 2016, 18.4% of the University of Otago's student population came from Auckland, and 21.8% of the professional programme population came from Auckland (Table 2). The four regions of Auckland, Canterbury, Otago and Wellington made up around 70% of the University student population and 68% of the professional programme student population.

The proportion of students from South Island locations decreased by 4.0 percentage points between 2010 and 2016. While there were no substantial shifts in the home area of professional programme students, the Wellington region saw the largest net gain (+2.9 percentage points), and Otago had the largest decrease (-3.1 percentage points).

### Rural classification

Recognising the importance of understanding the unique needs of rural communities and a general shortage of rural health professionals, the University introduced an affirmative rural admission category for medicine in 2004 and for dentistry in 2015 (the number of affirmative rural places is currently set at 55 for medicine and 10 for dentistry). The home addresses of all students have been used for the purposes of this analysis, as there are rural origin students entering via other admission pathways.

The New Zealand population is characterised as largely urban. In 2013, 71.8% of the New Zealand population was located in a main urban area (Table 3), while 28.2% lived in rural locations. The percentage of rural students in the professional programme population grew from 19.2% in 2010 to 22.5% in 2016.

**Table 2:** Geographic location of domestic students' home areas (2010, 2016).

Home area	% of NZ population (2016)	% of Health Sciences Professional Programme population (2010)	% of Health Sciences Professional Programme population (2016)	Trend
Northland	3.7	1.8	2.4	↑
Auckland	34.4	22.0	21.8	↓
Bay of Plenty	6.3	4.9	5.2	↑
Waikato	9.6	5.8	6.2	↑
Gisborne	1.0	0.9	0.8	↓
Hawkes Bay	3.4	2.5	2.8	↑
Taranaki	2.5	1.8	2.0	↑
Whanganui-Manawatu	5.0	4.5	4.1	↓
Wellington	10.8	14.0	16.9	↑
Tasman	2.1	2.4	3.6	↑
Marlborough	1.0	1.1	1.3	↑
West Coast	0.7	0.2	0.5	↑
Canterbury	12.8	22.7	20.3	↓
Otago	4.7	11.9	8.8	↓
Southland	2.1	3.4	3.2	↓
Unknown	0.0	0.4	0.2	↓

**Table 3:** Urban/rural classification of domestic student home address (2010, 2016).

	% of NZ population 2013	% of Health Sciences Professional Programme population 2010	% of Health Sciences Professional Programme population 2016
Main urban area	71.8	80.8	77.6
<b>Urban subtotal</b>	<b>71.8</b>	<b>80.8</b>	<b>77.6</b>
Independent urban community	11.0	7.2	8.4
Satellite urban community	3.2	1.2	1.5
Rural area with high urban influence	3.1	2.0	3.0
Rural area with moderate urban influence	3.8	3.1	3.0
Rural area with low urban influence	5.5	4.2	5.5
Highly rural/remote area	1.6	1.5	1.1
<b>Rural subtotal</b>	<b>28.2</b>	<b>19.2</b>	<b>22.5</b>

**Table 4:** Urban/rural classification of domestic student home address (2010, 2016).

	% of medicine 2010	% of medicine 2016	% of dentistry 2016*
Main urban area	81.8	77.8	77.9
<b>Urban subtotal</b>	<b>81.8</b>	<b>77.8</b>	<b>77.9</b>
Independent urban community	6.4	7.8	9.1
Satellite urban community	1.0	1.8	0.6
Rural area with high urban influence	2.0	3.2	3.2
Rural area with moderate urban influence	3.8	3.1	2.6
Rural area with low urban influence	3.1	5.4	5.2
Highly rural/remote area	1.9	0.9	1.3
<b>Rural subtotal</b>	<b>18.2</b>	<b>22.2</b>	<b>22.1</b>

\* Comparative 2010 data for dentistry are not available.

Table 4 shows that the medical student population is more rural than it was in 2010, rising from 18.2% to 22.2%.

### Sex

When compared with the New Zealand population females were overrepresented

at the University of Otago in general, and professional programmes in particular (Table 5). The programmes with the sex distribution most similar to the New Zealand population were the Bachelor of Dental Technology and the Bachelor of Medicine and Bachelor of Surgery.

**Table 5:** Sex (2010, 2016; domestic and international students).

	Male 2010	Male 2016	Male trend	Female 2010	Female 2016	Female trend
NZ Population (2016 Estimate)	49.0	49.3	↑	51.0	50.7	↓
NZ Population 15–24 year old (2016 Estimate)*	51.4	51.9	↑	48.6	48.1	↓
University of Otago student population	43.0	41.6	↓	57.0	58.4	↑
Health Science Professional Programme student population	40.4	38.7	↓	59.6	61.3	↑
BDS student population	43.2	34.4	↓	56.8	65.6	↑
BDentTech student population	47.3	45.5	↓	52.7	54.5	↑
BMLSc student population	35.0	32.5	↓	65.0	67.5	↑
MB ChB student population	45.1	43.7	↓	54.9	56.3	↑
BOH student population	12.9	15.6	↑	87.1	84.4	↓
BPharm student population	39.6	37.3	↓	60.4	62.7	↑
BPhy student population	35.5	37.4	↑	64.5	62.6	↓
BRT student population	14.1	17.1	↑	85.9	82.9	↓

\* 2010 data uses NZ population data for 18–24 year group.

**Table 6:** Citizenship status (2016; domestic students).

	% NZ citizen	% NZ permanent resident	% Tokelau Niue Cook Island	% Australian citizen
University of Otago student population	76.5	8.2	0.0	1.6
Health Science Professional Programme student population	79.8	9.7	0.0	1.0
BDS student population	58.3	10.9	0.0	1.8
BDentTech student population	41.8	21.8	0.0	0.0
BMLSc student population	77.5	13.8	0.0	0.0
MB ChB student population	88.3	6.2	0.0	0.9
BOH student population	68.1	20.7	0.0	1.5
BPharm student population	71.1	15.9	0.3	0.8
BPhty student population	82.1	10.3	0.0	1.7
BRT student population	98.6	1.4	0.0	0.0

The professional programme population has a higher proportion of female students compared to 2010, and this is reflected in most of the professional programmes (except for Bachelor of Oral Health, Bachelor of Physiotherapy and Bachelor of Radiation Therapy).

### Citizenship

Programmes with the smallest proportion of New Zealand citizens were the Bachelor of Dental Technology, the Bachelor of Dental Surgery and the Bachelor of Pharmacy (Table 6). The Bachelor of Dental Technology

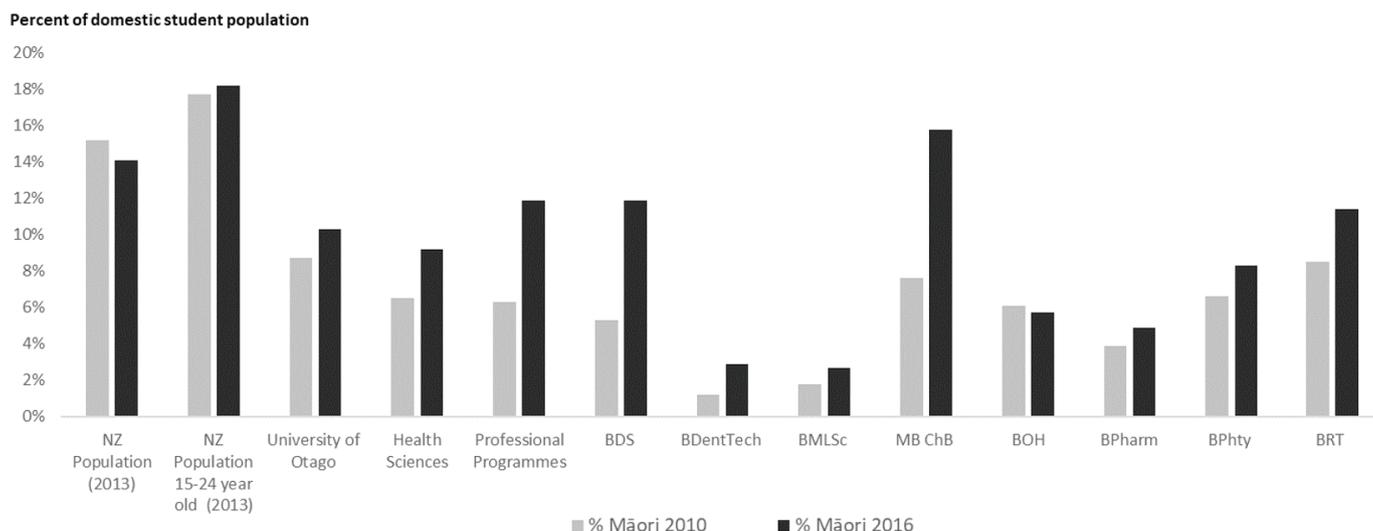
had the highest proportion of New Zealand permanent residents. All types of citizenship in the table, except for international, are eligible for government funding and therefore considered to be domestic students.

While the University has attracted a greater proportion of international students since 2010 this has not corresponded to international students in professional programmes (Table 7). This is due to total capacity constraints in some programmes as the number of funded domestic places has increased (eg, medicine). There has, however,

**Table 7:** Citizenship status (2010, 2016; international students).

	% International 2010	% International 2016	International trend
University of Otago student population	12.4	13.6	↑
Health Science Professional Programme student population	13.8	9.4	↓
BDS student population	22.6	29.0	↑
BDentTech student population	11.8	36.4	↑
BMLSc student population	8.3	8.8	↑
MB ChB student population	15.7	4.6	↓
BOH student population	14.7	9.6	↓
BPharm student population	13.0	12.0	↓
BPhty student population	3.6	5.9	↑

Figure 1: Māori students as a percentage of all domestic students, by programme, 2010, 2016.



been an increase in the percentage of international students in the Bachelor of Dental Surgery, Bachelor of Dental Technology, Bachelor of Medical Laboratory Science and Bachelor of Physiotherapy programmes.

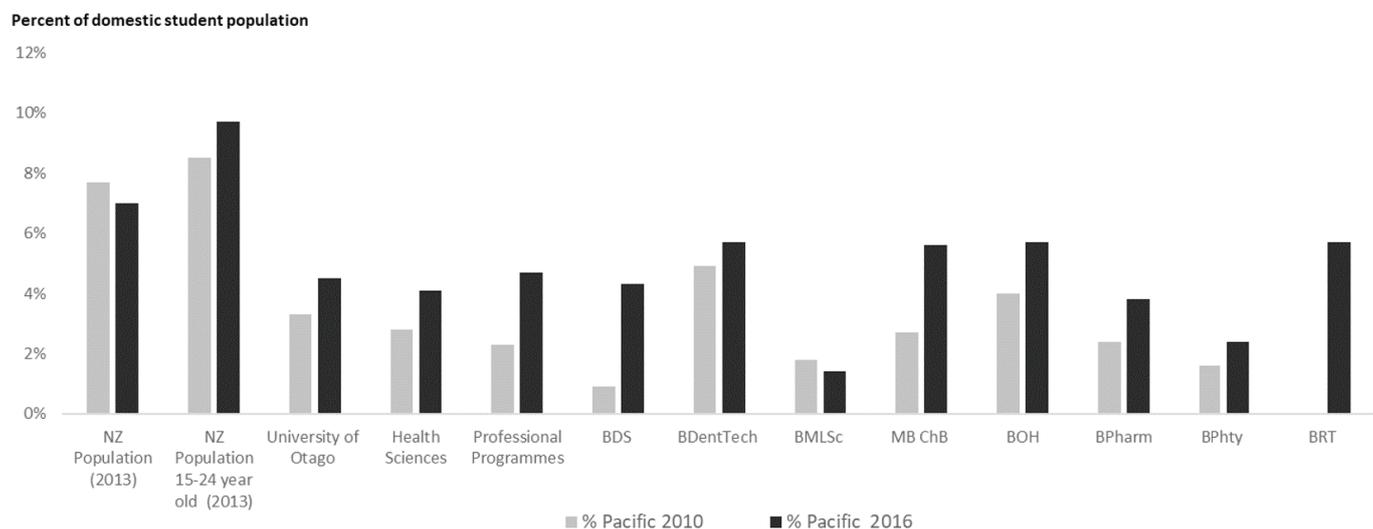
**Ethnicity**

The Health Sciences domestic student population has increased in diversity since 2010, with a 2.7 percentage point increase in Māori students from 271 to 417 students (54% increase), and a 1.3 percentage point increase in Pacific students from 127 to 202 students (59% increase) (Figures 1 and 2). Within the professional programme cohorts the increase is more marked: between 2010 and 2016 the percentage of Māori students increased by 5.6 percentage points from

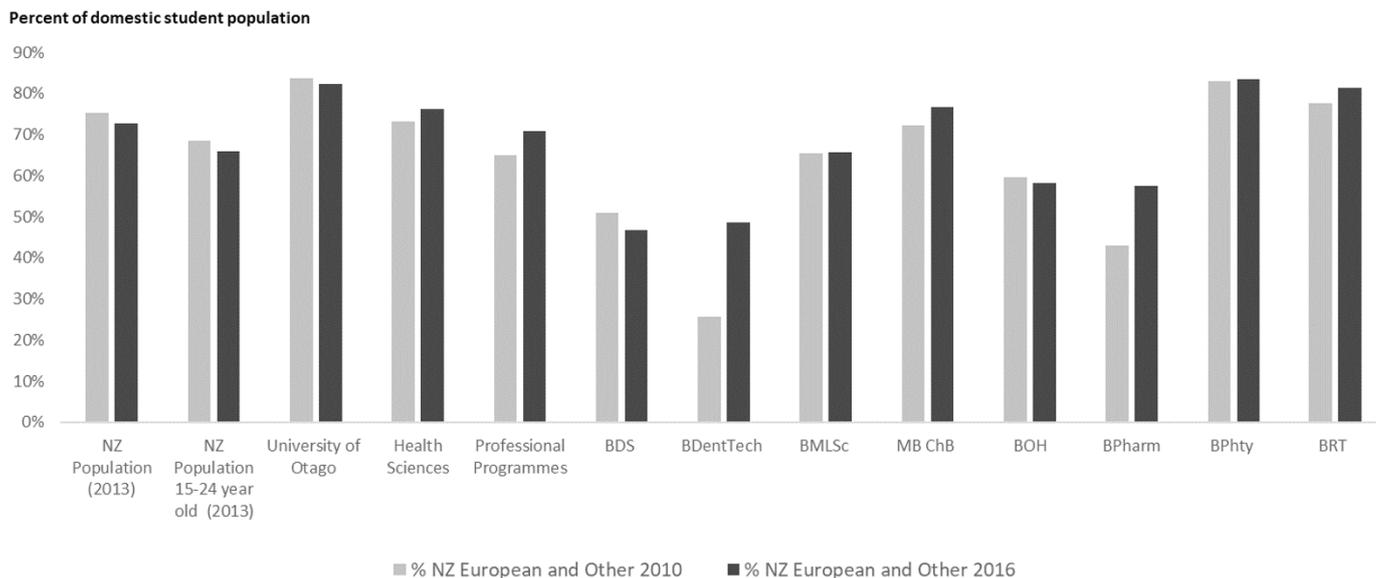
138 to 309 students (124% increase), while Pacific students increased by 2.4 percentage points from 57 to 126 students (121% increase).

In 2016, the professional programme with the highest proportion of Māori students was the Bachelor of Medicine and Bachelor of Surgery, with 15.8% of domestic MB ChB students in this programme identifying as Māori (218 students), a higher proportion than the New Zealand population. Between 2010 and 2016 the proportion of Māori students in the Bachelor of Medicine and Bachelor of Surgery programme rose by 8.2 percentage points from 78 to 218 students (179% increase). The percentage of Māori students in the Bachelor of Dental Surgery

Figure 2: Pacific students as a percentage of all domestic students, by programme, 2010, 2016.



**Figure 3:** New Zealand European and Other students as a percentage of all domestic students, by programme, 2010, 2016.



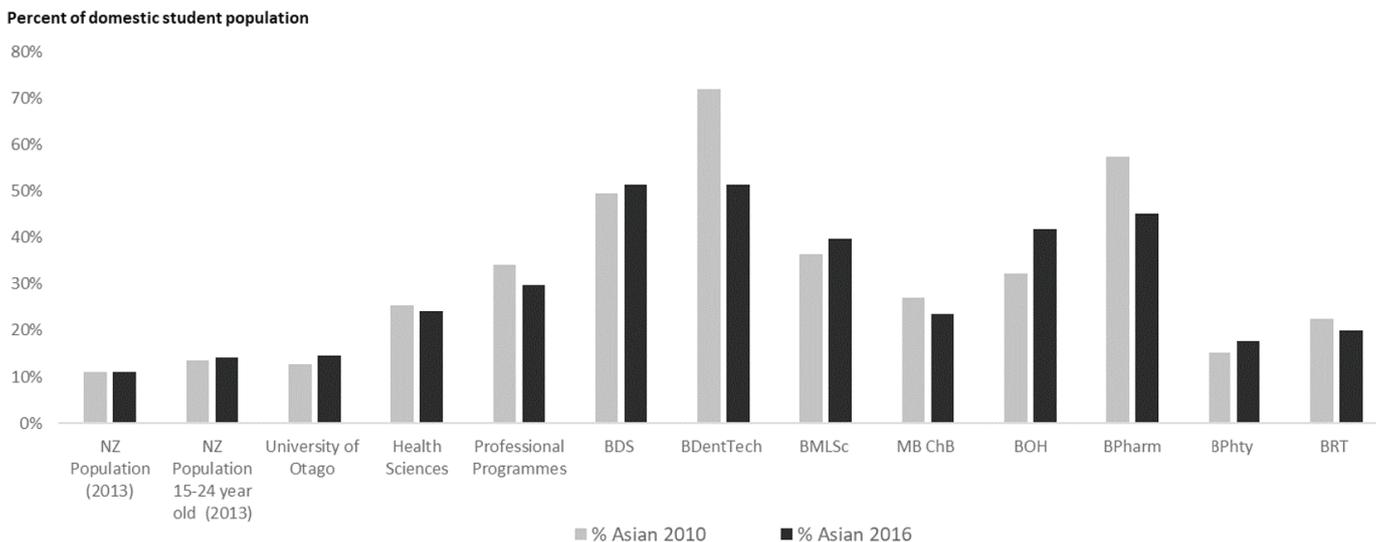
programme increased by 6.6 percentage points from 12 to 28 students (133% increase) since 2010.

The professional programmes with the highest proportion of Pacific students were the Bachelor of Oral Health and Bachelor of Radiation Therapy (5.7%, noting a relatively small cohort in each programme), closely followed by Bachelor of Medicine and Bachelor of Surgery (5.6%).

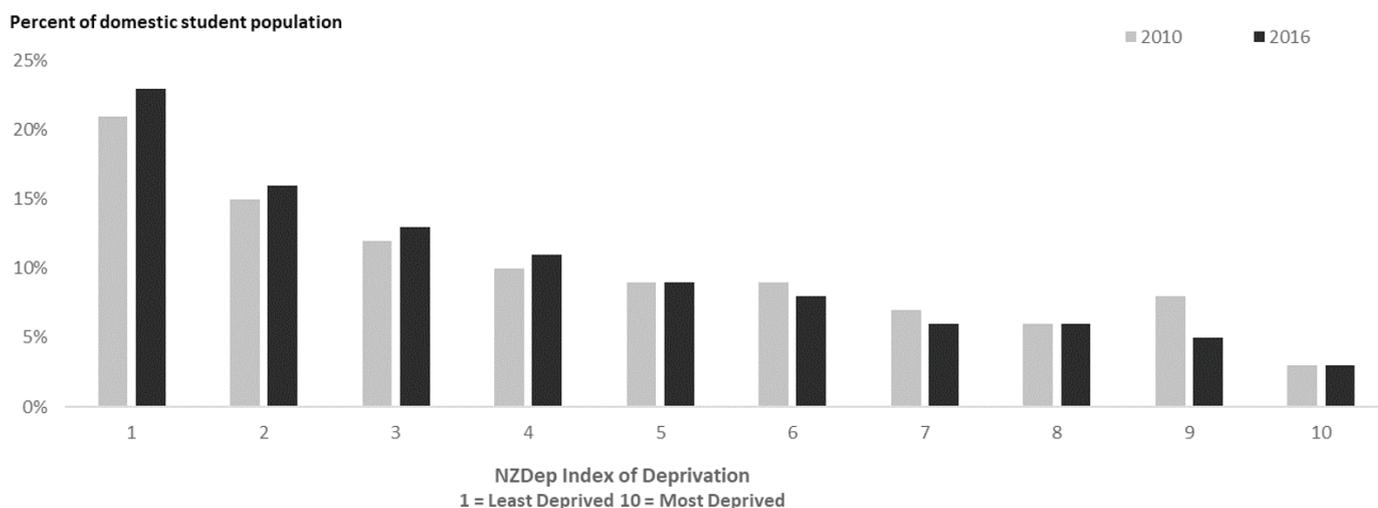
Compared to the New Zealand population, New Zealand European and Other students were slightly overrepresented in the wider University student population, but under-

represented in each of the professional programmes except the Bachelor of Physiotherapy, Bachelor of Medicine and Bachelor of Surgery, and the Bachelor of Radiation Therapy (Figure 3). In the Bachelor of Dental Technology programme, 48.6% of students identified as New Zealand European, and in the Bachelor of Dental Surgery 46.8% of students identified as New Zealand European. Asian students (Figure 4) were overrepresented in the wider University population, Health Sciences domestic population and each of the professional programmes.

**Figure 4:** Asian students as a percentage of all domestic students, by programme, 2010, 2016.



**Figure 5:** Health Sciences Professional Programme students by NZDep, 2010, 2016.



### Socioeconomic deprivation

There was little change in the overall socioeconomic profile of health sciences professional programme students between 2010 and 2016 (Figure 5).

At a national level, the number of people in each NZDep category is roughly equal; however, for all eight professional programmes there was a preponderance of students from areas of low socioeconomic deprivation. This pattern was least pronounced in the Pharmacy and Dental Technology programmes (data not shown).

The socioeconomic pattern for Māori and Pacific students differed markedly from the pattern for students who identified as European and Other, with a greater proportion of Māori and Pacific students recording home addresses in socioeconomically deprived neighbourhoods (data not shown).

### School socioeconomic scores

Students from schools with a decile rating of less than 4 (socioeconomically disadvantaged) were underrepresented in the University population, the Health Sciences population and the professional programme population (Table 8).

**Table 8:** School socioeconomic score\* (2010, 2016; domestic students).

Population	Decile <4 (%) 2010	Decile <4 (%) 2016	Decile between 4 and 7 (%) 2010	Decile between 4 and 7 (%) 2016	Decile >7 (%) 2010	Decile >7 (%) 2016	Decile unknown (%) 2010	Decile unknown (%) 2016
University of Otago students	3.5	4.8	29.8	35.4	43.0	49.8	23.7	10.0
Health Science Professional Programme students	3.4	5.3	27.1	33.0	50.9	54.6	18.6	7.2
BDS students	2.7	4.3	19.9	27.2	51.7	55.3	25.7	13.2
BDentTech students	4.3	2.9	17.2	37.1	58.1	42.9	20.4	17.1
BMLSc students	10.0	6.8	38.3	43.8	43.3	45.2	8.3	4.1
MB ChB students	2.4	4.7	26.0	30.7	50.7	58.5	20.8	6.2
BOH students	6.9	4.9	32.8	39.3	37.9	44.3	22.4	11.5
BPharm students	3.4	7.3	29.7	34.3	47.7	52.0	19.3	6.4
BPhty students	4.2	5.6	32.5	38.9	55.7	48.4	7.5	7.1
BRT students	7.0	8.6	31.0	37.1	62.0	51.4	0.0	2.9

\*1 (lowest socioeconomic level schools) – 10 (highest socioeconomic level schools).

## Discussion

### Key findings

There has been an encouraging increase in the diversity of the health professional student cohort between 2010 and 2016. This increase in diversity is temporally associated with changes in the University of Otago's selection policies for health professional students, and may as well have been influenced by external factors such as, for example, an increase in the number of tertiary-qualified Māori and Pacific students graduating from secondary schools. The principal changes included a marked increase in the proportion of Māori (124% increase) and Pacific (121% increase) students in health professional programmes, more pronounced in medicine and dentistry; and an increase in the proportion of students from rural areas from 19.2% to 22.5%. The increases in Māori and Pacific student numbers have been driven by specific strategies aimed at achieving increased engagement with Māori and Pacific communities and investment in structures and processes for supporting academic attainment.<sup>9</sup> Within the domestic student cohort, the majority of students in the professional programmes self-identified as being within the New Zealand European and Other category (70.9% compared with 72.7% of the national population). In other ethnic categories, students identified as Asian (29.8% compared with 11.1% of the national population), as Māori (11.9% compared with 14.1% of the national population) and as Pacific (4.7% compared with 7.0% of the national population).

Disappointingly there has been little change in the overall socioeconomic profile of health professional students. A large proportion of students came from socioeconomically advantaged areas and only 3.4% of students had attended secondary schools with a socioeconomic decile of less than 4. The increased number of students living in areas categorised as NZDep 9 is probably due to some students, particularly those who are permanent residents, listing Dunedin North as their 'home' address.

The trend of a continued increase in the proportion of female students (from 59.6% to 61.3%) is noteworthy and is counter to the policy intent for overall demographic representation in the health professional student cohort. In some programmes, such as oral

health, physiotherapy and radiation therapy, the heavily female-dominated student cohorts reflect historical role patterns and wage distributions.

The results show that in 2016, students studying in health professional programmes at the University of Otago were largely from outside the Otago region (91.2%), and were either New Zealand citizens or permanent residents (89.5%). It is important to note that the distribution of citizenship by programme is significantly influenced by government funding decisions. Both the New Zealand population (71.8%) and professional student population (77.6%) were characterised as largely urban, and rural categorisation was similar across the two populations.

### Significance and future challenges

The University's *Mirror on Society* policy has been successful in increasing the sociodemographic diversity of its health professional students. This is good news because the international evidence indicates that diversity among health professionals is beneficial for meeting the health needs of diverse populations. In 2017 the University included two further categories as 'affirmative' pathways—low socioeconomic groups and refugees. It is hoped that the inclusion of these two categories will in the future lead to increasing participation in health professional programmes by these demographic groups.

A challenge in the future will be to consider the implications of, and policy responses to, the increasing feminisation of some health professional student cohorts. For some professional groups, such as medicine and dentistry, feminisation represents a complete reversal of historical gender patterns. Indeed, the University still has a special prize each year for the top graduating female medical student. While this prize may be viewed as anachronistic, it serves as a reminder of the misogynistic structures of opportunity that were prevalent in the education system and wider society until recent decades. The role of the education system in adequately meeting the educational needs of boys and men is a matter of wider policy significance. Other challenges for the future could include, for example, the consideration of the role of selection policies in promoting the participation of students with disabilities and in increasing gender diversity (LGBTQI).

## Limitations

This study is based on analyses of routinely collected student data. The data are considered to be of high quality and the proportion of missing data is small. As detailed in the methods section, the data are a mix of verified and unverified fields and, as a consequence, there may be some error in the home address field. It is not possible to quantify the magnitude of any such error.

## Conclusion

Good progress has been made in increasing the diversity of the health professional student cohort at the University of Otago. The recent introduction of new affirmative categories will hopefully in the future see an increase in socioeconomic diversity and in the number of refugee students studying in health professional programmes.

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### Competing interests:

Nil.

### Acknowledgements:

We are grateful for comments made on earlier drafts by Tim Wilkinson and by the anonymous reviewers.

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# Paediatric team handover: a time to learn?

Stephen Bradley, John P Egan, Marcus Henning

## ABSTRACT

**AIM:** Paediatric team handovers provide medical professionals and students with the opportunity to exchange clinically relevant information about patients. This study explored the extent to which learning opportunities existed and were utilised within paediatric team handovers in New Zealand secondary hospitals.

**METHODS:** We undertook a qualitative, two-site case study within two paediatric departments in 2014 and 2015, and interviewed 29 participants, including medical students, junior doctors and consultants. We conducted a thematic analysis using a general inductive approach.

**RESULTS:** Participants' narratives revealed that safe transfer of pertinent patient information between clinicians was the primary function of team handover. They described learning as an additional key component. Most learning opportunities were reported to be informal and opportunistic, related to the specific patients whose care was discussed within each handover. Handover team members indicated that implicit learning occurred as a feature of their handover experience.

**CONCLUSIONS:** Learning opportunities exist within team handovers and the associated learning frequently occurs either opportunistically or implicitly. Adoption of a reflective approach to learning opportunities is likely to result in improved educational experiences for handover participants, particularly medical students and junior doctors. Handover represents a clinical event within which valuable workplace learning occurs.

Clinical education has traditionally been a curriculum dominated by formal teaching at an undergraduate level and an apprenticeship model at a postgraduate level. Today, clinical education embraces a complex learning environment utilising the principles of adult learning established in the educational literature.<sup>1</sup> Health professionals who work in hospitals and other complex workplace environments experience many learning opportunities of varying levels of formality.<sup>1,2</sup> Eraut (2000) defined formal learning as learning that occurred within a formal situation, such as within a prescribed learning framework, as an organised learning event or in the context of a formal qualification.<sup>3</sup> He described aspects of informal learning, and included deliberative learning, which occurred in time specifically set aside for the purpose of learning. By contrast, he noted that implicit learning took place when there was no explicit intention to learn and no immediate awareness of learning as it occurred. Between these extremes, he described reactive learning as

an almost spontaneous, unplanned event, in which the learner knows that learning is occurring but which might not necessarily be intentional.<sup>3</sup>

Clinical handover has been defined as “the exchange between health professionals of information about a patient accompanying either a transfer of control over, or of responsibility for, the patient”.<sup>4</sup> Handover is accepted as a critical component of patient care within modern health systems, such as hospitals.<sup>4,5</sup> The requirement for safe, effective transfer of patient information is driven by the contribution of multiple health professionals to individual patients' care.<sup>5</sup>

Within the handover context, medical staff and students assimilate previously acquired knowledge with new experiences that arise from everyday patient contact, and thus gain from these educational opportunities.<sup>6,7</sup> Klaber and Macdougall (2009) described variable team handover structures in paediatric teams. They proposed that handover represents a possible but demanding activity

within which educational opportunities could occur. Because handover is an activity that occurs regularly, they argued that it enables planning for learning to occur.<sup>7</sup> In addition, Nimmo (2014) asserted that uncertainties about patient management voiced by team members provided an opportunity for learning to occur.<sup>8</sup>

The handover setting thus allows an opportunity within which learning can occur. This literature provoked the following research question: to what extent do educational opportunities occur within paediatric team handovers in New Zealand secondary hospitals?

## Methods

We purposively selected two New Zealand paediatric departments located within secondary hospitals, which offered 24-hour acute medical services. Both departments had daily morning team handovers that a range of medical staff and students attended. Neither hospital's paediatric handovers routinely involved the presence of nursing staff. At both sites, weekday handovers lasted about 30 minutes and were usually attended by between 7 and 12 practitioners: one or more consultants, several junior doctors and medical students. At each site, the overnight on-duty junior doctor presented each patient listed on a handover sheet, which was maintained by doctors throughout each shift. Inclusion criteria for participation were to be a medical doctor or medical student who had participated in a morning paediatrics team handover at either hospital during the recruitment period (November 2014–January 2015). An administrator at each site offered all current paediatric team members the opportunity to participate in the study, and participants were then enrolled. The interviewer (SB) was available for interviews on three days at each site between November 2014 and January 2015. Participant involvement was thus dependent on staff availability on the days available.

The principal researcher (SB) has considerable experience as a general paediatrician and in team handovers but had never worked or had an educational relationship within either of the two hospitals studied. This decision was purposeful, to avoid any recruitment issues around conducting

research involving colleagues or direct reports. This study fulfilled the research component of his Master of Clinical Education degree.<sup>9</sup> The two supervisors are researchers with PhDs in educational psychology (MH) and adult education (JE), with extensive understanding of qualitative research methodology. We acknowledged the potential for power imbalance between the researcher and those interviewed.<sup>10</sup> The researcher (SB) attempted to take a stance that was non-judgmental, sensitive and respectful of the participants. Advantages of the researcher (SB) being enmeshed within the New Zealand paediatric system included his awareness of the processes being described, the disease conditions alluded to and the health system within which handovers occurred.

The interview schedule employed open-ended questions regarding the handover process, with supplementary structured questions regarding education within the handover process. The questions were developed based on the literature review conducted, appropriate to a qualitative study design, and based on SB's expertise in paediatric medicine to allow the development of themes within the handover process, but also to consider the role of education in this setting. (See Appendix 1). For each interview, digital audio recordings and field notes were made. The notes provided a further lens to assist with the interpretation of the interviewee's transcripts.

A code was assigned to each participant, and each audio-file was transcribed and subsequently reviewed for accuracy. To add a further check on the trustworthiness of the data, all participants were offered the opportunity to review their transcript and withdraw all or part of the transcript data.

We analysed the data inductively and reviewed each transcript several times, allowing coding of pertinent data. We used ATLAS.ti for Mac version 1.5.0 (Scientific Software, Berlin, Germany) qualitative data analytical software, and this resulted in the identification of multiple codes. These codes were collated into themes; further refinement of the codes and themes occurred, which provided understanding of the data in relation to the research question.<sup>11</sup> We undertook a detailed analysis of each theme and sub-theme and identified

exemplar quotes using a general inductive technique.<sup>12</sup> To ensure further rigor, two participants reviewed their transcripts and the preliminary themes<sup>13</sup> that these raised prior to the detailed study analysis stage. Both participants agreed with our interpretations.

The University of Auckland Human Participants Ethics Committee approved the research (reference number 012436). We obtained consent to recruit at the two paediatric departments from the team handover members, the Heads of Department and the Chief Executive Officers at each hospital.

## Results

Twenty-nine participants were interviewed, of whom 10 were consultants (C1 to C10), 13 were junior doctors (JD1 to JD13) and six were final-year medical students (MS1 to MS6). Junior doctors ranged in experience from house officers in their third postgraduate year of training through to senior registrars, who had six or more years of paediatric experience. Fourteen participants were from Hospital One and 15 were from Hospital Two; 14 were male and 15 were female. The structured interviews had a mean duration of 42 minutes. Two participants accepted the offer to review their transcript; only one made minor amendments to the original transcript. Data saturation was reached after 29 interviews were completed, in that few, new, rich concepts arose in the interviews.<sup>14</sup> Two peer reviewers concurred with the interpretation of the data provided to them, and agreed with the overall themes considered in relation to learning within the handover process.

### Themes

Every participant identified that the primary function of handover is to ensure safe, reliable exchange of pertinent information about patients the team provided care for. The other key themes that emerged from the interviews related to the importance of learning within handover. The thematic structure of the reported learning can be described as follows:

1. Informal learning, specifically:
  - (a) Opportunistic learning,
  - (b) Implicit learning, and
  - (c) Reflective learning.
2. Formal and deliberative learning.

### Informal learning within handover

The findings in this study indicate that handover contributed to patient safety by providing a regular meeting at which accurate transfer of information and responsibility occurred between team members. Learning was reported as a critical, but secondary function of handover. A medical student stated:

*“The most important thing [about handover] would be making sure everyone’s aware of what is happening with the patients, who the patients are and what the plan is for them, if there is anything that they particularly want done. That’s the most important thing, and I guess secondary you could have some teaching if there was an interesting point.”* (MS4)

The majority of participants indicated that the principal perceived beneficiaries of the learning were the junior doctors and students. A few junior doctors and most consultants indicated that consultants also experienced learning within handover.

Participants described most learning within handover as informal, which arose in relation to specific patients discussed during team handovers. A junior doctor noted:

*“We’re not saying, “and now I will talk about this, and here is [the] introduction, and here [are] my points, and then the finish.” It’s way more informal. It’s just like, “how would you have managed that?” “By doing this.” And then ... “oh, okay”, and that leads on to questions.”* (JD13)

Participants portrayed the value of learning within handover as being related to brief learning moments. A junior doctor (JD6) described education within handover as “narrow”, but valued because it contained otherwise inaccessible practice tips. He contrasted this with more formalised learning available in textbooks and through “didactic teaching” and suggested that “there’s a significant teaching component in most handovers”.

Study participants noted the relevance of the informal learning within handover to patients they had seen clinically or discussed. A junior doctor (JD4) found “trying to learn ... a lot easier when the education’s tied to a patient”. Another (JD6) described how “relatable” learning was within handover “because it’s a patient that we’ve seen or it’s an environment that we’re all familiar and comfortable with”. He

commented that “the learning points that you can get in spontaneous teaching in a handover, can be much more powerful than really structured teaching”.

A few participants voiced a concern that an overemphasis on teaching in handover might cause problems with getting the handover performed in a timely way, or that issues discussed might be of little relevance to some members.

### Opportunistic learning

Opportunistic learning represented the most commonly described form of learning within handover. It was typified by brief, opportunistic learning “moments”. A junior doctor stated:

*“I personally learn better by fleshing out a patient, discussing a clinical case you’ve got in front of you. It’s a spontaneous teaching moment, rather than it being someone setting out to: ‘I’m going to teach you about this’.”* (JD6)

Most participants stressed the opportunity handover provided for near-spontaneous teaching moments to occur. Uncertainty about a case prompted brief discussion about a point of diagnosis, management or another related issue.

A student (MS2) commented on the challenge of ensuring that education occurred in the handover. While he described the learning as “opportunistic”, he indicated that, if team members didn’t consider a potentially educative moment, then opportunistic teaching might not happen. Remembering to provide teaching within handover required “active” thinking by team members, particularly by those who provided leadership within handover.

### Implicit learning

Participants described how clinical experiences, including handover, contributed to their understanding about a condition and impacted on management of subsequent patients. In doing so, they described implicit learning occurring.<sup>3</sup>

A consultant commented in relation to educational opportunities:

*“It’s part and parcel of [handover]. People may not be aware specifically that that happens, but every chance to talk about something in the end can be viewed as an educational opportunity.”* (C3)

He understood that learning occurred as members handed over patients. Similarly, one junior doctor (JD8) stated: “especially when you’re just starting out in this job, you [are] using every opportunity that you can to soak in information”. She saw handover as a time when junior doctors could be “soaked in” clinical information in order to learn how to function more effectively as doctors.

A junior doctor (JD2) described handover as “like a whole lot of mini case discussions that you hear a brief bit about the history and the diagnosis and treatment”. Their description suggested that team members learned incrementally from hearing about successive cases and internalised the knowledge acquired in this way.

### Reflection in handover

Handover allowed participants to consider their management of patients, reflect on what they learned from the interactions, and plan management of patients they encountered in the future.

A junior doctor commented on two children presenting with a medical condition:

*“[A child] had this, and then we treated him with this, because of this. And now [another child] comes in with the same thing, and you’re like ... for [the first child] we did that ... because you’re attaching it to memory.”* (JD8)

She illustrated that learning from one case informed later management of similar cases for a team member. Another junior doctor stated:

*“I’m always trying to figure out, ‘what would I have done if that was me? Would I have done it the same?’ And then, actually using that as an opportunity to either say how I would have done it, or to say, ‘well that’s how they’re doing it. Maybe I’ll try that next time’.”* (JD10)

Another junior doctor (JD9) described “[putting] yourself in their shoes” as the team listened during handover, “and it might be you tomorrow that’s on call.” The reflection allowed her to consider how she might respond if she saw a similar patient “in the future”.

### Formal and deliberative learning

Many of the study participants were undertaking formal university degree or diploma courses. However, none of the participants described the handover process

as part of those formal processes.<sup>3</sup> Deliberative learning, where educational time was specifically set aside adjacent to handover,<sup>3</sup> did not occur overtly within the study participants' usual handovers. A junior doctor (JD3) referred to separate "teaching sessions fortnightly, or weekly ... secure teaching sessions for the whole team", where cases could be subsequently discussed.

One junior doctor recounted a particularly valuable handover experience in another team he had worked with, where:

*"... you'd try and get through the aspects of handover quickly, and then one of the [junior doctors] would present a topic. And it was semi-structured ... there was a PowerPoint presentation ... and it would be just five to ten minutes, and it could be case-based."* (JD6)

Participants did not routinely report deliberative learning of this type within the specific team handovers immediately prior to being interviewed. However, several reported having experienced this type of learning in earlier handovers. They saw value in such sessions, particularly when the teaching related to a patient for whom their team had recently provided care.

### Summary of results

Participants perceived learning as an important function of the team handover process, provided the issue of patient safety remained prioritised. They valued brief, opportunistic learning that occurred in relation to specific patients their team was providing medical care for. They particularly valued the opportunity to understand diagnostic, management and prognostic issues relevant to their patients. Participants acknowledged that important implicit learning occurred within the handover meeting. The meeting provided an opportunity for reflection on issues that arose in the handover, which in turn reportedly influenced future clinical encounters. Many participants acknowledged that deliberative learning had been part of other team handover experiences and had been valuable for them. However, they generally described the more informal, opportunistic learning as of greater educational value to them because it related to specific patients.

## Discussion

These findings reveal that learning opportunities existed within paediatric team handovers in New Zealand secondary hospitals. In the following analysis, we will consider key elements that emerged from the findings.

Participants identified patient safety as the primary reason for handover and one means by which team members decreased the likelihood of missing critical clinical issues. These findings reinforce the literature consensus regarding the primary purpose of handover, namely that it allows effective continuity of care by transmission of essential information between clinicians.<sup>4,5</sup>

Our study supported the view that team handovers provide an excellent opportunity for workplace learning.<sup>6,7,15</sup> The findings affirm that learning took place within a professional setting, and thus provided meaning to learning.<sup>16</sup> During handover, clinical teams gather, communicate and learn.<sup>7</sup> Participants from both sites portrayed their handovers as meeting these functions, and described learning as a secondary, but important function of handover. They described the simultaneous occurrence of working and learning within the handover setting, and that learning was influenced by the clinical work.<sup>17</sup> One described significant "teaching component[s] in most handovers", and many reported that patients' clinical problems discussed within handover were directly relevant to them. For example, clinicians involved in the handover often needed to leave their handovers to manage the actual patient, and this requirement made learning within handover meaningful to team members, and gave the learning immediacy.<sup>6,7</sup> Cohen and Hilligoss (2010) noted that health professionals need to maintain significant rates of continuous learning, and that handovers are an important event within which this vital learning can occur.<sup>4</sup>

The themes related to learning were congruent with those described by Eraut (2000),<sup>3</sup> but we suggest modifications within the team handover situation. We believe

**Table 1:** Modes of learning within team handover.

Formality	Formal and deliberative learning		Informal learning		
	Modes	Deliberative learning	Opportunistic learning	Reflective learning	Implicit learning
Relevant aspects	In the context of a course; the presence of a prescribed learning framework <sup>3</sup>	Organised before a specific handover; time set aside for this <sup>3</sup>	Response to an opportunity within handover; directly related to patients discussed	Precipitated by handover discussions; reflection centred on patients seen by clinician or described by others	Often not explicitly recognised at the time
Characteristics in current study	Not reported	Experienced by participants in other team settings; teaching precipitated by handover topics; often occurred immediately after handover	Immediate, brief; relevant to patients and learners; often apparently spontaneous; potential to prepare for likely teachable moments	Near -simultaneous or subsequent reflection; apparent effect on subsequent management of similar patients	Role modelling; relevance to the hidden curriculum. A frequently unrecognised, important mode of learning within handover.

that a summary of learning methods within handover provides contributors with a framework that can inform their own team handovers. In Table 1, we consider the key concepts depicted in Eraut's typology and apply these to the handover setting by integrating the themes which emerged within this study.

Participants did not report that formal learning had a significant role within the handovers studied. Deliberative learning was not a feature of the studied handovers, although several participants commented on its usefulness in other team handovers. Brief, planned teaching relevant to a recently-treated patient often typified this type of deliberative learning, and represents one way in which the handover meeting can be adapted for learning. The planned nature of both formal and deliberative learning prompted us to consider these types of learning as distinct modes from the more informal learning that participants described in relation to their handover learning experiences.

All participants focused on informal learning within handover positively due to its relevance to their work. Teaching within handover was reported as "narrow", but specific to patients' actual clinical problems. Stephenson (2001) noted that learners at work incidentally accumulate specialist knowledge and skills through experience.<sup>18</sup> The description of informal learning and of "teaching moments" within handover resonates with Stephenson's description.

Study participants described the recognition of knowledge gaps, and the use of questions that allowed brief, spontaneous, rich learning opportunities that were relevant to the patients discussed and met their learning needs. Several participants described this type of learning as "opportunistic", which resulted in brief teaching within handover. They emphasised the near-spontaneous nature of learning which the handover structure enabled. Eraut (2000) suggested within his typology that "reactive" learning involves "incidental noting of facts, opinions, impressions and

ideas”,<sup>3</sup> a feature of the handover dialogue described in this study. He linked this with a recognition of learning opportunities and suggested that learners and teachers could maximise reactive learning by being prepared for these learning opportunities.<sup>3</sup>

Active conversation between handover team members is important, as it allows the opportunity for assumptions to be questioned, and areas of uncertainty to be raised.<sup>8,19</sup> Within this study, the term “opportunistic” was used repeatedly by participants and appears to reflect the way that teaching and learning usually occurred in this context. We prefer to use the term “opportunistic learning” rather than “reactive learning” in relation to this important form of learning within the team handover context. The role of opportunistic learning in handover has been alluded to in previous literature,<sup>4,7,19</sup> but this study explicitly draws attention to this as a critical mode of learning for handover members.

Implicit learning is “the acquisition of knowledge that takes place largely independently of conscious attempts to learn”.<sup>20</sup> Participants described handover contributing to their understanding of patients’ conditions, and such learning was “part and parcel” of each handover, but team members might “not [be] aware specifically that that happens”. Others described handover as an “opportunity that you can soak in information”. Overall, participants perceived that learning within handover impacted positively on their ability to deal with subsequent patients with similar clinical presentations. Participants’ remarks have resonance with Hilligoss and Cohen’s (2011) statement that “every [handover] interaction is an opportunity for the participants to learn, in the sense of altering the skills and assumptions that will shape their actions beyond their work with the patient at hand”, thus creating an opportunity for implicit learning.<sup>15</sup> This study did not explicitly focus on the acquisition of implicit learning in handover. However, it seems likely that the rich, probing dialogue described by participants within typical handovers allowed implicit learning to occur.

The findings reinforce those of Egan and Jaye (2009), who considered learning within clinical placements for New Zealand medical students. They noted that learning depends

on the opportunities that arise and clinicians’ response to these clinical encounters, and that medical students learn from applications of knowledge in ways that are practical and informal.<sup>21</sup> Implicit learning was described as a key means of learning within this study, and this adds to the body of evidence that the hidden curriculum forms a major factor in students’ and junior doctors’ acquisition of knowledge, skills and attitudes.<sup>22,23</sup> The implication of this is that the way the handover occurs, including the nature of the interactions, may be critical as to whether the more junior members of the team are able to learn. In short, the team atmosphere is important, and handover leaders may wish to consider whether their handovers invite juniors to interact within them.

Handover members discussed patients they had just seen and understood that they had to either acquire knowledge or interpret existing knowledge in this context to deal effectively with these patients’ presentations, diagnoses or management. Participants portrayed this learning as reflective, in that professionals learned about something while they were doing it.<sup>24</sup> They described hearing about a patient’s management during handover, asking whether they would have managed the child in the described manner, and then deciding, “maybe I’ll try that next time”. Handovers thus provided the opportunity for participants to reflect on their and others’ management of a patient after the clinical event.<sup>24</sup> Some participants reported “putting [themselves] in [their colleagues’] shoes”, understanding that “it might be [them] tomorrow”. Because the same or similar patients were discussed on a regular basis in handovers,<sup>7</sup> this allowed reinforcement of understanding about specific patients’ conditions and what management steps proved helpful. Reflection has been described as “the engine that shifts surface learning to deep learning”.<sup>25</sup>

Many opportunities for reflection within clinical practice occur after meaningful “teachable moments”.<sup>26</sup> Those involved in handovers might usefully consider specific patients about whom it would be instructive for participants to spend time during handover discussing their clinical presentations. An awareness of the gaps in understanding of the doctors

and students in specific handovers might allow leaders the opportunity to tailor these teachable moments.<sup>27</sup> We consider this to be an important way in which consultants can prepare for handovers. Many conditions are seen frequently, and they can be prepared with a 30- to 60-second teachable moment relating to a common condition or investigation, which in turn may greatly assist more junior members of the team in understanding their patients. The study findings support the importance of reflective learning within the handover process, as handover provides a valuable environment in which teachable moments and reflection occur. The central role of reflection that is precipitated by the team handover process has prompted us to include this as a key mode of learning within handover.

The study raised a note of caution about an overemphasis on education within team handovers. The principal function of handover is allowing the handing over of essential information,<sup>4,5</sup> and several participants expressed a concern about the need to balance education as a brief but important component of handover. If handover participants can perceive the importance of implicit learning and that relatively brief, opportunistic teachable moments can be powerful means by which learning may occur, then concerns about an overemphasis on education may abate.

This study has the limitations implicit in qualitative research: the findings are not generalisable to other team handover situations.<sup>28</sup> Even though this study involved handovers in two New Zealand paediatric departments, the process of investigation and many of the emergent ideas will likely have relevance for other medical team handovers in other contexts.<sup>29</sup> Qualitative interviews can provide important insights into people's views and experiences, but are limited by individuals' abilities to recall detailed information.<sup>30</sup> While study participants reported during the interviews that they found handovers a rich education experience, this study was not focused on quantifying measurable changes in learning. Nonetheless, it was because of the need to reach an understanding of the rich complexity of learning within handover that a qualitative methodology was adopted. Indeed, qualitative research's emphases on rich description of context, naturalistic inquiry and transferability of findings allowed the ability to probe deeply into participants' perceptions of handovers in a

way that an observational study or a questionnaire-based study would not have.<sup>10</sup>

The potential exists for team handovers to be potent learning encounters within which clinicians and students can actively learn. While patient safety remains the critical focus of handover, team members value brief, opportunistic "teachable moments" that are directly relevant to the patients that they are discussing and treating. Handover leaders might usefully consider whether some "teachable moments" are predictable and prepare for them. Handover allows participants multiple opportunities to reflect on their practice in the context of their own and other clinicians' patient management experiences: this process might be encouraged by handover leaders, specifically by the use of appropriate questioning within the handover. The role of implicit learning within handover needs careful consideration by handover participants. Leaders might usefully consider the quality of interactions within the handover process, and whether this could be improved to allow a more supportive learning environment.

Future research could explore similar themes within other team handover situations, such as with other specialty groups, in larger hospitals, with inter-professional teams, and in other countries with different medical systems. An observational study could be planned in which researchers observed actual handovers for potential educational and learning moments.

## Conclusion

In summary, the participants viewed team handovers as having an essential safety function but described learning as representing a valuable secondary function. Most learning represented informal workplace learning, with an emphasis on opportunistic learning which arose from discussion about specific patients. The ability within handover to reflect on the participants' own and others' clinical practice allowed a powerful opportunity to learn from these experiences. Within handover, implicit learning appeared to be a critical process by which participants improved their understanding of clinical practice and modelled behaviours. It is suggested that handover participants reflect on the ways in which their practice enables learning to occur, and that senior team leaders consider whether brief teachable moments could become integrated into their handovers. Paediatric team handover represents a time to learn.

## Appendix 1: Interview schedule

### Introduction

Tell me about yourself.

What position, age group & ethnicity do you identify with?

How long have you worked at this DHB? How long have you been in your current position?

How much time have you spent working in paediatrics since graduating?

### Handovers

Tell me what you see as positive aspects of the team handover process?

Tell me what you see as negative aspects of the team handover process?

What do you see as the important priorities for paediatric team handover?

In the most recent paediatric team handover which you were part of, what went well?

Why did it go well?

What went less well? Why?

Tell me about any specific issues.

### Education

To what extent do you think that education is an important part of the team handover process?

Please identify any educational opportunities that occurred in the most recent paediatric team handover which you were part of.

How were the educational opportunities handled?

Who did you think was involved in the educating?

To whom was the education directed?

To what extent do you think that the participants' educational needs were being considered?

Who raised any educational issues?

Can you give examples of where you or your paediatric team would turn to in order to answer questions raised in a team handover? For example, books, personal knowledge or internet sites?

If education has a role in paediatric team handover, what is it?

Can you identify instances of missed educational opportunities within the most recent paediatric team handover which you were part of? Explain.

If you identified an educational question you were still uncertain about at the end of a team handover, how would you address the question?

What educational areas do you see as important during paediatric team handovers?

To what extent are team issues and/or communication issues important in the paediatric team handover?

To what extent does the paediatric team handover allow participants to ask educational questions?

Can you describe any barriers to asking questions in a paediatric team handover?

To what extent do you think that junior members of the team can ask educational questions?

When questions get asked, who usually provides the answers?

What would enable more education to occur in the paediatric team handover?

What barriers do you identify to education occurring in the team handover?

Within the handover process, is there a conflict between education and the service requirements?

### Closing questions

Do you have any other comments?

Do you have any other questions?

**Competing interests:**

Nil.

**Acknowledgements:**

We are grateful to the participants of the study at the two hospitals, who graciously shared their experiences of the handovers they were part of. Dr Tim Jelleyman, Dr Emma Merry, Dr Danny de Lore and Dr Ben Wheeler all provided valuable peer comment regarding the initial study findings. Dr Sonja Crone participated in a pilot interview, and provided rich feedback. We are grateful to Brenda Flood for carefully transcribing the interviews.

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**URL:**

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2018/vol-131-no-1476-8-june-2018/7586>

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# The Matthew effect in New Zealand rural hospital trauma and emergency care: why rural simulation-based education matters

Marc Gutenstein, Sampsa Kiuru

## ABSTRACT

We describe a phenomenon of self-reinforcing inequality between New Zealand rural hospitals and urban trauma centres. Rural doctors work in remote geographical locations, with rare exposure to managing critical injuries, and with little direct support when they do. Paradoxically, but for the same reasons, they also have little access to the intensive training resources and specialist oversight of their university hospital colleagues. In keeping with international experience, we propose that using simulation-based education for rural hospital trauma and emergency team training will mitigate this effect. Along with several different organisations in New Zealand, the University of Otago rural postgraduate programme is developing inter-professional simulation content to address this challenge and open new avenues for research.

**T**he Matthew effect<sup>1</sup> describes a general pattern of self-reinforcing inequality related to economic wealth, political power, prestige, knowledge or in fact any other scarce or valued resource. Also termed ‘cumulative advantage’ or ‘success-breeds-success’, it is closely related to the concept of preferential attachment in network science, where the more connected nodes are destined to acquire many more links in the future than the auxiliary nodes. We suggest that multiple factors converge to create a rural hospital ‘Matthew effect’ in New Zealand. For trauma and emergency care, a relative lack of exposure, training opportunities, collegial support, facility and team cohesion may lead to an increasing gap in performance between rural hospital clinicians and their urban trauma team counterparts.

Rural hospital medicine is determined by its social context, the rural environment, the demands of which include professional and geographic isolation, limited resources and special cultural and sociological factors.

It is invariably practised at a distance from comprehensive specialist medical and surgical services and investigations. A broad generalist set of skills, knowledge and attitudes are needed to deliver optimum patient outcomes in rural hospitals.<sup>2</sup> In New Zealand, vocational training and maintenance of professional standards in rural hospital medicine is undertaken through the Division of Rural Hospital Medicine (DRHM), a chapter of the Royal New Zealand College of General Practitioners.

Inherent to rural hospital practice is trauma and emergency care. Accidental or non-accidental injuries, and medical emergencies are a function of the local population not the medical service, hence rural practitioners can expect to be exposed to a variety of significant clinical challenges. These cases are best described as “high-risk, low-frequency situations” for both the patient and the clinical team, and in these circumstances healthcare professionals require a specific set of skills to enable the translation of their knowledge into safe patient care.<sup>3</sup>

A variety of compounding factors lead to differences between rural and urban trauma and emergency care. Rural providers must perform competent and safe care, yet individual practitioner exposure is limited by rural scope. Furthermore, the infrequency of exposure is itself a challenge to achieve and maintain competency in critical procedures. In contrast to urban emergency departments with resident specialist teams of emergency physicians, surgical and medical sub-specialists, a typical rural team may consist of one or two rural hospital doctors and nurses. Hence both specialist backup in critical scenarios and collegial support is lacking.

Outside direct patient care, the educational networks and resources that accompany large urban hospitals have historically also been largely absent in rural New Zealand, making opportunities to train rural emergency teams more difficult. While great gains have been made through development of the Division of Rural Hospital Medicine (DRHM) training programme, and a new national school of rural health has been proposed,<sup>4</sup> the rural workforce itself is still highly dependent on overseas trained practitioners,<sup>5</sup> and the institutional knowledge that builds up in larger centres may be more fragile in the rural context.

The implication of this Matthew effect is significant. A rural ‘mortality penalty’ where increased mortality from traumatic injury can be attributed to distance and terrain, has been described in Australia<sup>6</sup> and the US.<sup>7</sup> In New Zealand, only 84% of the population has the theoretical pre-hospital service coverage to undergo transport to a level 1 or 2 trauma service within 60 minutes.<sup>8</sup>

Despite this, the needs of a rural population can equal or exceed urban populations. The incidence of moderate to severe traumatic brain injury in the rural population is almost 2.5 times greater than in the urban population.<sup>9</sup> There is considerable variation across New Zealand in fatal injury rates by district health board, and current research into preventable injury deaths and identifying opportunities to improve timeliness and reach of emergency healthcare services in New Zealand is ongoing.<sup>10</sup> Preliminary research findings suggest that rural areas are of major concern.<sup>8</sup>

### Addressing the Matthew effect: The role of simulation training

We propose that the solution to a rural Matthew effect is an investment in simulation-based education in the rural sector, and suggest that this principle is used to strengthen connections, develop inter-professional and interdisciplinary networks, and redesign rural postgraduate and post-vocational training in trauma and emergency care.

Simulation-based education is a now well established and evidence-based educational intervention. Heterogeneous evidence across multiple topic areas shows that training with simulation-based exercises increases technical and procedural performance, expertise, communication and collaboration, can improve team performance and interpersonal dynamics, and more limited evidence suggests that improvements in patient outcomes attributable to simulation exercises can occur at the health system level.<sup>11,12</sup> Benefits of rural simulation education would include the following (see Table 1).

**Table 1:** Proposed benefits of rural simulation-based education.

1.	Procedural skills maintenance
2.	Inter-professional learning including pre-hospital teams
3.	Enhanced teamwork, communication and leadership
4.	Rural workforce retention and recruitment
5.	Highlighting latent issues in rural practice, such as patient transfer issues
6.	Standardisation of equipment and procedures
7.	Improving patient safety
8.	Encouraging research
9.	Bridging rural practice to other New Zealand medical networks
10.	Opportunities for educational faculty development

Simulation is an ideal fit for reversing the rural inequality in dealing with high-risk, low-frequency scenarios—effectively increasing frequency of exposure while improving competence and team dynamics. Deliberate investments in rural simulation have occurred internationally in the US,<sup>13</sup> Canada<sup>14</sup> and Scotland.<sup>15</sup> Examples include the development of a Rural Trauma Team Development Course,<sup>13</sup> to which a more rapid patient transport time from rural to tertiary centres has been credited.<sup>16</sup> Training as native teams rather than individuals may improve the resilience of small centres by cementing team-based rather than individual-based knowledge, and introducing a culture of deliberate practice and debriefing.

In New Zealand, simulation-based education can be fostered by incorporating these methods into both pre-vocational training in rural hospital medicine and continuous medical education (CME) programmes for the established workforce. This will require an inter-professional and collaborative approach. In the South Island this includes organisations such as the University of Otago Rural Postgraduate Programme<sup>17</sup> and Rural Health Academic Centre, the district health boards, St John, New Zealand Defence Force, South Island

Alliance and others. The aim should be to create a coordinated clinical simulation network across rural areas that emulates and reinforces the clinical networks that exist for patient care, and supports the promotion and sharing of rurally relevant simulation resources across New Zealand and into the Pacific.

In addition to the development of simulation courses and resources for rural clinicians, future directions for rural simulation in New Zealand include developing a robust multi-professional faculty, research into small team dynamics and simulation effectiveness, and creating a virtual network of simulation facilitators, educators and debriefers using video technology. We believe that rural simulation based education will not only mitigate the Matthew effect but will also foster collaboration across the whole health system.

## Conclusions

We have described a rural hospital ‘Matthew effect’, along with a simulation-based educational strategy to mitigate this effect, strengthen connections and networks, and grow resilient rural trauma and emergency teams in New Zealand and the Pacific.

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### Competing interests:

Nil.

### Acknowledgements:

Canterbury Simulation Interest Group; South Island Alliance; St John; Rural Health Academic Centre, Ashburton.

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# Acute appendicitis in an incarcerated femoral hernia

Simon Richards, Joel D'Souza

A 69-year-old lady presented acutely to our surgical unit with a four-day history of a painful lump in her right groin. This was associated with nausea but no vomiting or obstipation. Systemically she was well. On examination she had a red tender irreducible mass in the right groin below the inguinal ligament. This was approximately 5x4cm in size. Clinically this appeared to be an incarcerated femoral hernia. She had a history of a prior open left femoral hernia repair two years earlier. Blood tests showed a normal white cell count and an elevated C-reactive protein of 79mg/L. A CT scan was performed which showed the presence of a right femoral hernia with the appendix incarcerated within (Figure 1). Extensive surrounding inflammatory changes were seen suggesting inflammation, however, infective changes could not be excluded.

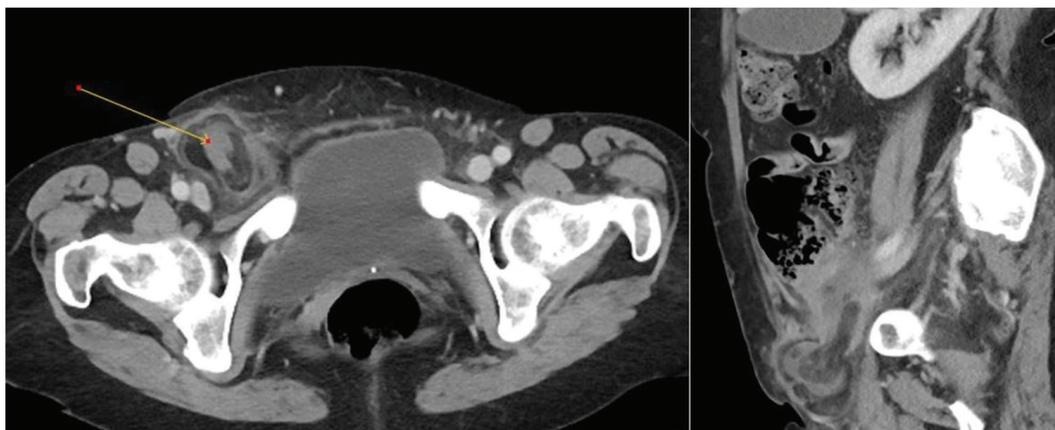
She was taken to theatre for an acute open femoral hernia repair via a high approach. Operative findings were of an infarcted necrotic appendix within a femoral hernia sac (Figure 2). There was no contamination. A standard appendicectomy was performed and the hernial orifice was closed with a suture repair. The patient's recovery was uncomplicated. Histological findings were of global infarction of the appendix with extensive coagulative necrosis.

## Discussion

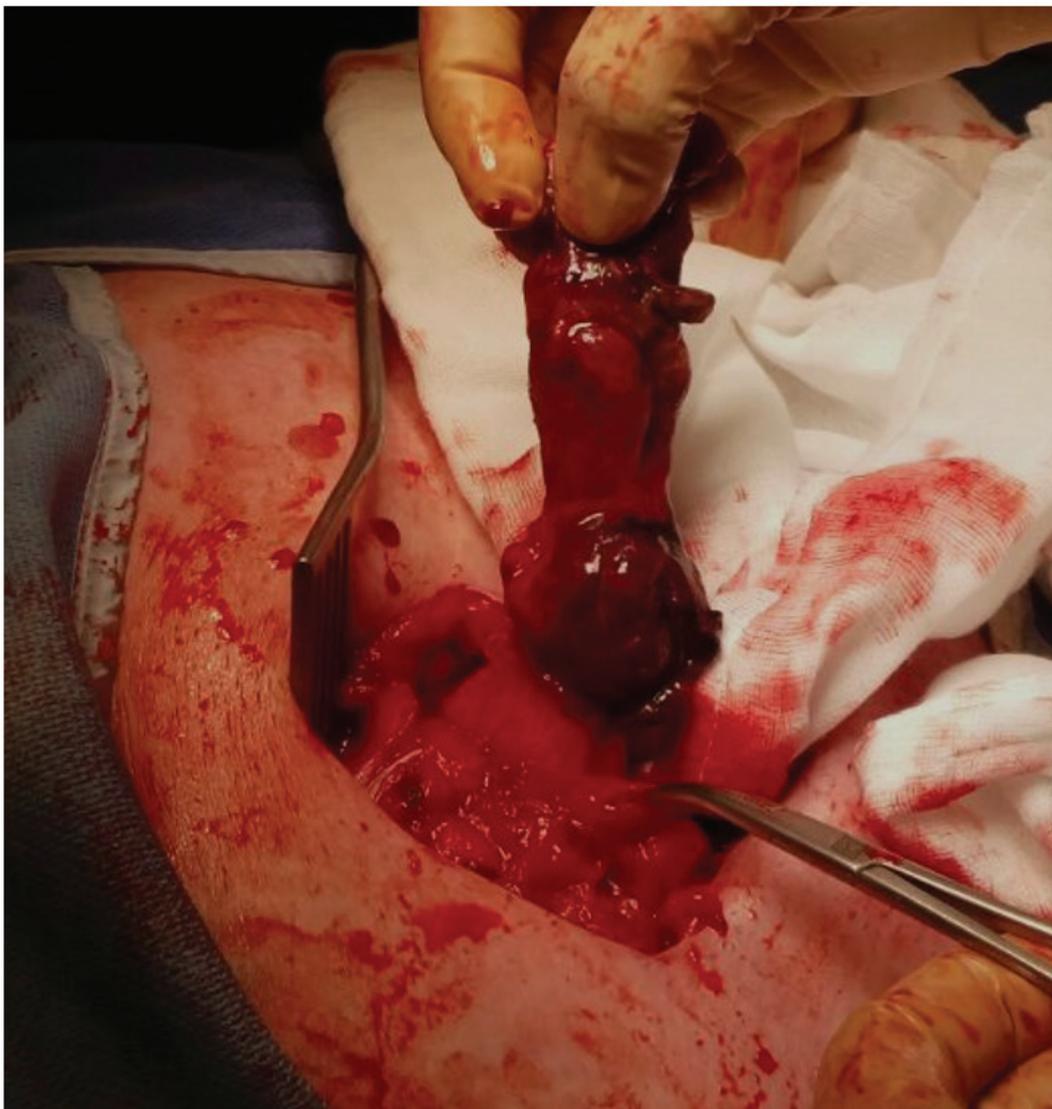
The presence of the appendix within a femoral hernia was first described by the French surgeon Rene De Garengeot in 1731<sup>1</sup> and in modern surgical literature this clinical entity is often referred to as a De Garengeot hernia (DGH). In 1785, Hevin was credited with being the first surgeon to perform an appendicectomy for appendicitis within a femoral hernia. Femoral hernias account for only 4% of groin hernias and are five times more common in females.<sup>2</sup> They typically present as a painful swelling below the inguinal ligament and often contain preperitoneal fat or omentum. A femoral hernia containing the appendix is uncommon and is typically an incidental intraoperative finding occurring in 0.5 to 3% of all femoral hernias.<sup>3</sup> Appendicitis within a femoral is rare with approximately 100 cases described within the literature. It is thought that a large, mobile pelvic caecum may predispose to the appendix lying within a femoral hernia.<sup>4</sup> The narrow neck of the hernia may compress the appendix leading to secondary inflammation, "appendicitis", necrosis and perforation.

Typical presentation is non-specific, usually mimicking a standard incarcerated femoral hernia with an irreducible right-

**Figure 1:** Axial and Sagittal CT slices showing De Garengeot hernia.



**Figure 2:** Operative image of infarcted appendix after removal from hernial sac.



sided groin lump, pain and associated signs of inflammation.<sup>5</sup> In a review of 36 patients presenting with a symptomatic DGH, Kalles et al noted that 97% of patients had a tender groin lump and 56% of patients had erythema of the overlying skin.<sup>6</sup> Patients may also present with systemic symptoms such as fever and tachycardia.<sup>5</sup> Rarely patients may present with bowel obstruction.<sup>4</sup> Preoperative laboratory investigation typically shows leukocytosis and elevation of C-reactive protein. Radiological findings are non-specific<sup>5</sup> and imaging is often not performed pre-operatively in the case of a suspected incarcerated femoral hernia. In their review, Kalles et al noted that pre-operative ultrasound had a diagnostic accuracy of 20% and CT had an accuracy of 44%.<sup>5</sup>

Operatively a high approach as for a femoral hernia is often recommended.<sup>6</sup>

This allows for entry into the peritoneum with reduction of the appendix and appendectomy, with subsequent repair of the femoral defect. This may be achieved via a suture or mesh repair with similar complication rates.<sup>5</sup> Most authors tended to reserve mesh repair for cases where the finding was incidental.<sup>6,7</sup> Some authors have reported a successful laparoscopic approach.<sup>7</sup> Given the paucity of literature currently, there is no gold standard operative approach.

## Conclusion

The presence of the appendix in a femoral hernia sac is known as de Garengeot hernia. The diagnosis should be considered in a patient with a red tender right-sided groin mass. Appropriate management consists of an appendectomy and hernia repair.

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**Competing interests:**

Nil.

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# Diagnosing pre-clinical dementia: the NZ Genetic Frontotemporal Dementia Study (FTDGeNZ)

Brigid Ryan, Ashleigh Baker, Christina Ilse, Kiri L Brickell, Hannah M Kersten, Helen V Danesh-Meyer, Joanna M Williams, Donna Rose Addis, Lynette Tippett, Maurice A Curtis

Imagine discovering you have dementia only to be told it could have been prevented if you knew 10 years earlier that you were at risk. The pathological processes of dementia begin decades before clinical symptoms arise<sup>1</sup> so by the time dementia is diagnosed clinically, cell death in specific brain regions can be extensive and the damage is likely irreversible.<sup>2</sup> Although no confirmed treatments currently exist, significant research efforts are currently focused on identifying disease-modifying therapies. When treatments are identified, pre-clinical diagnosis will be critical before irreversible changes have occurred in the brain. Towards understanding pre-clinical biomarkers of dementia, New Zealand researchers and clinicians are studying an aggressive form of dementia that has an identified genetic cause and a much more predictable course than sporadic Alzheimer's disease. The NZ Genetic Frontotemporal Dementia Study (FTDGeNZ) is a multidisciplinary, inter-institutional initiative in search of pre-clinical diagnostic markers of dementia in a large New Zealand kindred. The family carries a genetic mutation in the *MAPT* gene that predictably causes behavioural variant frontotemporal dementia (bvFTD).

FTD is a leading cause of early-onset dementia, typically striking between age 45 and 65. Large-scale epidemiological studies of FTD are lacking, but two groups have reported a prevalence of 15 per 100,000 45–64 year-olds in the UK.<sup>3,4</sup> There are currently no prevalence data for New Zealand. Typically FTD is described as having two variants based on clinical

presentation—a language variant and a behavioural variant (bvFTD). Within the language variant two subtypes are recognised: non-fluent primary progressive aphasia (a disorder primarily of expressive language) and semantic dementia (a multimodal loss of semantic knowledge). BvFTD is characterised clinically by personality and behavioural change, impairment of social cognition and/or executive function deficits.<sup>5</sup> Recent findings have suggested that variable memory difficulties are evident in bvFTD.<sup>6</sup> Parkinsonism, usually without resting tremor, can be a feature of bvFTD. A minority of pathologically confirmed cases of bvFTD have been misdiagnosed as Alzheimer's disease, Parkinson's disease, corticobasal syndrome or progressive supranuclear palsy. Initial symptom onset is gradual, eventually progressing to severe generalised dementia. Average survival varies widely, ranging from 2–14 years, and differs by subtype. As with other progressive dementias there is currently no effective treatment; however, selective serotonin reuptake inhibitors and atypical antipsychotics can help with behavioural symptoms.<sup>7</sup> The available data do not support the use of Alzheimer's disease drugs such as Memantine and acetylcholinesterase inhibitors.<sup>7</sup> Parkinsonism typically does not respond to dopaminergic medications such as levodopa.<sup>7</sup>

The FTDGeNZ cohort consists of a single family (NZ-1) with familial bvFTD caused by an autosomal dominant mutation in the gene that encodes the protein tau (*MAPT*). Studying healthy mutation-carriers in this

family before clinical symptoms arise will allow measurement of potential biomarkers up to 30 years before expected clinical onset. The NZ-1 kindred provides a rare opportunity to study the earliest effects of a single mutation in environmentally and genetically similar participants, compared to related non-carrier controls. The mutation (*MAPT* 10+16 C>T) has been identified in 27 other families worldwide, which may constitute a single pedigree from a founder in North Wales.<sup>8</sup> The mutation has complete penetrance, with an average age of onset of 50, although this is variable even within families.<sup>9</sup> This mutation, like all *MAPT* mutations, leads to tau aggregation, neuronal dysfunction and cortical atrophy.

Like Alzheimer's disease, FTD is a prote-inopathy. It is defined pathologically by abnormal protein inclusions in neurons and/or glia that are associated with progressive dysfunction and cell death in frontal and/or temporal lobes. The inclusions usually consist of the proteins tau (~40%) or TDP-43 (~50%).<sup>10</sup> FTD is distinguished from Alzheimer's disease pathologically by the distribution of tau inclusions and the relative absence of amyloid plaques. The relationship between pathology and phenotype is complex: there are correlations between the type of protein inclusion and the FTD subtype, but these are not exact.<sup>10</sup> In 25–50% of cases these protein inclusions are caused by an inherited genetic mutation (familial FTD); the remaining cases are sporadic.<sup>11,12</sup> Familial FTD is caused by a mutation in one of nine genes, most commonly *C9orf72*, *MAPT* or *GRN*. Familial and sporadic FTD of the same subtype are clinically indistinguishable.<sup>13</sup>

The aim of FTDeNZ is to identify accurate markers of disease onset, risk and progression that are relevant to both familial and sporadic FTD. The focus is on non-invasive, cost-effective diagnostic markers, in the hope that they will ultimately be used widely as a screening tool. Understanding the natural course of

FTD may also elucidate the pathological processes underlying related dementias. This is the only study of its kind in New Zealand and one of the largest pre-clinical studies of a family cohort with a single mutation internationally.<sup>14</sup>

We have enrolled 24 healthy participants from the NZ-1 kindred, ranging from 26–59 years old, and have undertaken baseline assessments measuring a range of potential biomarkers that are expected to be affected early in the disease course: blood-based molecules, olfactory dysfunction, cognitive dysfunction, mood changes, retinal changes, and structural and functional brain changes. These assessments will be repeated annually to track the earliest pathological changes that are associated with pre-clinical FTD in mutation carriers versus non-carrier controls.

In addition to identifying markers of pre-clinical dementia, FTDeNZ aims to assist and advocate for the dementia community in New Zealand, specifically those with FTD and other rare dementias. FTDeNZ works in close association with the Dementia Prevention Research Clinics to support the NZ-1 kindred. FTDeNZ is also willing to help clinicians, care-workers, carers and those with FTD connect with support networks, services and researchers nationally and internationally to advance early detection and treatment of dementia.

Support for FTD sufferers and their families is provided by Alzheimer's New Zealand. International resources for FTD and rare dementias are available, for example [ftdtalk.org](http://ftdtalk.org), [ftdsupportforum.com](http://ftdsupportforum.com), [raredementiasupport.org](http://raredementiasupport.org) and [youngdementiauk.org](http://youngdementiauk.org). For those with suspected familial FTD, genetic counselling and genetic testing are provided by Genetic Health Service New Zealand. The International Society for Frontotemporal Dementias hosts a biannual meeting (the International Conference on FTD, ICFTD) to present research findings and provides workshops for caregivers and clinicians.

**Competing interests:**

Nil.

**Acknowledgements:**

FTDGeNZ is generously supported by Brain Research New Zealand, the Auckland Medical Research Foundation and the University of Auckland Faculty Research and Development Fund.

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# Rarely a triple whammy in general medicine

Amy Okamura-Kho, QianYi Chuah, Paul Chin, Matthew Doogue

The ‘triple whammy’—the combination of an angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB), a diuretic and a non-steroidal anti-inflammatory drug (NSAID)—is a well-documented and often avoidable precipitant of acute kidney injury (AKI).<sup>1</sup> The Health Quality and Safety Commission New Zealand (HQSCNZ) recently updated the Atlas of Healthcare Variation, adding the ‘triple whammy’ in people aged 65 as a measure of potentially harmful polypharmacy.<sup>2</sup> The Atlas reports the frequency of the combination in patients aged 65 and over using community dispensing data. In 2016, the ‘triple whammy’ was dispensed to 3.2% (21,286) of elderly people in New Zealand and 2.3% (1,887) in Canterbury.<sup>3</sup> Further, an unknown number of patients purchased NSAIDs over-the-counter in addition to their regular ACEI/ARB and diuretic. The frequency of the ‘triple whammy’ in New Zealand hospitals is unknown. We examined hospital rates of co-prescribing ACEIs/ARBs, diuretics and NSAIDs in general medicine at Christchurch Hospital.

The aim of this study was to determine the incidence of the ‘triple whammy’ in general medical inpatients.

## Methods

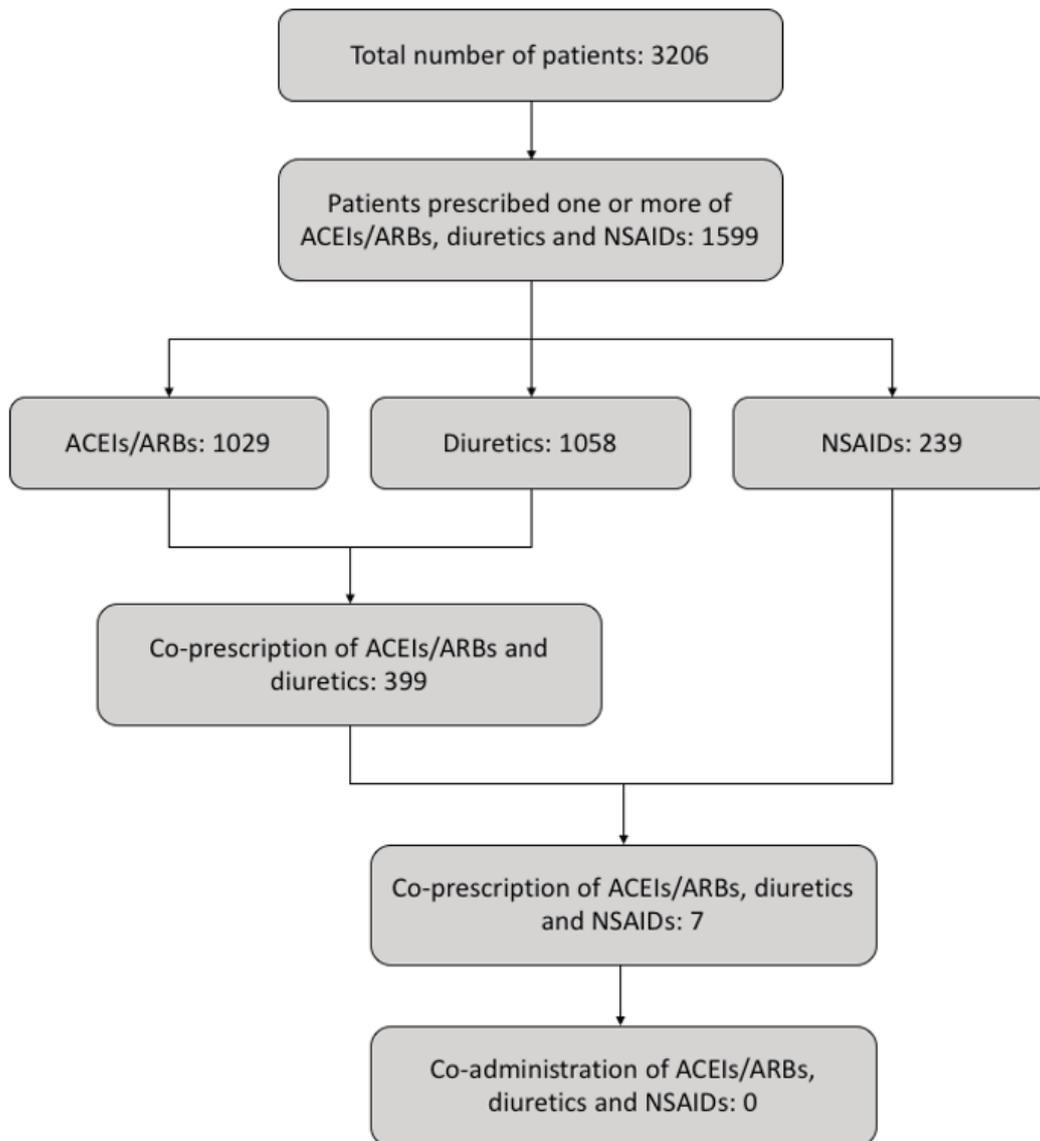
A retrospective cohort study of patients discharged from the Department of General Medicine at Christchurch Hospital between 1 August and 31 October 2017. Prescribing data were extracted from the electronic prescribing record (MedChart®) and analysed using Tableau Desktop®. The data were filtered by medication name to identify all records which included ACEIs/ARBs, diuretics and NSAIDs, and instances of co-prescribing were identified. The prescribing and administration records, discharge summaries, and laboratory

results of each patient prescribed the ‘triple whammy’ were manually reviewed. The additional data extracted included: medication dose (amount and frequency); medication administration (some NSAIDs were prescribed to be administered as required or PRN); current medicines at discharge; and drug-related AKI. For the same time-period discharge coding data were screened for AKI due to medicines. The data were analysed using descriptive statistics using Microsoft Excel®.

## Results

A total of 3,206 patients were discharged from general medicine and prescribed medicines during the study period (Figure 1). The median age (range) was 76 years (15–104), 71% were 65 years or older and 53% were female. One or more ‘triple whammy’ medicines were prescribed to 1,599 patients (50%). This comprised 1,029 prescribed ACEIs/ARBs (33%), 1,058 (33%) prescribed diuretics and 239 (7.5%) prescribed NSAIDs. The combination of an ACEI/ARB and a diuretic was prescribed to 399 (12%) patients of which seven (0.2% of the total and 1.7% of those prescribed ACEI/ARB and diuretic) were also prescribed an NSAID.

Of the seven patients prescribed the ‘triple whammy’, two were taking ACEIs/ARBs, diuretics and NSAIDs on admission as their regular medicines. In both cases the NSAID was ceased on admission. A further two were taking regular NSAIDs on admission that were ceased prior to inpatient prescription of new ACEI and diuretic. Three patients were prescribed the ‘triple whammy’ as inpatients. These three patients were on regular ACEI and diuretic and were subsequently prescribed regular or PRN NSAID. However, in all three cases no doses of NSAIDs were administered during admission nor were they prescribed on discharge.

**Figure 1:** General medicine inpatient prescribing patterns of ACEIs/ARBs, diuretics and NSAIDs.

During the study period there were 12 patients admitted to general medicine with AKI due to medicines. Three of these were coded as being due to diuretics and two as due to NSAIDs. The remaining seven were attributed to other agents. A further four patients developed AKI as inpatients, all coded as being due to diuretics; none of these received the 'triple whammy'.

## Discussion

The incidence of pain increases with age and multi-morbidity,<sup>4</sup> as does the incidence of hypertension and heart failure treated with ACEIs/ARBs and/or diuretics. Less use of NSAIDs is not necessarily better because

NSAIDs can provide effective analgesia, particularly for musculoskeletal pain,<sup>5</sup> and the alternatives are either less effective (for example paracetamol)<sup>6</sup> or associated with other potential harms (for example opioids).<sup>7</sup> Co-prescription of ACEIs/ARBs and diuretics is not an absolute contraindication to the use of NSAIDs but increases the risk of AKI.<sup>8</sup> While this study did not detect any cases of AKI due to inpatient co-prescription of the 'triple whammy', coding data demonstrated that drug-induced AKI can be caused by one or a combination of the 'triple whammy' medicines.

It should be noted that the method used to record the 'triple whammy' in this

inpatient study is not the same as used by HQSC to record co-prescribing in the community. Hence direct comparison of co-prescribing rates cannot be made. However, given the reported incidence of the 'triple whammy' in the community, this study suggests that patients admitted under general medicine are less likely to be prescribed the 'triple whammy' than those in the community. This could be because inpatients are generally frailer and more co-morbid, leading to more prescriber caution with NSAIDs. Further, in hospital there is usually more than one doctor, as well as a nurse and sometimes a pharmacist involved before a medicine is administered, each of whom can intervene. Of note, there are no electronic drug interaction alerts related to this combination in the electronic prescribing system at Christchurch Hospital (MedChart®). This study is limited to a

three-month period in general medicine and cannot be extrapolated to all inpatients.

This study demonstrates the utility of data produced by electronic prescribing. Unlike paper charts, data from e-prescribing software recorded electronically can be easily analysed for audit purposes. The method used for this current study could be applied to other medicines, other departments or other hospitals, providing opportunity for comparison and collaboration towards safer prescribing practices.

There was no co-administration of ACEIs/ARBs, diuretics and NSAIDs to inpatients in general medicine during the study. The incidence of inpatient co-prescription was 2 per 1,000 admissions to general medicine and there was no co-prescription on discharge. The incidence of AKI attributable to the 'triple whammy' was zero during the three-month period.

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#### **Competing interests:**

Nil.

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# Acupuncture and ACC: therapeutic regulation and funding in New Zealand

Dylan A Mordaunt

A report<sup>1</sup> was recently published in the *Journal* which identified marketing materials (websites) which make therapeutic claims that may breach Section 58(1)(a) of the Medicines Act. Though the focus of the study was acupuncture, the report is timely with respect to issues it raises in the New Zealand therapeutics environment. This letter explores some of these issues through the lens provided by the study.

With regards to the therapeutic effectiveness of acupuncture, Ryan reports that many providers claim therapeutic efficacy without adequate evidence and that the funding of acupuncture by ACC is not evidence-based policy. Ryan presents a simple method for identifying these claims on publicly accessible websites. This is relevant to the readers of the *Journal*, as 50% of ACC-funded acupuncture providers are medical professionals.

Ryan laments the lack of evidence for the initial decision to fund acupuncture and cites the costs to ACC- NZD \$30M in 2015–16 with 15% growth over that year. These costs are not contextualised by the costs of alternate interventions and therefore it's not possible to determine the comparative magnitude of the “problem”. Indeed, we do not know how ACC's decision to fund acupuncture has affected health outcomes for New Zealanders.

With regards to acupuncture, the report description seems to conflate multiple techniques under the term “acupuncture” and the omission of the keyword “dry needling” is notable. Ryan mainly refers to acupuncture as a single therapeutic intervention although within the discussion, Ryan reflects on ACC reports that showed “little effectiveness other than some positive evidence for chronic neck and shoulder pain” and also references inconclusive evidence of a positive effect for nausea and vomiting.

One of the over-riding principles of therapeutic regulation is to “manage the risk of avoidable harm”.<sup>2</sup> These assessments are based on the intended, specific therapeutic use (which Medsafe refers to as “therapeutic purpose”<sup>3</sup>) and are usually made separately to economic assessments such as cost-effectiveness analyses. For medicines, this regulatory-funder split is reflected in Medsafe's role being medicines regulator and PHARMAC being the main public funding decision-maker. Particularly in the context that acupuncture seems to be used for such a wide range of conditions, the efficacy of acupuncture should be assessed by each therapeutic purpose—eg, for chronic neck pain—rather than as a single meta-group. Funding decisions should equally flow on this and so it is equally inconsistent with the principles of therapeutic regulation that ACC eschewed this convention in making their original funding decision.

Ryan cites that acupuncture has a placebo effect. Ideally therapies should not only be compared with placebo or a suitable sham-equivalent, but they should also be compared with other accepted interventions, for instance in chronic neck pain, pain medicines. Other than the potential for economic harm, which would not usually be considered by the regulator, Ryan fails to cite evidence that the placebo effect yielded by some uses of acupuncture are outweighed by potential harms. Furthermore, Ryan's conclusion that acupuncture as a whole is ineffective, is inconsistent with the comments that it does yield a placebo effect, and with the principles of therapeutic regulation in that he acknowledges that evidence exists for specific therapeutic purposes. Evidence of a placebo effect is not evidence that a therapy is ineffective or harmful.

Despite these inconsistencies, Ryan's article draws attention to some important public policy issues, particularly in light of the ongoing review of the therapeutic products regulatory regime, the drafting of the Therapeutic Products Bill<sup>4</sup> and decisions made by public funders. In the rush to introduce new, exciting and promising therapies, often in response to consumer-demand, the medical profession has in the past done harm. To quote Prasad and Cifu,<sup>5</sup> "A sizeable proportion of what doctors have done has turned out to be wrong—not wrong in retrospect but unfounded when they were doing it". Therapies have been approved, only to be later withdrawn due to safety concerns—known as "medical reversal"; therapies have been funded, despite lack of evidence for cost-effectiveness.

Attention is often given to the ineffectiveness of complementary and alternative therapies, and yet arguably the largest source of harm has been from medical and surgical therapies. Indeed, management of adverse effects of therapies is a routine part of medical and surgical practice.

Well-known examples of medical-reversal are oestrogen-replacement therapy and the withdrawal of Vioxx (rofecoxib) from the global market. In the surgical realm, a current example is the use of mesh repairs for urinary incontinence—with recent NICE and TGA reports recommending market withdrawal.<sup>6</sup> Though some of these are unlikely to be marketed in the public sector, "marketing" in the private sector is often more ambient and socially-mediated, and efforts need to be made to identify and prevent misleading statements being made about the risk-harm balance of medical and surgical therapies in New Zealand.

So in conclusion, Ryan's report should draw attention to why and how therapeutics are approved and funded in New Zealand. The report's conclusion that there is insufficient evidence for the effectiveness of acupuncture is not, if somewhat semantically, supported by the assertion that there is evidence of efficacy for particular purposes. Efforts need to be made to identify and remove similarly misleading statements about medical and surgical interventions.

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#### Competing interests:

Nil.

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# Acupuncture and the Medicines Act: a reply

Ben Gray

**D**aniel Ryan's paper<sup>1</sup> arguing that acupuncturists are breaching the medicines act is implicitly based on a number of assumptions. In arguing that acupuncture therapy is not based on evidence he implies that medical practice is based on evidence. This is a very simplistic understanding of a complex issue. In fact very little of what I as a GP do is based on high-level evidence. For example, in an evaluation of 55 American Heart Association Guidelines on cardiovascular practice only a median of 11% of the recommendations were based on level A evidence.<sup>2</sup> In addition, as a GP around 20% of the problems that I see do not have a clear diagnosis.<sup>3</sup> This means that there is no chance of having evidence on how to manage the problem. Even when I make a diagnosis it is usually uncertain (until the patient is better) a viral respiratory tract infection presents the same way as an early case of meningitis. The beliefs of my patients vary considerably. Many of them believe that if they are unwell then their doctor should give them something to treat them. Some of them believe that acupuncture is effective.

For complex problems with either no diagnosis or an unclear diagnosis my most effective strategy is to provide care (listening, understanding, reassurance of absence of serious illness) and try to invoke a positive placebo response. This may be achieved by 'doctor as placebo'; my reassurance. It may be achieved by prescribing something that I think might help, which in the current funding environment is likely to be a pharmaceutical because they are funded. A simple example is that I would prescribe paracetamol or ibuprofen for someone with back pain, even though the evidence is that they are no more effective than placebo.<sup>4</sup> I would say that this helps some people, and ensure that they were unlikely to suffer from adverse effects. If they thought that acupuncture would help

I would encourage them to try that. In both instances they would recover faster than if I declined to provide any treatment, either because of an active effect that "the evidence" has not delineated, or as a result of a placebo response.

If Daniel Ryan wanted to look at an area of healthcare that is not based on high-level evidence and costs a lot of money he should look at surgery. As Harris has documented, it is arguably "the ultimate placebo".<sup>5</sup> The recent banning of the use of surgical mesh for incontinence and prolapse highlights how on occasion surgeons introduce procedures (and implants) without rigorous evaluation. One of the problems of course is that like acupuncture, surgery is operator dependent, it is really hard to do "placebo" surgery (or place placebo needles) so like acupuncturists, surgeons make judgements based on their knowledge and experience as to what would be the best treatment. If the only "evidence" considered is a randomised control trial, then neither surgery nor acupuncture will fare very well. A lack of evidence means a lack of evidence; it is not proof that a treatment does not work. There is no "evidence" on the efficacy of parachutes.<sup>6</sup> All the surgical patients will be harmed (anaesthetic risk, scarring, risk of infection). Very few of the acupuncture patients will be harmed.

Ryan suggests that there is a problem with acupuncture publication bias based on a 20-year-old reference. We know there is publication bias in pharmaceutical research.<sup>7</sup> This problem is not limited to acupuncture.

There is no question that some of what I do is based on high-level evidence and I would not be happy if my patient wanted to treat their scurvy with acupuncture. However, an approach of presuming acupuncture is good for nothing is not justified. It is lazy to condemn treatments that are not part of your own culture by

arguing that there is no “evidence”. That is one factor to consider, but we also need to consider what harm the treatment causes, the extent to which the treatment enhances a placebo response, and issues of exploitation, missing out on effective treatment and the ethical behaviour of

practitioners delivering the treatment.<sup>8</sup> It would be interesting to study how many of the procedures that ACC funds surgeons to perform are supported by high-level evidence and take that into account when interpreting Ryan’s findings.

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**Competing interests:**

Nil.

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# The importance of medical assessment prior to high-intensity interval training

Melyssa Claire Roy, Kimberley Anne Meredith-Jones,  
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**A**lthough there is irrefutable evidence that exercise leads to improved health for almost all patients,<sup>1</sup> adherence to physical activity guidelines remains poor. Emerging evidence demonstrates that brief spurts of high-intensity exercise can produce comparable (and possibly greater) health benefits as moderate exercise of longer duration.<sup>2-4</sup> Thus, it has been proposed that high-intensity interval training (HIIT)—brief bursts of vigorous activity interspersed with rest periods—could be recommended as a time-efficient and effective alternative to standard exercise recommendations.<sup>5,6</sup>

However, prescribing high-intensity exercise presents complex challenges for doctors who must encourage their patients to exercise safely to obtain maximum health benefits. Unaccustomed vigorous physical activity is associated with a small and transient, yet significantly increased, risk of a cardiac event.<sup>7</sup> To mitigate this risk, current American College of Sports Medicine (ACSM) guidelines recommend that unless healthy or habitually active, vigorous exercise should not be undertaken without medical assessment.<sup>8</sup> Consequently, in an increasingly obese, sedentary population, it is likely that many people will require medical evaluation if choosing to undertake HIIT. Similarly, infrequent vigorous exercise is often performed by people who engage in occasional sporting activities, the so-called ‘weekend warriors’.<sup>9</sup> However, it has been argued that advising medical assessment prior to exercise promotes unnecessary fear, provides a barrier to participation and may be ineffective at preventing adverse outcomes.<sup>10</sup> As the overall risks of exercise are small and the potential benefits great, a balanced approach to risk and benefit must be considered.

We recently undertook the Support strategies for Whole-food diets, Intermittent Fasting and Training (SWIFT) randomised controlled trial (Australian New Zealand Clinical Trials Registry, ACTRN12615000010594) investigating the effectiveness of different monitoring strategies on weight loss over 12 months.<sup>11</sup> As part of the intervention, overweight and obese participants could choose to undertake HIIT in a ‘real-world’ unsupervised environment. In order to ensure participant safety, SWIFT recruited healthy overweight adults, who were self-screened using a modified American Heart Association/American College of Sports Medicine (AHA/ACSM) health/fitness facility pre-participation screening questionnaire.<sup>12</sup> This questionnaire excluded participants at high risk of a cardiovascular event, including those with known cardiovascular disease or type 2 diabetes. Of the 705 people who expressed interest, 217 participants (31%) were automatically excluded by the screening questionnaire for pre-existing health conditions, symptoms or unsuitable medications. This proportion of potentially high-risk participants contained within an apparently ‘overweight but healthy’ population reflects the reality of exercise prescription in an increasingly obese demographic.

There were 279 participants who met all study criteria and were considered to be at low or moderate cardiovascular risk. However, physical screening detected five of these participants had hypertension (of stage two or greater), and six had elevated fasting blood glucose in the diabetic range (>7.0mmol/L). Thus, screening by questionnaires alone missed 4% (95% CI: 2–7%) of people with possible chronic disease in a group of apparently healthy overweight individuals.

Out of these 250 participants, 104 (41.6%) opted to try HIIT, and in 11 of these participants, medical evaluation identified issues not detected by the self-screening. Clinical examination revealed signs of possible cardiovascular disease in two participants; a new carotid bruit and an aortic murmur, and another participant was found to have a significant resting tachycardia. Although screening was intended to detect pre-existing conditions, a history taken in person revealed that two more participants had unreported arrhythmias, with another disclosing a significant family history of early cardiac deaths. These six participants were not suitable for HIIT without further assessment. Five other participants required medical attention for unrelated issues; these comprised an atypical pneumonia that required treatment, and issues such as possible hypothyroidism and alcohol misuse disorder.

Thus, of the 104 participants who chose to undertake HIIT, 6/104 (5.8%) had potentially undiagnosed cardiovascular disorders, and in total, 11/104 (10.6%) required medical assessment or management. However, considering that a further 11 of the participants who were excluded by physical screening would have been eligible to choose HIIT, up to 22/115 (19.1%) of potential HIIT participants had medical issues that required evaluation, representing almost one in five overweight but 'apparently healthy' individuals. These results highlight the necessity for medical assessment prior to the commencement of HIIT training in overweight adults.

During the SWIFT trial, nine participants also developed emergent medical issues that required management and influenced HIIT safety. These included a new diagnosis of angina, a brainstem cerebrovascular accident, breast cancer, a head tumour, chronic pain syndrome, hypothyroidism,

Bell's Palsy, burns and an unexpected pregnancy. All of these participants required further medical advice, and in most cases needed to cease HIIT. In addition, 11 participants spontaneously reported being unable to complete HIIT due to musculoskeletal issues. While no serious injuries were sustained during HIIT activity, three participants noted that the HIIT exacerbated their musculoskeletal problems. A foot fracture was the only medical issue reported as a direct consequence of HIIT performance.

In summary, while HIIT should be considered a fairly safe and effective intervention for most types of stable patients, experiences from SWIFT support current recommendations that for many, medical evaluation prior to undertaking high-intensity exercise is advisable. It appears that screening questionnaires alone may not be sufficient to identify those requiring further assessment. Doctors are ethically bound to minimise the possibility of harm for individual patients, and for most patients this can be done by excluding the possibility of occult cardiovascular disease or other serious conditions. This initial consultation is also valuable to set up an ongoing relationship for supporting patients to exercise, and to advise them with any change in health status. Given the levels of obesity and physical inactivity in the general population, exercise recommendations are of utmost importance to improve outcomes for almost all patients. Increasing rates of diabetes, cardiovascular and other obesity-related diseases mean that doctors are now invariably involved in exercise risk assessment, especially in relation to vigorous activities such as HIIT. Outcomes from the SWIFT study provide evidence that a brief medical evaluation prior to HIIT participation proved valuable and garnered important information, allowing exercise participation to be undertaken safely.

**Competing interests:**

Nil.

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# Professor Diana Lennon

3 October 1949–15 May 2018



**P**rofessor Diana (Dinny) Lennon died suddenly of natural causes on 15 May 2018. This is a huge shock and is a tragic loss to child health in New Zealand.

At this time we send deepest sympathy to her family—her husband John Ormiston, children Harry and William, and their families. Her family was the centre of her world, and our hearts go out to them.

Dinny was Professor of Population Child and Youth Health in the Department of Paediatrics: Child and Youth Health at the University of Auckland, a world class researcher, an inspiring teacher and mentor, and a superb clinician. She was passionate about children, especially those without a fair opportunity for health, particularly Māori and Pacific children. Her determination and energy to make things better for children was limitless and led to advances in clinical care, national policy change, vaccine development and rheumatic fever programmes that are some of her greatest achievements.

## Academic career

She graduated MBChB from the University of Otago in 1972 with the TWJ Johnson Prize in Clinical Medicine, and was awarded FRACP in Paediatrics in 1978. She took up her first research position at the University of Auckland in 1978, followed by further training in paediatric infectious diseases at the University of California, Los Angeles, from 1979 to 1981. In 1982 she was appointed Senior Lecturer with a half-time specialist paediatrician role with Auckland Hospital Board. She was promoted to Associate Professor in 1991 and Professor in 1996. She served on innumerable committees within and outside the University. She was a highly experienced specialist in Paediatric Infectious Diseases with many years of clinical service to Princess Mary Hospital, then Starship and Kidz First (Middlemore) Hospitals and provided consultative services throughout the country. Her advice was sought after, always generous and apt for the clinical care of children.

## Recognition

Dinny's work was highly respected and she was honoured with the following awards:

- Plunket Woman of the Year (1992)
- Fellow of the Infectious Diseases Society of America—a peer-reviewed elevation based on scholarly achievements and leadership (1994)
- Officer of the New Zealand Order of Merit (2005) for services to science and health
- Outstanding Kidz First Achievement Gold (2006) for meningococcal work
- Hood Fellowship – The University of Auckland (2007)
- Dame Joan Metge Medal of the Royal Society of New Zealand (2008)
- Vice Chancellor's Medal for Commercialisation – The University of Auckland (2013)
- Outstanding Kidz First Achievement Silver (2015) for school-based rheumatic fever prevention work
- National Hauora Coalition Award (2015)

She had a high profile and impressive portfolio as an academic researcher in the field of preventable infectious diseases, both in New Zealand and internationally. At the time of her death she had about 265 publications of which 192 were journal articles, and many books or book chapters, including a chapter in five editions of the leading Feigin and Cherry's Textbook of Pediatric Infectious Diseases. She was the principal or a named investigator on many research grants totalling millions of dollars. But she was not one to collect and count these outputs; in fact she eschewed such processes. She was forthright about the things that mattered to her, and dismissive of those that didn't. Far more important to her was making a difference to the health of children, which she did in spades.

## Preventable infectious diseases, their causes and solutions

In her training Dinny developed an understanding of epidemiology and the big influences on child health. She systematically researched preventable infectious diseases affecting New Zealand children

and their causes, developing appropriate solutions accessible to children. Her growth as an epidemiologist (in collaboration with the US Centers for Disease Control and Prevention) led to her confidence in developing further solutions. She was an original thinker who became a translational researcher—not just describing disease but implementing practical measures to reduce the burden of disease. Her work ensured the introduction of a vaccine against *Haemophilus influenzae* type b to prevent bacterial meningitis, and was key in efforts to control the meningococcal A outbreak of the 1980s. She played a lead role in addressing the prolonged meningococcal B epidemic through the 1990s to 2000s, working tirelessly at national and international levels in developing a vaccine, then setting up and leading clinical trials culminating in the mass MeNZB vaccination programme in 2004/2005, which reduced deaths and disability from meningococcal disease. She described, with others, the burden of invasive Group A streptococcal disease and post-streptococcal glomerulonephritis. More recently she co-led research into *Staphylococcus aureus* invasive disease, osteomyelitis, skin sepsis, and was part of a collaborative group aiming to reduce the burden of respiratory disease in South Auckland. For decades she has been a leader in national vaccination policy.

In 1991, she drew attention to the huge inequities in child health with her public lecture entitled "Health in the Ghetto". Subsequent research findings, that crowding was the greatest risk factor for meningococcal disease, led to Housing New Zealand building larger, healthier state homes. The Healthy Housing initiative in the Auckland region, which included joint health and housing interventions, was of proven benefit.

## Rheumatic fever

Throughout her career, Dinny advocated tirelessly, both nationally and globally, for rheumatic fever prevention and control. In the 1980s, she helped to develop the Auckland regional rheumatic fever register, which led to delivery of free community-based intramuscular benzathine penicillin treatment and greatly reduced rheumatic fever recurrence rates in the Auckland region—a benchmark for New

Zealand practice. In 2006, she was co-lead author of New Zealand's first evidence-based guideline for the diagnosis and management of rheumatic fever, updated in 2014 with the sore throat algorithm. She helped develop diagnostic criteria appropriate to high-incidence settings such as New Zealand.

She initiated and led the randomised controlled trial of primary prevention of rheumatic fever with sore throat school programmes, which has been described as the most innovative rheumatic fever research for over 50 years. Due to her continued championing of this work the government of the time was persuaded to invest in the rheumatic fever prevention programme, which led to the 2012 Better Public Service targets, resulting in reduced rates of rheumatic fever. She led an international workshop that provided "Advice to the Ministry of Health" on control of rheumatic fever by 2020.

Dinny's work on rheumatic fever culminated in global advocacy work with international collaborators to reduce the impact of this disease in other settings, both through delivery of penicillin prophylaxis and vaccine development. She was co-signatory to the 2015 Addis Ababa Communique on the eradication of rheumatic heart disease in Africa. Finally she was immensely proud that in 2017, New Zealand co-sponsored a successful bid for the adoption of a resolution on rheumatic fever and rheumatic heart disease at the 71<sup>st</sup> World Health Assembly in May 2018.

### Health professional education

Dinny has had a profound influence on countless health professionals through her mentoring and teaching. Dinny knew that it was vital that medical students learn to recognise unwell children, and that this teaching was reinforced for postgraduate doctors, especially in general practice. Dinny was the academic leader of the Diploma of Paediatrics for many years following its establishment, and continued academic oversight. She supported youth

health teaching and research. To help paediatric registrars with their basic training, in 1988 she established the residential course for FRACP trainees, which continues to be highly successful. She supervised many masters and doctoral students, paediatric registrars, summer students and colleagues, and many others benefitted from her direct support and encouragement in training and beyond.

She respected all child health professionals and particularly recognised the value of nurses, supporting their crucial role in healthcare delivery, not only within the hospital but in the community. Dinny recognised that nurses are key to reaching children where they live and go to school. Paediatric nurses have been vital to the success of the rheumatic fever prevention programme.

### Pacific colleagues

Dinny actively supported colleagues in the Pacific Islands, especially the Cook Islands, Fiji, Samoa, Tonga and Vanuatu. She supported and attended Pasifika Medical Association conferences, facilitated training opportunities, advised on rheumatic fever control strategies and infectious diseases. She supported colleagues in Samoa and Tonga to develop and strengthen their rheumatic fever services. She successfully advocated for training positions for Samoan registrars in New Zealand and supervised Pacific PhD students.

Dinny was a feminist and set an example in her empowerment of women. Her appointment as one of the first women Professors of Paediatrics in New Zealand was fitting, and she was an inspirational role model for many. Many have deeply appreciated Dinny's support over a long period of time.

Diana Lennon was a truly remarkable woman. She has left an inestimable legacy. The world is a better place because of her life and we will miss her deeply.

*Kua hinga te totara i te wao nui a Tane*  
The totara has fallen in the forest of Tane

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#### Author information:

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#### URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2018/vol-131-no-1476-8-june-2018/7609>

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## Lipid-lowering therapy use and achievement of cholesterol targets in an Australian diabetes clinic

Patients with diabetes are at high risk for the development of cardiovascular (CV) disease. Statins have been shown to reduce CV events in direct relationship to their low-density lipoprotein cholesterol (LDL-C)-lowering effect.

In this report from St Vincent's Hospital in Melbourne the authors review data from their diabetic clinic. 75.9% of the patients had type 2 diabetes and 18.2% had a history of cardiovascular disease.

The authors compared the usage of statins between 1993–1995 and 2014–2016. Statin usage increased from 6 to 69% between these periods. This corresponded to a decrease in low-density lipoprotein cholesterol from 3.7 to 2.4mmol/L ( $P<0.01$ ).

**Internal Medicine Journal 2018; 48:201–204**

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## Atraumatic versus conventional lumbar puncture needles

Postdural-puncture headache is the most common complication after lumbar puncture, affecting up to 35% of patients. This may be due to leakage of cerebro-spinal fluid from the dural defect caused by the needle.

This meta-analysis compares outcomes associated with the use of conventional and atraumatic lumbar puncture needles. Conventional needles have a sharp slanted tip whereas the atraumatic needles are blunt with a closed pencil point tip and a side port for injection or collection. Data from 110 trials including 31,412 patients was reviewed. There was a significant reduction in the incidence of postdural puncture headache in the atraumatic cohort.

The authors of the meta-analysis report that among patients who had lumbar puncture, atraumatic needles were associated with a decrease in the incidence of postdural-puncture headache and in the need for patients to return to hospital for additional therapy, and had similar efficacy to conventional needles.

**Lancet 2018; 391:1197–204**

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## Catheter ablation for atrial fibrillation with heart failure

Mortality and morbidity are higher among patients with atrial fibrillation and heart failure than among those with heart failure alone. This report is of a randomised trial which compares catheter ablation with medical therapy (rate or rhythm control) in such patients.

Three hundred and sixty-three patients with paroxysmal or persistent atrial fibrillation and heart failure were randomised to catheter ablation or medical treatment. The composite end point was death from any cause or hospitalisation for worsening heart failure. At median follow-up at 37.8 months the end point was significantly less in the ablation cohort-hazard ratio 0.62.

It was concluded that catheter ablation for atrial fibrillation in patients with heart failure was associated with a significantly lower rate of a composite end point of death from any cause or hospitalisation for worsening heart failure than was medical therapy.

**N Engl J Med 2018; 378:417–27**

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### URL:

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2018/vol-131-no-1476-8-june-2018/7589>

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# New Zealand Soldiers' Medical Club

June 1918



A formal portrait of Ettie Rout (in the middle without a hat) and the first group of her New Zealand Volunteer Sisterhood to go overseas. Their uniforms were long blue-print dresses with white aprons and panama hats. Eileen Neilson is at the far right, back row. Marion Higgens and Agnes Kerr (with glasses) are on either side of Ettie Rout. Dora Murch is at right, front row. Emily Leggatt is behind Ettie Rout, third from left, back row. Ada Ballantine is third from right, back row. Taken by Stanley Polkinghorne Andrew in October 1915.

**W**e have perused the various pamphlets issued by this Club, and note that it has been established first at Hornchurch, and is owned in trust for the New Zealand Expeditionary Force by Miss E. A. Rout, Hon. Sec. New Zealand Volunteer Sisterhood. It is established with the approval of the Commandment of the New Zealand Expeditionary Force in the United Kingdom, and its establishment announced in New Zealand Expeditionary Force Orders.

One of its alleged objects is to preserve the social controls on which civilisation rests. All orders sent in by post are to be addressed to the Club, High Street, Hornchurch, Essex. Co-operation in this effort is requested for the men's own sake and for the sake of the New Zealand nation. The capsules advertised are said to be protective both against gonorrhoea and syphilis if used before connection; if used after connection they are protective only against syphilis.

The Club will provide all the equipment necessary for a premeditated whoring expedition. One of the printed injunctions reads: "Be clean and go with clean people, and you will avoid disease. Cleanliness prevents disease. If you follow the foregoing directions you will save yourself and others from much pain, sickness, and expense, and **help to win the war.**" We do not propose, on the ground of decency to quote further from the pornographer who writes the advertising literature of the Club. It is salacious enough for the

taste of the most abandoned sensualist. We do not object to medical prophylaxis after exposure to venereal infection has been incurred, but we deny the right of the promoters of this Club, even under the sanction of the New Zealand Expeditionary Force authorities in England, to lead the sons of respectable parents in New Zealand into ways of venery. It is high time that official sanction for pimps and panders should cease. We have heard a good deal of late of autocracy and democracy. Heaven preserve us from a pornocracy!

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**URL:**

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2018/vol-131-no-1476-8-june-2018/7590>

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