

The  
New Zealand  
**Medical Journal**  
Te ara tika o te hauora hapori

Published by the Pasifika Medical Association Group

Vol 136 | No 1584 | 2023 October 20



# Mental health and paid parental leave—what does the evidence say?

Retrospective survey of colposcopy experience for wāhine Māori across two time periods (2016 and 2021) in Waitematā and Auckland districts, New Zealand

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## Publication information

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The *New Zealand Medical Journal (NZMJ)* is the principal scientific journal for the medical profession in New Zealand. The *Journal* has become a fundamental resource for providing research and written pieces from the health and medical industry.

The *NZMJ*'s first edition was published in 1887, marking the beginning of a rich 136-year history. It was a key asset of the New Zealand Medical Association (NZMA) up until July 2022.

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ISSN (digital): 1175-8716

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## Publication information

published by the Pasifika Medical Association Group

### Further information

ISSN (digital): 1175-8716  
Publication frequency: bimonthly  
Publication medium: digital only

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# Contents

## Editorial

- 7 **Mental health and paid parental leave—what does the evidence say?**  
*Kate Eggleston, Katie Douglas, Katherine Donovan, Matthew Tennant, Roger Mulder*

## Articles

- 10 **Retrospective survey of colposcopy experience for wāhine Māori across two time periods (2016 and 2021) in Waitematā and Auckland districts, New Zealand**  
*Karen Bartholomew, Phyu S Aye, Virginia Griffiths, Tayla Schaapveld, Megan Gingell, Selah Hart, Erin Chambers, Marara Metekingi, Billie Baty, Georgina McPherson, Deralie Flower*
- 27 **Alcohol advertising near schools in Tāmaki Makaurau Auckland**  
*Sarah Sneyd, Noor Al-Jebouri, Helina Gifawossen, Nathan Cowie, Nicki Jackson*
- 38 **The unseen casualties of the First World War: insights from a randomly selected military sample**  
*Nick Wilson, Jennifer A Summers, Glyn Harper, George Thomson*
- 56 **The spectrum of paediatric uveitis in New Zealand**  
*Priya D Samalia, Hannah Ng, Sarah Hull, Justin Mora, Joanne L Sims, Rachael L Niederer*
- 67 **The use of neonatal bubble Continuous Positive Airway Pressure in a rural hospital setting**  
*Glenn A Barker*
- 73 **Cannabis and methamphetamine in New Zealand: a Kaupapa Māori literature review**  
*Erena Wikaire, Te Hira Doherty*

## Viewpoint

- 84 **Planning and executing a national point prevalence study: a blueprint for the future**  
*Sally A Roberts, Ruth Barratt, Arthur J Morris, Nikki Grae*

## Clinical correspondence

- 91 **Coronary artery aneurysms: the chest pain “zebra”**  
*Zoe J Clifford, Philippa JT Bowers, Graham D McCrystal*

## Letter to the editor

- 95 **Hapū with Omicron—the Wellington experience. Maternal and neonatal outcomes of pregnant people diagnosed with COVID-19**  
*Judy Ormandy, Noor Al-Shamma, Sara Filoche*

## 100 years ago in the *NZMJ*

- 100 **The Subconscious Mind**  
*NZMJ, 1923 [excerpt]*

# Summaries

## **Retrospective survey of colposcopy experience for wāhine Māori across two time periods (2016 and 2021) in Waitematā and Auckland districts, New Zealand**

*Karen Bartholomew, Phyu S Aye, Virginia Griffiths, Tayla Schaapveld, Megan Gingell, Selah Hart, Erin Chambers, Marara Metekingi, Billie Baty, Georgina McPherson, Deralie Flower*

Wāhine Māori who attended a clinic as follow up for an abnormal smear test (colposcopy clinic) were surveyed about their experience. The survey was done over the phone, and it was done twice, in 2016 and in 2021. Overall, 201 women did the survey, and they reported a positive experience with high scores across both years. This is reassuring to know ahead of the changes to the cervical screening programme in late 2023.

## **Alcohol advertising near schools in Tāmaki Makaurau Auckland**

*Sarah Sneyd, Noor Al-Jebouri, Helina Gifawossen, Nathan Cowie, Nicki Jackson*

There has long been concern about the exposure of children and young people to alcohol advertising, which places them at risk. This study counted alcohol advertisements within a 500-metre radius of a randomly selected sample of Auckland schools (10%). The findings show that alcohol advertising near Auckland schools is common and there is a need for protections in these areas.

## **The unseen casualties of the First World War: insights from a randomly selected military sample**

*Nick Wilson, Jennifer A Summers, Glyn Harper, George Thomson*

This study examined a random sample of the military files of 200 New Zealand World War One (WWI) veterans. It found that these personnel experienced a very high morbidity burden with 94% having at least one new condition diagnosed during their military service (average: 2.4 per individual; range: 0 to 8). The relative severity of these health conditions was reflected by the high level of hospitalisation (89% at least once) and 59% of personnel being deemed no longer fit for military service at some stage. Respiratory conditions affected 33% of personnel, 14% were diagnosed with sexually transmitted infections, 10% had diagnoses suggestive of post-traumatic stress disorder (PTSD), and 6% had chemical warfare injuries. In conclusion, the overall morbidity burden of this military force in WWI was very high, and much higher than the previous official estimates.

## **The spectrum of paediatric uveitis in New Zealand**

*Priya D Samalia, Hannah Ng, Sarah Hull, Justin Mora, Joanne L Sims, Rachael L Niederer*

Eye inflammation in childhood is uncommon but an important vision-threatening condition. It is important to consider infections as a cause of inflammation in this age group. A large proportion of children will have no symptoms of eye inflammation and many children with eye inflammation will require immunosuppression treatment.

## **The use of neonatal bubble Continuous Positive Airway Pressure in a rural hospital setting**

*Glenn A Barker*

This paper shows that specialist breathing machines normally used for unwell babies in intensive care

units can also be used in rural hospitals. In a small rural hospital, this machine reduces the time spent holding a face mask on a baby and reduces the need for emergency helicopter transfers to specialist intensive care units.

### **Cannabis and methamphetamine in New Zealand: a Kaupapa Māori literature review**

*Erena Wikaire, Te Hirea Doherty*

This Kaupapa Māori study reviewed literature about the experiences of Māori in the context of cannabis and methamphetamine use. Mainstream research often overlooks Māori perspectives or the potential implications of their findings for Māori communities. Several studies seek to establish links between cannabis and methamphetamine use and individual “risk factors” factors. Recent research has started to place greater emphasis on capturing the lived experiences of Māori, adopting a critical lens to analyse findings and exploring the role of systemic institutions within the context of drug-related harm. To effectively address the harms associated with cannabis and methamphetamine use among Māori, future research must explicitly commit to benefitting Māori and employ research approaches consistent with Kaupapa Māori principles. An essential focus should be on prevention, addressing root causes, taking decisive action and not just measurement alone.

### **Planning and executing a national point prevalence study: a blueprint for the future**

*Sally A Roberts, Ruth Barratt, Arthur J Morris, Nikki Grae*

New Zealand-wide data are required to support change and improvement in the care provided. Often this is considered too difficult to achieve due to the cost and logistics. We are sharing our experience so other healthcare groups may consider using this methodology to capture national data.

### **Coronary artery aneurysms: the chest pain “zebra”**

*Zoe J Clifford, Philippa JT Bowers, Graham D McCrystal*

This patient came to hospital with what looked like a heart attack (blockages in the arteries supplying his heart) but we found that he actually had unusual widening in his heart arteries, one of which was blocked with a blood clot. We performed a heart bypass to solve his problems.

# Mental health and paid parental leave—what does the evidence say?

Kate Eggleston, Katie Douglas, Katherine Donovan, Matthew Tennant, Roger Mulder

Becoming a parent is a major life event and, while the birth of a baby is exciting, the postpartum period can be an intensely stressful time for parents. In addition to the physical recovery and significant hormonal changes experienced by mothers following pregnancy and childbirth, both parents face emotional, psychological and practical challenges relating to the transition to parenthood, the demands of caring for a newborn, financial stress and career uncertainty. These factors may contribute to mental health problems, including perinatal depression and anxiety. Paid parental leave has been suggested to help alleviate psychological distress and reduce the risk of mental disorders by reducing the stress associated with the postpartum period.<sup>1</sup>

Mental health difficulties are common during the postpartum period. In New Zealand, studies using the Edinburgh Postnatal Depression Scale (EPDS), a screening tool, have reported rates of postpartum depression between 5–14%.<sup>2,3</sup> Rates of perinatal mental health difficulties are higher for Māori, Pacific and Asian women.<sup>2,3,4</sup> Postpartum depression and anxiety can have serious consequences for both the mother and the infant. Symptoms of postpartum depression can involve suicidal thinking or thoughts of harming the infant. Suicide is the most common cause of death for women in pregnancy and the early postpartum period in New Zealand.<sup>5</sup> New Zealand has a particularly high rate of maternal suicide, with rates around six times higher than in the United Kingdom.<sup>5,6</sup> This discrepancy is contributed to by significant inequities in suicide risk for pregnant and postpartum women, and wāhine Māori are over three times more likely to die by suicide than NZ European women.<sup>6</sup> These statistics highlight the serious impact of postpartum mental health problems in New Zealand and demonstrate the need for our government to develop policy to support and improve wellbeing in the postpartum period.

Partners may also experience increased anxiety and depression symptoms in the year following a child's birth. The rate of postpartum depression

in New Zealand fathers is reported to be between 4–12%.<sup>7,8</sup> Relationship stressors and maternal depression are associated with an increased risk of depression in partners.

Recently, both of New Zealand's major political parties have announced new policies regarding paid parental leave. First, National deputy leader Nicola Willis proposed a bill that would have allowed parents to share their leave entitlement, meaning they could take paid time off together. The bill was voted down by Labour at its first reading in Parliament. Several weeks later, Labour announced a new Paid Partner's Leave policy, where partners would be eligible for increasing amounts of paid parental leave over the next three years, culminating in four weeks of paid leave by mid-2026. Under this policy, partners' leave would be able to be taken either concurrently or consecutively with the primary caregiver, on top of the current entitlement for partners of two weeks' unpaid leave. This is timely, as New Zealand is currently one of only three OECD countries that offers no paid partner leave.<sup>9</sup>

It is heartening that both major parties in New Zealand are considering how to support parents and families during the postpartum period. Both parties' schemes improve support for the primary caregiver by allowing the option of their partner to remain home, while Labour's policy provides additional paid leave for the partner on top of the current entitlement.

We have several questions relating to these policies. What does the evidence tell us about the effect these policies may have on parents' mental health? Does paid parental leave help to prevent postpartum mental health difficulties, or improve symptoms? Does having the partner home make any difference?

A recent systematic review in *The Lancet Public Health* helps answer these questions.<sup>10</sup> The review included 45 studies in high-income countries (mainly USA, where paid parental leave is not available for most parents). Overall, the evidence suggests that parental leave is protective against poorer mental health outcomes for mothers, especially paid leave lasting at least 2–3 months.

Studies showed that increased duration of leave was associated with reduced risk of depressive symptoms, psychological distress and burnout.<sup>10</sup> Protective effects for mothers appeared to be long-lasting and extend beyond the postpartum period. The review found limited studies examining the association between fathers' parental leave and paternal mental health. However, there was some suggestion that partners demonstrate mental health improvement with more generous parental leave policies.<sup>10</sup> Additionally, partners' leave appeared to have a positive effect on maternal mental health, with decreased maternal depressive symptoms.<sup>10</sup> A limitation was that studies included in the review were predominantly observational or quasi-experimental in nature.

As well as positive effects on parents, there is evidence that paid parental leave is associated with improved infant and child health.<sup>1</sup> This includes clear physical health impacts, including lowered child mortality in the first five years of life.<sup>1</sup> A recent study demonstrated that paid maternal leave was associated with positive cognitive, behavioural and socio-emotional effects.<sup>11</sup> Furthermore, there is preliminary evidence demonstrating increased length of maternity leave is linked to higher quality mother-child interactions, with indirect effects on attachment security.<sup>12</sup> Additionally, from an economic perspective, there may not be any substantial negative economic or employment consequences to paid parental leave.<sup>1</sup> Importantly, unpaid leave does not appear to be associated with the same benefits as paid leave.<sup>1,11</sup>

In summary, there is good evidence for the

beneficial effects of paid parental leave on mothers' mental health, as well as positive physical and mental health effects for children. Increasing duration of leave appears to be associated with better maternal mental health outcomes. The impact on partners is less clear; however, the limited evidence available suggests that paid leave is likely to be helpful. Therefore, current evidence suggests that Labour's policy has the edge on National's in terms of likely beneficial health effects for parents and families. Whatever happens in the upcoming election, evaluation of any new policy implemented is essential in determining whether the changes have been effective in providing families with additional support, or whether more needs to be done. Research investigating mental health outcomes for parents would be useful. Given New Zealand's high rates of postpartum depression and the clear link with paid parental leave, we welcome further extension of the support offered to families in the postpartum period.

#### **Note**

This editorial uses the words "women", "men", "mothers" and "fathers" because we have reviewed research that has used this language. It is important to acknowledge that not all people who give birth identify as female, therefore the words "women" and "mothers" do not reflect all people who give birth. Additionally, not all partners are "men" or "fathers". We have used the gender-neutral term partner where it has not been based on research using gendered terms.

**COMPETING INTERESTS**

Nil.

**ACKNOWLEDGEMENTS**

KMD would like to acknowledge salary support from the Health Research Council of New Zealand (Sir Charles Hercus Health Research Fellowship; ref: 19/082).

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# Retrospective survey of colposcopy experience for wāhine Māori across two time periods (2016 and 2021) in Waitemata and Auckland districts, New Zealand

Karen Bartholomew, Phyu S Aye, Virginia Griffiths, Tayla Schaapveld, Megan Gingell, Selah Hart, Erin Chambers, Marara Metekingi, Billie Baty, Georgina McPherson, Deralie Flower

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## ABSTRACT

**AIMS:** To examine wāhine Māori experiences of colposcopy services in New Zealand based on surveys conducted in 2016 and 2021.

**METHODS:** The surveys included a total of 201 wāhine Māori who had attended one of the three colposcopy clinics in the Waitemata and Auckland districts. Participants were retrospectively surveyed about their experience via telephone using a pre-tested questionnaire. Pre-defined responses were analysed quantitatively, and narrative comments were analysed thematically.

**RESULTS:** Response rates were 27.6% in 2016 and 34.2% in 2021. Prior to their appointment, most women reported receiving the information leaflet and a reminder. At the clinic visit, overall interaction with staff, comfort, listening and explanation of the procedure all scored highly, with maintenance or improvements from 2016 to 2021. Wāhine reported feeling culturally safe. Areas for improvement included content of information, access to Māori community liaison, appointment waiting time and delivery of colposcopy results.

**CONCLUSIONS:** The findings indicated that wāhine Māori had overall excellent experiences of colposcopy services, maintained over a five-year period with some suggested improvements to context of information and communication. This provides reassurance for wāhine Māori in the diagnostic and treatment part of the cervical screening pathway ahead of the upcoming change to HPV primary screening.

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In New Zealand, about 160 women develop cervical cancer annually, and about 50 women die from it, accounting for an age standardised mortality rate of 1.6 per 100,000 population.<sup>1</sup> This represents a substantial decrease from the rate of 5.5 in 1990, when the routine National Cervical Screening Programme (NSCP) was introduced. Despite the sharp decline in cervical cancer mortality, persistent inequities remain, with mortality about three times higher for wāhine Māori than non-Māori.<sup>2</sup> Early detection plays a major role in reducing inequities in cervical cancer outcomes;<sup>2</sup> however, access to cervical screening is lower for wāhine Māori, linked to a range of factors, issues including discomfort, fear of cancer, cost and health service factors.<sup>3,4</sup> Three-year cervical screening coverage for 25–69 years for wāhine Māori is 59% compared to 79% for European/other women.<sup>5</sup>

Colposcopy is the key step in early diagnosis of the disease, following detection of cervical cell

changes that are picked up in primary care via cervical screening (currently cytology) or symptomatic presentation. A colposcopy examination usually takes place in a hospital outpatient setting where the cervix is observed under magnification looking for signs of precancerous or cancerous changes. Where the colposcopy examination is abnormal, further treatment may follow in the clinic setting or later with a procedure. Colposcopy is an invasive examination and wāhine Māori are less likely to attend the colposcopy appointment.<sup>5</sup> Quality of care and culturally tailored approaches, such as delivery of information through community groups, culturally friendly clinic environments and the use of interpreters, are critical in improving equitable access to screening services.<sup>6,7</sup> In this service evaluation, we present the experiences of colposcopy for wāhine Māori at the Auckland and Waitemata district clinics, first surveyed in 2016 as a prioritised activity to improve the timeliness and experiences of colposcopy for Māori women

in the Māori Health Plan,<sup>8</sup> with the second survey, conducted in 2021, as both district services had made improvements over the period, which provided a comparison to the 2016 survey.

## Methods

### Study design and participants

Two separate retrospective telephone surveys were undertaken in 2016 and 2021 from a sample population of all wāhine Māori who had attended one of the three colposcopy outpatient clinics in the Waitematā and Auckland districts. The 2016 survey was conducted between March and June 2016, surveying women who visited one of those clinics between July 2015 and January 2016. The 2021 survey was conducted in September and October 2021, surveying women who visited one of those clinics between January 2020 and September 2021. Ethnicity data were extracted from hospital outpatient clinic lists; where multiple ethnicities were identified, ethnicity was prioritised as per the Health and Disability Ethnicity Data Protocols: Māori>Pacific>Asian>Other.<sup>9</sup> No clinical exclusion criteria were applied.

### Survey procedure

All participants were contacted by an experienced kaimahi Māori interviewer/researcher. Working backwards from the end of the study period, attempts were made to contact all eligible women to obtain a sample of 50 women from each district. Participants were deemed “uncontactable” when they could not be contacted after at least three attempts either on a weekday, after hours or in the weekend. Consented participants were interviewed using an agreed survey script (Appendix 1), which was developed based on elements of the Waitematā Friends and Family text, with input from the Waitematā and Te Toka Tumai Auckland Women’s Health service and the Waitematā Patient Experience Team. Colposcopy experience mechanisms in other districts were also reviewed. The survey was pilot tested and refined. Responses were recorded electronically at the time of the interview using SurveyMonkey in 2016 and Buzz Channel in 2021. As a recognition of time and valuable contribution to improving services, a \$20 koha was posted to participants.

The 2021 survey protocol adhered as closely as possible to the protocol used in 2016. Interviewers used the same questionnaire, with an additional four questions relating to cultural safety included in the 2021 survey to better understand women’s experience of colposcopy (Appendix 1).

### Ethics approvals

The survey was considered a service evaluation and low risk; thus, it did not meet the criteria for Health and Disability Ethics Committees review. Localities approval, however, was provided by the Waitematā District Health Board (DHB) Awhina Research and Knowledge Centre (updated RM#15144).

A Māori data sovereignty assessment was completed.<sup>10</sup> This assessment includes a principles matrix used to identify the level of sensitivity, determined to be “Orange”, which recommends Māori governance. Māori governance for this project was provided by Te Kōtui Hauora (Iwi DHB Partnership Board at the time) and Māori leadership was provided by the Manager Māori Health Gain support and Māori staff (kaimahi Māori interviewers for both years).

### Statistical analysis

Pre-defined responses were analysed quantitatively and reported as numbers and percentages. The comparisons between the two surveys were made using Fisher’s exact tests, with a p value <0.05 considered statistically significant. Participants’ comments recorded as free text were analysed thematically. The analyses were conducted using R version 4.1.2 and Microsoft Excel.

## Results

In 2016, a total of 365 eligible women were contacted to obtain a sample of 101 women who completed the interview, giving a response rate of 27.6%. Among this total, 5 (1.3%) women declined and 259 (71.1%) were uncontactable. In 2021, 292 eligible women were contacted to successfully interview 100 women, giving a response rate of 34.2%. Among this total, 16 (5.5%) women declined and 176 (60.3%) were uncontactable. Of all wāhine Māori, the majority were between 21 and 40 years old (67.3% in 2016, 68.0% in 2021) (Table 1). Approximately half the women in each survey came from each of Auckland and Waitematā districts (Table 1).

### Experience prior to colposcopy appointment

Most participants in both surveys received a letter and information leaflet from the hospital prior to their appointment (91% in 2021 and 89% in 2016) and indicated that it prepared them for their appointment (90% and 96%, respectively) (Table 2, Figure 1). However, a significantly lower

proportion of women (71%) in 2021 reported that the leaflet contained all the information they needed, compared to 92.2% in 2016.

Most women (90% in 2021, 86% in 2016) received at least one form of reminder about their appointment by text, phone call or letter. In 2021, only 3% of participants reported contact with a Māori and Pacific community liaison worker, while 22% liaised with a women's health community worker in 2016. All the women who used the service found it helpful.

### Experience at the colposcopy clinic visit

A majority of 2021 survey participants (84%) indicated that the clinic was easy to find, although it showed a decline from 93% in 2016 (Table 3, Figure 1). It is noted that some patients from the elective surgical centre, North Shore Hospital had to attend the appointment at the Waitakere Hospital at some points during the 2021 survey period. The 2021 survey, however, showed an improvement in time to being seen in clinic—83% (versus 66% in 2016) were seen by a colposcopist within 10 minutes. Similarly, in 2021, a significantly higher proportion of participants reported excellent for staff friendliness (91% versus 77% in 2016), and

staff answering participants' questions (85% versus 74% in 2016). For the remaining questions on their experience at the clinic visit, both surveys showed similar positive responses (Table 3, Figure 1).

### Participants' comments on their experience of colposcopy clinic visit

Free-text comments were collected from the participants about their overall experience of the clinic visit and areas for improvement in both surveys. Additionally, the 2021 survey included comments on the cultural aspects and receipt of information on other services (Appendix 1). Analysed thematically, three major themes were identified: interaction with staff, cultural safety, and information and communication.

#### Interaction with staff

A great majority of participants in both surveys commented very positively on their interaction with staff, noting that the staff were kind, friendly, put them at ease, made them feel safe and reassured them if they were nervous. The staff also made their partners, children and family members feel welcome.

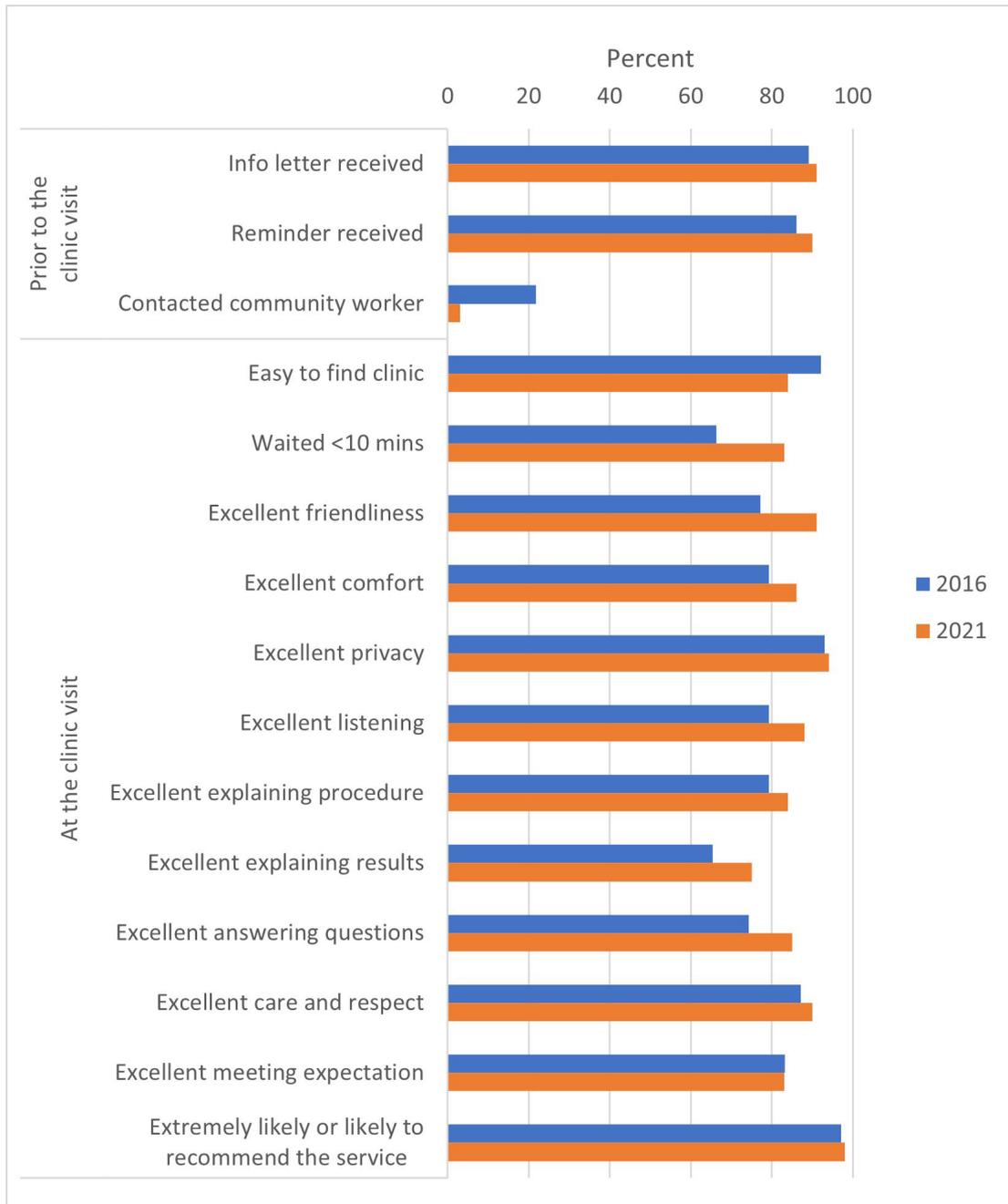
**Table 1:** Participants' background information.

Category	2016		2021		p-value
	Number	%	Number	%	
Total	101	100.0	100	100.0	
<b>Clinic attended</b>					<b>0.871</b>
Elective surgical centre, North Shore Hospital	24	23.8	21	21.0	
Waitakere Hospital	33	32.7	32	32.0	
Greenlane Clinical Centre	44	43.6	47	47.0	
<b>Age in years</b>					<b>0.829</b>
21–30	36	35.6	42	42.0	
31–40	32	31.7	26	26.0	
41–50	13	12.9	15	15.0	
51–60	11	10.9	10	10.0	
60+	9	8.9	7	7.0	

**Table 2:** Participants' experience prior to colonoscopy appointment.

		2016			2021			
Responses		Total	Number	%	Total	Number	%	p-value
Receipt of letter and information leaflet from the hospital		101			100			0.825
	Yes		90	89.1		91	91.0	
	No		6	5.9		6	6.0	
	Don't know		5	5.0		3	3.0	
(i) Whether the information was useful		90			91			0.078
	Yes		86	95.6		82	90.1	
	No		2	2.2		3	3.3	
	Don't know		2	2.2		6	6.6	
(ii) Content of information		90			91			<b>0.002</b>
	Too much		0	0.0		3	3.3	
	Right amount		83	92.2		65	71.4	
	Inadequate		3	3.3		7	7.7	
	Other		4	4.4		16	17.6	
Receipt of reminder of clinic visit		101			100			0.192
	Yes		87	86.1		90	90.0	
	No		8	7.9		2	2.0	
	Don't know		6	5.9		8	8.0	
Contact with Māori and Pacific Community Liaison workers		101			100			<b>&lt;0.001</b>
	Yes		22	21.8		3	3.0	
	No		64	63.4		91	91.0	
	Don't know		15	14.9		6	6.0	
(i) Whether the contact was useful		22			3			1.000
	Yes		22	100.0		3	100.0	
	No		0	0.0		0	0.0	

**Figure 1:** Summary of positive responses, comparing the 2016 and 2021 surveys.



**Table 3:** Participants' experience during the colposcopy clinic visit.

		2016		2021		
	Responses	Number	%	Number	%	p-value
<b>Total</b>		<b>101</b>	<b>100.0</b>	<b>100</b>	<b>100.0</b>	
Whether the clinic was easy to find						<b>0.049</b>
	Yes	93	92.1	84	84.0	
	No	8	7.9	11	11.0	
	Don't know	0	0.0	5	5.0	
Waiting time						<b>0.000</b>
	<10 mins	67	66.3	83	83.0	
	10–60 mins	34	33.7	12	12.0	
	>60 mins	0	0.0	3	3.0	
	Don't remember	0	0.0	2	2.0	
Staff friendliness						<b>0.014</b>
	Excellent	78	77.2	91	91.0	
	Good/fair	22	21.8	9	9.0	
	Poor	1	1.0	0	0.0	
Feeling comfortable						0.443
	Excellent	80	79.2	86	86.0	
	Good/fair	20	19.8	13	13.0	
	Poor	1	1.0	1	1.0	
Privacy to get dressed and undressed						0.260
	Excellent	94	93.1	94	94.0	
	Good/fair	7	6.9	6	6.0	
Staff listen						0.163
	Excellent	80	79.2	88	88.0	
	Good/fair	20	19.8	11	11.0	
	Poor	1	1.0	1	1.0	
Staff explain the procedure						0.458
	Excellent	80	79.2	84	84.0	
	Good/fair	18	17.8	15	15.0	

**Table 3 (continued):** Participants' experience during the colposcopy clinic visit.

	Poor	3	3.0	1	1.0	
Staff explain the results						0.416
	Excellent	66	65.3	75	75.0	
	Good/fair	24	23.8	20	20.0	
	Poor/don't know	11	10.9	5	5.0	
Staff answer participants' questions						<b>0.025</b>
	Excellent	75	74.3	85	85.0	
	Good/fair	24	23.8	10	10.0	
	Don't know	2	2.0	5	5.0	
Staff show care and respect						0.695
	Excellent	88	87.1	90	90.0	
	Good/fair	11	10.9	10	10.0	
	Poor	2	2.0	0	0.0	
Staff meet participants' expectations						0.728
	Excellent	84	83.2	83	83.0	
	Good/fair	15	14.9	14	14.0	
	Poor/don't know	2	2.0	3	3.0	
Likeliness to recommend the service to others						0.059
	Extremely likely or likely	98	97.0	98	98.0	
	Neither likely nor unlikely	2	2.0	2	2.0	
	Unlikely	1	1.0	0	0.0	

Note: Categories with "0" only are omitted from the table.

*“The lady who did my procedure felt like whānau, it felt like she cared about me. She talked to me about if I was planning on having children, and it felt like she cared about my plans.” (26–30 years, 2021 survey)*

### **Cultural safety**

The participants’ experience from a cultural aspect was explored specifically in the 2021 survey, and almost all women positively commented that the colposcopy service was culturally competent. Many women described that they were, as wāhine Māori, treated well, while a few others mentioned that they didn’t think this was relevant to their care.

*“Very well, they responded well in general, regardless of if I am Māori or not.” (41–45 years, 2021 survey)*

*“Very good. The nurse was very accommodating and really took the time to get to know me and answered all my burning questions in a mana-enhancing way.” (31–35 years, 2021 survey)*

Several women noted that they were not aware of a Māori community liaison service or role and would have liked that service. Some women preferred having more Māori staff at the clinic and having more cultural content in the letter. Five women suggested an option with a female health professional. The participants felt encouraged to attend the appointment mostly by their family and friends, followed by their GPs or nurses; a few of them were self-encouraged, and three of them did not tell anyone about the appointment.

### **Information and communication**

Although most participants were satisfied with the information and communication they received, the 2021 survey indicated a variety of areas for improvement. Seven women did their own research to prepare for the appointment. One woman found it difficult to get in contact with the clinic. Three women suggested better explanation of the procedure prior to the appointment. Some women preferred electronic communication to letters; others would rather receive normal results over the phone than in-person. Several women sought further resources to understand their results, such as the internet or discussion with GPs. Two women suggested education for school-age girls.

*“Didn’t get results and chased them up after the 4 weeks, they said, ‘Yep, we’ll call you’ and didn’t ... [the result] went to her GP and not her so still had to chase it from there.” (21–25 years, 2021 survey)*

As the 2021 survey further explored receipt of information on other health and social services, about one third of participants received such information and benefited from various services such as quit smoking service, HPV vaccination, mammogram, gynaecologist and post-colposcopy support.

*“Quit smoking—have since quit.” (31–35 years, 2021 survey)*

### **Other comments**

Less frequently, the participants commented about the procedure being quick and easy, and expressed issues with long wait lists for appointments and getting to the clinic. Similar to the 2016 survey, in the 2021 survey four women shared their stressful experience due to the long time to get an appointment.

*“Had to wait six months for an appointment, know I wasn’t that serious priority but still had to wait and that was stressful.” (41–45 years, 2021 survey)*

While most participants found it easy to get to the clinic, a few of them in both surveys suggested improved signage, better directions in the information pack and improved access to parking. Four participants in the 2021 survey suggested that free parking would be helpful.

*“It took me ages to find the right parking spot and it was a hassle to find the right building but once I got in there I kind of knew where to go ... From memory the letter didn’t explain which entrance to go in.” (21–25 years, 2021 survey)*

## **Discussion**

In this service evaluation we reported the findings of two separate surveys in 2016 and 2021, exploring wāhine Māori experiences of their colposcopy clinic visit. We also examined the progress in delivering the service over a five-year period by comparing the 2021 results to the 2016 results. We found that the experience of the

participants in both surveys were overall very positive, with many results either being maintained or improved. Given the number of studies that have drawn attention to poor patient experience for whānau Māori in a range of diagnostic and treatment settings,<sup>11,12</sup> both the positive experiences seen here and the consistency of those positive results are encouraging, and reflect a wāhine and whānau centred approach. Participants specifically acknowledged excellent interactions with staff members, reporting their personalised care and friendliness more favourably in the 2021 survey. The findings also reflected that wāhine overall felt culturally safe.<sup>13</sup> The colposcopy clinics had significantly improved in time waiting in clinic—17% more participants were seen by a colposcopist within 10 minutes in 2021, which may result from spacing out the appointments to accommodate for social distancing in waiting rooms as a COVID-19 prevention and, hence, reduced waiting times.

In addition to the success, the surveys identified the areas for improvement, notably around information and communication. In 2021, 29% of women suggested that the content in the pre-appointment information leaflet could be improved. Providing efficient information is essential for women to prepare for their appointment, and it may help reduce “Did Not Attend” (DNA) rates.<sup>14,15</sup> The colposcopy service standards in New Zealand<sup>16</sup> advise that women should be given information on available Māori support services. However, only few women were aware of these services in 2021. We note that these services may have been substantially impacted by COVID-19. Since the women who received liaison services found them helpful, these services could be promoted to ensure wāhine Māori are fully supported. Having to have a colposcopy exam is often stressful for women, and various supports, including from whānau and friends, enabled them to attend the appointment, which was also noted in earlier research.<sup>17</sup>

According to the 2021 survey some women reported consulting other resources to understand their results. A previous study<sup>17</sup> also reported similar issues with delivery of results, which call for a strategy to effectively communicate the results to the women. A few women commented on the waiting time to get to a colposcopy appointment, and anxiety relating to this. The timeliness of colposcopy assessment in the national report documented widely varied timeframes depending on the cytology grading, as well as local women’s

health service factors and the district of residence.<sup>5</sup> It has been reported that wāhine Māori have longer waiting times for colposcopy overall, with greater DNAs.<sup>5</sup>

Colposcopy is the key diagnostic and treatment intervention in the cervical screening pathway. Evidence shows that health outcomes are comparable among the patients who are screen-detected at an early stage.<sup>18,19</sup> However, there are known ethnic inequities in cancer pathways more broadly,<sup>11,20–22</sup> and longstanding inequities for wāhine Māori in cervical screening participation and outcomes.<sup>5,23–25</sup> HPV self-testing has significant potential to address these inequities;<sup>25–28</sup> however, support to ensure access to cytology and colposcopy follow-up will be essential to achieve equity, particularly with the anticipated increase in colposcopy referrals.<sup>29</sup> This evaluation provides important assurance, ahead of the imminent implementation of primary HPV screening (including HPV self-testing), of a culturally safe and positive experience for wāhine Māori at colposcopy.

The surveys provided robust data at two large urban clinics over two time points, and the age distribution of the participants was reflective of overall wāhine having a colposcopic examination;<sup>30</sup> however, there were some limitations. The women were interviewed retrospectively, at several months post-appointment for some of them, which may result in recall bias. Only wāhine Māori who attended colposcopy appointments were recruited into the surveys; therefore, comparison with experience of other ethnic groups was not possible. The application of the survey findings may be limited given the low response rate, which, however, showed similar to that of another survey on HPV self-testing.<sup>25</sup> It was also noted that those who had poor experience may have declined to participate. Surveys of women who did not attend the colposcopy clinics in the future may complement our findings.

## Conclusion

With HPV primary screening implementation imminent in Aotearoa, it is timely to consider women’s current experiences of colposcopy services to contribute to improved health outcomes. Both the 2016 and 2021 surveys indicated that wāhine Māori had overall excellent experiences of colposcopy services at the Waitematā and Auckland district clinics. The surveys suggested some improvements to context of information and communication. This provides important

evidence of best practice services and provides reassurance for wāhine Māori seeking self-testing in the new HPV primary screening programme.

A repeated survey after the primary HPV programme change may be useful as a monitoring tool.

**COMPETING INTERESTS**

The authors declare that there are no conflicts of interest.

**ACKNOWLEDGEMENTS**

We would like to acknowledge the time taken by the wāhine Māori participants to contribute their experience to feedback and improve health services. We would like to acknowledge the Women's Health Services and Waitematā Patient Experience Team for supporting the survey development and pre-testing, and the Women's Health Services at Waitematā and Te Toka Tumai Auckland for extracting and checking the outpatient clinic data.

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## Appendix 1: Auckland and Waitematā DHB Colposcopy Survey 2021

No.	Area/ heading	Question	Possible responses
1	Location	What clinic did you attend?	<ul style="list-style-type: none"> <li>• Elective Surgical Centre - North Shore Hospital</li> <li>• Waitakere Hospital</li> <li>• Greenlane Clinical Centre</li> </ul>
2	Preparation	Did you get a letter & leaflet from the hospital telling you your GP, nurse or smear taker had referred you for the procedure?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• Don't know</li> </ul>
3		<b>If yes:</b> Did the information prepare you for your appointment?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• Don't know</li> </ul>
4		<b>If any yes/no/don't know</b> Can you tell us about the information in the letter & leaflet?	<ul style="list-style-type: none"> <li>• Too much information</li> <li>• It had all of the information I needed</li> <li>• I wanted more information</li> <li>• I did not understand the information</li> <li>• Other, please comment—free text</li> </ul>
5		Did you get another reminder of your clinic visit?	<ul style="list-style-type: none"> <li>• Yes, text</li> <li>• Yes, phone</li> <li>• Yes, another letter</li> <li>• No</li> <li>• Don't know</li> </ul>
6		Did you talk to our Māori and Pacific Community Liaison workers before or after your appointment?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• Don't know</li> </ul>
7		<b>If yes,</b> was this helpful?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• Don't know</li> <li>• Comment—free text</li> </ul>

**Appendix 1 (continued):** Auckland and Waitematā DHB Colposcopy Survey 2021.

8	At the clinic visit	Was the clinic easy to find?	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> <li>• Don't know</li> </ul>
9		If <b>no</b> : please tell us how we could improve this for you and your family	Free text
10		Did we see you on time, how long did you have to wait?	<ul style="list-style-type: none"> <li>• Excellent; no wait</li> <li>• Good; 5–10 mins</li> <li>• Fair; 10–30 mins</li> <li>• Poor; 30–60 mins</li> <li>• Very poor; &gt;60 mins</li> <li>• Don't know; can't remember</li> </ul>
11		Were we welcoming and friendly?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
12		Did we make you feel comfortable?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
13		Did we give you privacy to get dressed and undressed?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
14		Did we listen?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>

**Appendix 1 (continued):** Auckland and Waitematā DHB Colposcopy Survey 2021.

15		Did we explain the procedure in a way that you understood?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
16		Did we explain the results in a way that you could understand? (Follow-up open question below)	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
17*		Did you feel that we took a personal approach when we explained your results?	Free text
18		Did we answer any questions you had?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
19		Did we show care and respect?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
20		Did we meet your expectations?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Fair</li> <li>• Poor</li> <li>• Don't know</li> </ul>
21*		Was there anyone in particular who encouraged you to attend this appointment? Partner, doctor, nurse, family, friend?  <i>If no—had you told anyone that you were going along to this appointment?</i>  <i>If no—was there a reason you didn't tell anyone?</i>	Free text

**Appendix 1 (continued):** Auckland and Waitematā DHB Colposcopy Survey 2021.

22	Overall experience	How likely are you to recommend our service to friends and family who might need a similar clinic?	<ul style="list-style-type: none"> <li>• Extremely likely</li> <li>• Likely</li> <li>• Neither likely nor unlikely</li> <li>• Unlikely</li> <li>• Extremely unlikely</li> </ul>
23		Please tell us the main reason for that score?	Free text
24*		<p><i>Did the colposcopy service, or people who worked in it, help you to access (or encourage you to access) other health or social services?</i></p> <p><i>If yes—what were these and how important was this to you?</i></p> <p><i>(Transport; Quit Smoking; HPV Vaccination; Cervical Screening Providers; Breast Screening—do not routinely promote breast screening in our services)</i></p>	Free text
25*		<p><i>How satisfied are you that the service responded to your needs as a Māori woman accessing healthcare?</i></p> <p><i>(New initiative at Waitematā offers Māori women the choice to have a female colposcopist)</i></p>	Free text
26		What is one thing we could do to improve the service?	Free text
27		Any other comments?	Free text
28	Admin	Age	<ul style="list-style-type: none"> <li>• &lt;20</li> <li>• 21–25</li> <li>• 26–30</li> <li>• 31–35</li> <li>• 36–40</li> <li>• 41–50</li> <li>• 51–55</li> <li>• 56–60</li> <li>• 60+</li> </ul>
29		Today's date	<ul style="list-style-type: none"> <li>• Date</li> </ul>
30		Date of referral	<ul style="list-style-type: none"> <li>• Date</li> </ul>

**Appendix 1 (continued):** Auckland and Waitematā DHB Colposcopy Survey 2021.

31		<i>Date of referral assessment</i>	• <i>Date</i>
32	<i>Admin—from clinic record</i>	<i>Date of clinic visit</i>	• <i>Date</i>

\* Additional questions to the 2016 survey.

# Alcohol advertising near schools in Tāmaki Makaurau Auckland

Sarah Sneyd, Noor Al-Jebouri, Helina Gifawossen, Nathan Cowie, Nicki Jackson

## ABSTRACT

**AIM:** There has long been concern about the exposure of children and young people to alcohol advertising, which places them at risk. This study aimed to measure the prevalence, type and location of alcohol advertisements within a 500-metre radius of schools in Auckland, Aotearoa New Zealand.

**METHODS:** A cross-sectional observational study was used to quantify alcohol advertisements within a 500-metre radius of 52 Auckland schools selected using stratified random sampling.

**RESULTS:** Over half of all schools sampled (56%) had at least one alcohol advertisement within 500 metres, and this was highest among low-decile schools (63%). Nearby licensed premises were responsible for 75% of advertisements.

**CONCLUSION:** Alcohol advertising near Auckland schools is common. Mechanisms available to Territorial Authorities, District Licensing Committees and the Government to restrict alcohol advertising in communities can be used to regulate areas around schools.

The extent of alcohol-related harm in Aotearoa New Zealand warrants considerable concern. Alcohol is Aotearoa New Zealand's most harmful drug,<sup>1</sup> contributing to more than 200 disease and injury conditions<sup>2</sup> and causally linked with seven types of cancer.<sup>3</sup> Among New Zealanders aged 15–49 years, alcohol use is the leading behavioural risk factor for death and disability-adjusted life years.<sup>4</sup>

Alcohol use is normalised and widespread, with almost one in five New Zealanders reporting hazardous levels of consumption in 2021/2022.<sup>5</sup> The prevalence of heavy drinking is disproportionately higher among males, young adults (18–24 years), and Māori and Pacific Peoples,<sup>5</sup> showcasing a number of inequities associated with alcohol-related harm.

Young people, in particular, experience substantially more short- and long-term harms from alcohol use than their adult counterparts. Short-term harms include being less likely to finish high school after experiencing alcohol-related harm,<sup>6</sup> an increased risk of injuries,<sup>7</sup> sexually transmitted infections<sup>8</sup> and rates of violent offending.<sup>9</sup> Long-term harms include later depression,<sup>10</sup> risks to the developing brains of those with an alcohol-use disorder<sup>11–15</sup> and a dose–response relationship between alcohol use and decreased verbal learning and memory.<sup>16</sup> Adolescence is a period of heightened risk for addiction, with research showing that almost 50% of alcohol abuse and dependence cases in Aotearoa New Zealand are established before the age of 20 and 70% before the age of 25 years,<sup>17</sup>

leading to more alcohol-related harm in later life.

Alcohol advertising contributes to more harmful alcohol use by normalising, glamourising and embedding alcohol consumption into day-to-day settings. Children and young people are at greater risk from harm as their developing cognitive skills increase their susceptibility to the influence of advertising.<sup>18</sup> Research has established that exposure to alcohol advertising is a cause of youth drinking,<sup>19</sup> with greater exposure leading to earlier drinking initiation and drinking at higher quantities.<sup>20,21</sup>

The University of Otago Kids'Cam research found that Aotearoa New Zealand children aged 11–13 years were exposed to alcohol marketing on average 4.5 times per day.<sup>22</sup> Māori and Pacific children had levels of exposure five and three times greater than European children, respectively. While marketing through digital media is an increasingly common approach for alcohol companies, traditional advertising sites (such as billboards) remain prevalent, and alcohol marketing continues to be common in urban areas in Aotearoa New Zealand.<sup>23</sup> These sites in the built environment have particular implications for children and young people, who are more bound to their environment than adults and thus less able to avoid advertising appearing on fixed sites in their daily environment.

The right for children to have healthy and safe environments has been agreed upon at an international Convention on the Rights of the Child,<sup>24</sup> and is supported in the Government's

Child and Youth Wellbeing Strategy.<sup>25</sup> Routes to school warrant particular protection, given their frequency of use. In Tāmaki Makaurau (Auckland), several restrictions currently exist pertaining to alcohol advertising in physical spaces. Firstly, alcohol advertisements are currently prohibited on public transport vehicles, stations and other infrastructure.<sup>26</sup> Secondly, a Signs Bylaw restricts the number and proportion of advertisements that can be displayed on exterior shop fronts.<sup>27</sup> Thirdly, the location of third-party billboard and poster advertisements is governed by the Auckland Unitary Plan. Resource consents are required for these sites, but specific content restrictions are rare. At a national level, the self-regulatory Advertising Standards Authority (ASA) advertising code provides guidelines that there be no alcohol advertisements within a 300-metre sightline of the main entrance of any school.<sup>28</sup> It is important to note that this guideline was weakened in the 2020 Code update, as under the previous Code complaints could be made in relation to any alcohol advertising surrounding the school (not just within sightline of the main entrance).

The (partial) restrictions on specific forms of advertising will not eliminate all exposure, placing children at risk. To determine the prevalence, type and location of alcohol advertising near schools, this study collected data of all alcohol advertising located within 500 metres of a sample of primary, intermediate and secondary schools in Auckland.

## Methods

In this cross-sectional observational study, alcohol advertisements were identified within a 500-metre radius of 52 schools across Auckland over the period 2 December 2022 to 16 March 2023.

The aim was to select a sample of schools that represented at least 10% of all state and state-integrated schools in Auckland. To select the sample, a list was obtained from the Ministry of Education of all state and state-integrated schools located within the boundaries of Auckland Council. Schools marked as currently operating, apart from activity centres and schools on Great Barrier and Waiheke Islands, were included. The schools were first stratified into one group of primary and intermediate schools, and a second group of secondary schools. The schools were then stratified into Central, North, West and South Auckland regions based on their Council ward,

and finally stratified by school decile, being low (deciles 1–3), medium (4–7) and high-decile (8–10). In Aotearoa New Zealand, school decile rating is commonly used as an indicator of socio-economic deprivation, as it is derived from the socio-economic position of the student community compared to the wider country. Decile 1 reflects a catchment area with the highest socio-economic deprivation and decile 10 reflects areas with the least socio-economic deprivation.

From each stratified list (i.e., level of school, region, decile grouping), the schools were chosen at random using a random number generator. In the event that school size influenced the placement of advertising, the schools were selected to ensure relative balance in student size across the regions and by deciles. Two selected schools were later replaced due to inaccessibility following damage by Cyclone Gabrielle. The schools in the sample were classified as being urban (located in small, medium, large and major urban areas) or rural (rural settlements or rural other) using definitions from Stats NZ.<sup>29</sup>

To collect the data, researchers walked and drove all streets and public areas within a 500-metre radius from all boundaries of each school. Alcohol advertising was defined as any alcohol branding imagery (e.g., Heineken or Steinlager, including alcohol-free product branding), depictions of drinking or alcohol products, and licensing trust branding (such as West Liquor off-licence branding). Alcohol litter and public consumption of alcohol products were not included. For digital billboards in the sample area, the entire roll of advertisements was viewed. Each advertisement site (for instance, an off-licence outlet) was counted as one advertisement site, regardless of how many separate alcohol advertisements were shown.

Finally, using Google Maps, the distance between each advertisement site and school was calculated using road and network paths from the nearest evident access point (for both vehicles and pedestrians). Chi-square analyses and analysis of variance were used in SAS Enterprise guide 8.2 (Cary, NC, USA) to identify significant differences in advertisement site prevalence by school characteristic.

## Results

Table 1 details the characteristics of the school sample. The majority of schools were primary/intermediate schools located in urban areas.

## Alcohol advertisements

As shown in Table 2, over one half (n=29, 56%) of sampled schools had at least one alcohol advertisement site within 500 metres. In total, 55 advertisements were identified. The majority (n=41, 75%) of these advertisements were from nearby off- or on-licences. Other advertisements comprised posters or flyers (n=3, 5%), standalone posters or stands (n=3, 5%), billboard advertising (n=2, 4%) and other types (n=6, 11%). The latter included product branding on a parked delivery truck, a parked company car, a flag on private property, portable fencing at an on-licence and on outdoor umbrellas at an on-licence.

Of the schools with an advertisement site, most (n=19, 66%) had one advertisement site in the radius. The mean number of advertisement sites, excluding schools with no advertisements, was 1.9 (Standard Deviation [SD] 1.7, range 1–8) (Table 3). However, almost 30% of schools with any advertisement site (n=8, 28%) had between two to four advertisement sites within the radius, and

seven percent (n=2) had five or more advertisement sites within the radius. The greatest number of separate advertisement sites within one school radius was eight advertisement sites within 500 metres of a Central Auckland primary school.

For the alcohol advertisement sites observed (n=55), over three quarters were located more than 200 metres from the school. Four advertisement sites (7%) were within 0–50 metres, three (5%) within 51–100 metres, six (11%) within 101–200 metres, 30 (55%) within 201–400 metres and 12 (22%) within 401–500 metres. The closest proximities of an alcohol advertisement site were nine and 22 metres. Three schools had advertisement sites within 50 metres of an entry (representing 6% of all sampled schools), with one of these schools having two advertisement sites within 50 metres of an entry.

The school roll of the schools exposed to alcohol advertising in this study (n=16,505) represents 55.9% of the total school roll sampled.

**Table 1:** Characteristics of the school sample.

Schools	n (%)
<b>School level</b>	
Primary/intermediate	41 (79%)
Secondary	11 (21%)
<b>Urban/rural classification</b>	
Urban	9 (17%)
Rural	43 (83%)
<b>Decile</b>	
Low (1–3)	19 (37%)
Medium (4–7)	18 (35%)
High (8–10)	15 (29%)
<b>Region</b>	
North Auckland	16 (31%)
Central Auckland	12 (23%)
West Auckland	12 (23%)
South Auckland	12 (23%)

**Table 2:** Prevalence and proximity to alcohol advertisement site(s).

<b>Among all schools (n=52)</b>	<b>n (%)</b>
<b>Alcohol advertisements within 500m</b>	
No alcohol advertisement	23 (44%)
One alcohol advertisement	19 (37%)
Two–three alcohol advertisements	6 (12%)
Four–five alcohol advertisements	2 (4%)
Six or more alcohol advertisements	2 (4%)
<b>Any alcohol advertisements, by region (row percentage)</b>	
North Auckland	11 (69%)
Central Auckland	8 (67%)
West Auckland	5 (42%)
South Auckland	5 (42%)
<b>Any alcohol advertisement, by decile (row percentage)</b>	
Low	12 (63%)
Medium	9 (50%)
High	8 (53%)

**Table 3:** Prevalence and proximity to alcohol advertisement site(s) among schools with a nearby advertisement site (n=29).

<b>Measure</b>	
<b>Average number of advertisements (SD)</b>	<b>1.9 (1.7)</b>
<b>Distance (metres) to nearest advertisement</b>	
Average, total (SD)	283 (156)
Average, by decile (SD)	
Low-decile	334 (133)
Medium-decile	199 (143)
High-decile	301 (178)
<b>Any alcohol advertisement(s) within 300m, by decile (row percentage)</b>	
Low-decile schools	5 (42%)
Medium-decile schools	6 (67%)
High-decile schools	5 (63%)

### Advertisement sites by region

Of all 52 schools, the schools in Central Auckland had the highest proportion of the 55 advertisement sites (n=23, 42%), followed by the North (n=12, 22%) and South (n=12, 22%) regions.

Of all schools sampled, schools in North Auckland had the highest proportion of schools in the area having any alcohol advertisement sites within 500 metres (69%), followed by Central Auckland schools (67%), and West (42%) and South Auckland (42%) schools (Table 2). While West and South Auckland had the same proportion of schools with any advertisement sites, the average number of sites at South Auckland schools (2.4) was higher than that among West Auckland (1.6) schools.

### Advertisement sites by decile

Of all the advertisement sites (n=55), 45% of these were in medium-decile areas, 31% were in low-decile areas and 24% were in high-decile areas.

Of all schools sampled, low-decile schools had the highest proportion of schools having any alcohol advertising within 500 metres (63%), followed by high-decile schools (53%) and medium-decile schools (50%) (Table 2).

No significant differences were found in the prevalence of advertisement sites by school level, region, decile, or rural/urban status. No differences were found by school type in the total number of advertisement sites per school, the proximity of alcohol advertisements to the school, or the nearest distance from advertisement site to school. However, the sample size limited power to detect small differences.

### Advertisement sites by Auckland Unitary Plan zoning

Of all advertisement sites (n=55), 89% (n=49) were located in Business zones and 11% (n=6) were in Residential zones. Forty-four percent of the sites (n=24) were in either a Business – Local or Business – Neighbourhood Centre zoning. Twenty-four percent (n=13) were in a Business – Neighbourhood Centre zoning.

## Discussion

The aim of this study was to examine the prevalence and characteristics of alcohol advertising within a 5–10 minute walk of a sample of Auckland schools. In line with previous Aotearoa New Zealand studies,<sup>22,30–33</sup> these results indicate that a substantial number of children and young

people are at risk of regular and repeated exposure to alcohol advertising in their built environments. These findings demonstrate that alcohol advertisement sites can be at multiple locations near schools, both near the school grounds and up to 500 metres from school grounds. The prevalence of advertisement sites in this study is likely to be significantly under-estimated, given high school students in Aotearoa New Zealand have been shown to travel kilometres to their school.<sup>34</sup>

The finding that low-decile schools were the most likely to have alcohol advertisement sites is consistent with similar findings that children living in deprived neighbourhoods are inequitably affected by alcohol advertising.<sup>22</sup> The unequal distribution of alcohol outlets in Aotearoa New Zealand is well-established.<sup>35</sup> However, more advertisement sites were found surrounding medium-decile schools, followed by low-decile and high-decile schools. This may reflect many medium-decile schools being in urban, commercial areas. While a larger sample size is required to test statistical significance, the results do point towards children and young people living in areas of high socio-economic deprivation as likely to have greater exposure to harmful advertising. This exposure, in turn, may exacerbate inequities in alcohol use and harm that is disproportionately experienced by low-income communities.

Off- and on-licence shop frontage comprised a considerable proportion of alcohol advertisement sites. Of the schools sampled in this study, only one off-licence had no alcohol advertising on its exterior. This mirrors findings from other studies that show the association between off-licence density and children's exposure to alcohol advertising<sup>31,32</sup> and the significant role that shop frontage plays in the overall mix of alcohol advertising exposures to children.<sup>30</sup> Exposure to alcohol advertising at outlets serves to normalise alcohol use, with the effects of advertising working subliminally without cognitive processing.<sup>36</sup> Further, the brand livery of many off-licence outlets is brightly coloured, attracting attention. This further harms children and young people who might walk past these sites to or from school.

As mentioned previously, Auckland has a Signs Bylaw<sup>27</sup> that includes rules around the proportion of shop frontage that can be used for advertising and the number of advertisements that are permitted within five metres. However, previous research has found poor compliance to bylaw requirements.<sup>37,38</sup> More comprehensive and legislative measures to restrict alcohol signage

are necessary, together with active enforcement to protect children and young people from advertising at off-licences.

The majority of alcohol advertisement sites were located in Business zoned areas, and almost half (44%) were located in either Business – Local or Business – Neighbourhood Centre zoned areas. Given that the Auckland Unitary Plan has identified Neighbourhood Centre zones as particularly important for preserving health-promoting and aesthetic features,<sup>39</sup> at a minimum, signs bylaws must prohibit alcohol advertising in these areas, as well as on Residential zoned land.

In this study, two billboards near schools showed alcohol advertisements. Most notably, a billboard for a brewery was situated 22 metres from the entrance of a secondary school. This is not the first alcohol-related billboard to be in close proximity to a school, despite the voluntary ASA guidelines in place.<sup>40,41</sup> No statutory rules currently prohibit alcohol advertising on billboards, whether near schools or in general. Yet, a recent Aotearoa New Zealand study found that alcohol advertisements were over-represented on billboards in Wellington, possibly reflecting the alcohol industry's interest in billboards as key marketing spaces.<sup>23</sup>

However, in 2022, for the first time, a resource consent application for two digital billboards in Māngere, Auckland was granted with the condition of no advertising permitted by alcohol brands, products, or companies with the primary purpose of manufacturing or selling alcohol. Conditions such as these are increasingly important, given the ineffective nature of the self-regulatory code for alcohol advertisers,<sup>42</sup> and the mounting evidence that billboards near schools show alcohol advertising.

The current regime for alcohol advertising in Aotearoa New Zealand has been ceded to industry self-regulation through the ASA.<sup>28</sup> While the ASA states that only adult audiences should be targeted, and that there should be no alcohol advertisements within a 300-metre sightline of the main entrance to a primary, intermediate or secondary school, this study found alcohol advertising within this boundary. This suggests that, despite the ASA standard, children and young people may be exposed to alcohol advertising near schools through a number of different advertising media. This highlights the urgent need for comprehensive action to regulate alcohol advertising and marketing, as recommended by the Law Commission in 2010,<sup>43</sup> the Ministerial Forum on Alcohol

Advertising and Sponsorship in 2014<sup>44</sup> and the Mental Health and Addiction Inquiry in 2018.<sup>45</sup> Effective regulation of alcohol advertising would mirror the approach in the *Smokefree Environments and Regulated Products Act 1990* that prohibits the advertising of tobacco and vaping brands and products.<sup>46</sup>

Local government also has a role to reduce harmful sites of alcohol advertising. Options are available via conditions in local alcohol policies and/or through utilising other mechanisms to prohibit external advertising at licensed premises. Territorial Authorities must be empowered, via an amendment to the *Sale and Supply of Alcohol Act 2012*, to specifically control alcohol-related signage via bylaws (akin to provisions in the *Prostitution Reform Act 2003* regarding local government powers to control the advertising of commercial sexual services).

Practice notes from District Licensing Committees (released to guide the Committee's approach to granting and renewing alcohol licences) are a possible mechanism for local governments. A second option may be to develop, or increase active enforcement of, a Signs Bylaw. For example, in October 2022 the Auckland District Licensing Committee released a practice note on external signage that prohibited external alcohol advertising on all alcohol licences. However, this practice note was revised in March 2023<sup>47</sup> following information received from a licensing consultant and feedback from the alcohol industry (12 April 2023, information obtained from the District Licensing Committee by *Official Information Act*). Now, it applies to all licences unless there is a valid reason for it not to, and among the conditions are measures that will prohibit alcohol-related lifestyle or branding comprising greater than 25% of the façade exterior. It also prohibits pricing advertising on the exterior of premises, as well as alcohol product advertising on external sandwich boards and bollard covers. The Committee may choose to impose greater restrictions where the licence is near sensitive sites, including schools. While this may reduce the quantity of alcohol advertising that children may be exposed to, it is unlikely to eliminate all exposures.

This study has a number of limitations. Firstly, the small sample size limits the generalisability and interpretation of findings. A broader research study with a larger sample size should follow this preliminary study to further quantify alcohol advertising near schools and, in particular,

examine ethnic inequities in advertising prevalence. Secondly, as the study was undertaken in Auckland where there are a number of existing controls and regulations, the results may not be applicable to other Territorial Authorities. For example, Auckland Transport has an advertising policy that prohibits alcohol advertising on public transport infrastructure. Further, the lower density of off-licences in the Licensing Trust area in West Auckland<sup>48</sup> may have resulted in fewer advertisement sites identified, limiting further generalisability of findings from this study to non-Trust areas. Thirdly, the 500-metre distance threshold may not be applicable for rural schools, as children and young people are likely to travel much further to reach school. Finally, this study was completed over the summer period. It is likely that there are seasonal differences in alcohol advertising (i.e., higher in summer months). While schools are often closed during

this period, local children are likely to continue to be exposed via local travel and attending school holiday programmes.

## Conclusion

While research in Aotearoa New Zealand suggests that children and young people are widely exposed to alcohol advertising in their built environments, this study is the first step towards quantifying advertisement sites near schools. The current context offers few protections, is variable across local governments and is insufficient to reduce sites of alcohol advertising. Given the proven harm to children and young people from alcohol use and the causal link with alcohol advertising exposure and consumption, urgent legislative action is required to reduce inequities in harm and empower local bodies to protect vulnerable populations.

**COMPETING INTERESTS**

All authors declare that they have no competing interests.

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## Appendix 1: Copy of the data collection form used by data collectors

### Alcohol advertising at schools

Where an answer is left blank, it will be assumed the question was not present/relevant/applicable.

#### Guidelines for the audit:

- Walk the radius where possible (we suggest walking through busier streets).
- Stay within the radius provided. Audit will be 500m from the boundaries of the school.
- Audit all alcohol advertising only (included—poster advertising Heineken. Not included—passer-by drinking Heineken).
  - Alcohol advertising should include alcohol product advertising.
  - Alcohol advertising should include advertising by on- and off-licences, including licensing trusts.
  - Alcohol advertising should include images/visuals of individual/s consuming alcohol, even if featured as part of a non-alcohol ad.
  - Alcohol advertising should include zero percent alcohol products.
- Audit all streets and public areas (e.g., parks) within the radius.
- Audit school grounds where possible (some schools have known billboards on the grounds).
- Take picture and note frequency of advertisements.
- For digital billboards, please sit through the whole roll-out of ads.
- Note the coordinates through Google Maps or screenshot location of each advertisement.

What school is this audit for?

Surveillance list (photo attachment area is at the end of the Jotform)

	Alcohol ad present	Quantity	Location note	Other note
<b>Bus stop</b>				
<b>Buses</b>				
<b>Posters or flyers</b>				
<b>Standalone posters/stands</b>				
<b>Store frontage or sides</b>				
<b>Billboard</b>				
<b>Anything else/general environment</b>				

Anything else?

Please upload any relevant photographs or videos here, or email separately to sarah@ahw.org.nz. By uploading or sending through an image or video, you are allowing us to use your image or video in this research and subsequent publications.

Submit

# The unseen casualties of the First World War: insights from a randomly selected military sample

Nick Wilson, Jennifer A Summers, Glyn Harper, George Thomson

## ABSTRACT

**AIMS:** Studies of the morbidity burden of military personnel participating in the First World War (WWI) have tended to focus on specific outcomes (e.g., injuries). Therefore, we aimed for a more complete assessment.

**METHODS:** From a random sample of active war service-exposed New Zealand WWI veterans used in previously published work, we examined a random subsample of 200 personnel. Data on diagnoses, hospitalisations and outcomes were extracted from the online archival military files.

**RESULTS:** These personnel experienced a very high morbidity burden with 94% having at least one new condition diagnosed during their military service (mean: 2.4 per individual; range: 0 to 8). The relative severity of these conditions was reflected by the high level of hospitalisation (89% at least once; mean: 1.8 hospitalisations for new conditions per individual) and 59% of personnel being deemed no longer fit for military service at some stage. More of the new diagnoses were for infectious diseases than for conflict-related injuries (117 vs 50 cases per 100 personnel). Respiratory conditions such as influenza, pneumonia and tuberculosis affected 33% of personnel, and 14% were diagnosed with sexually transmitted infections. Diseases reflecting hazardous environmental conditions were relatively common e.g., for dysentery/gastroenteritis in 12% and scabies in 5% of personnel. Diagnoses suggestive of post-traumatic stress disorder (PTSD) were present in 10% and chemical warfare injuries in 6%.

**CONCLUSIONS:** The overall morbidity burden of this military force in WWI was very high, and much higher than the previous official estimates.

## Introduction

The First World War (WWI; 1914 to 1918) caused a substantial burden of injury and disease among participating military personnel. The most common injuries were caused by weapons (e.g., shrapnel from artillery, bullets and grenades). These injuries ranged from minor wounds up to those requiring limb amputations and causing permanent disability (e.g., blindness, deafness and traumatic brain injury).

Reviews have covered other health conditions in these personnel, including: the effects of the 1918 influenza pandemic on United States (US) and other soldiers;<sup>1,2</sup> the occurrence of malaria;<sup>3</sup> the (re)emergence of trench fever;<sup>4</sup> trench foot and other trench diseases;<sup>5,6</sup> and infectious diseases.<sup>7</sup> Reviews of mental health impacts have included the psychological effects on medical personnel involved,<sup>8</sup> shell shock and other psychoneuroses.<sup>9,10</sup>

For New Zealand, there were an estimated 98,950 military personnel who served overseas in WWI, and 7,036 who served on home territory in the New Zealand Expeditionary Force (NZEF) for a

total of 105,986.<sup>11</sup> An estimated 18.2% died during the war and up to the end of 1923 (with this period used in the official New Zealand *Roll of Honour*<sup>11</sup>). The official number of personnel wounded or suffering illness was 41,317 (equivalent to 39.0% of NZEF personnel). However, this number included “*all those removed from the front-line for medical treatment*”, as well as including repeat hospitalisations of soldiers, so it was more “*than the number of ‘wounded men’ per se*”.<sup>11</sup>

These estimates do not include the more than 12,000 New Zealanders who served separately with other military forces during this war.<sup>12</sup> We also suspected that the official number of those wounded or suffering illness would be far below the level of overall morbidity that could be found upon examining military records for individual personnel—as found in a study of New Zealand personnel who served overseas in the South African War.<sup>13</sup>

The New Zealand military personnel were predominantly volunteers, though 26.0% were conscripted.<sup>14</sup> Previous studies of this military population have focussed on their overall life-span,<sup>15–17</sup> but also aspects of their injury burden.<sup>18,19</sup>

The infectious disease burden included that from pandemic influenza,<sup>20–23</sup> dysentery,<sup>24</sup> sexually transmitted infections<sup>25</sup> and disease outbreaks in training camps.<sup>26</sup> Other health aspects studied include the poor nutrition (e.g., at Gallipoli),<sup>27</sup> oral health<sup>28</sup> and mental health.<sup>29,30</sup> A wide range of health conditions were described in an official report published soon after the war<sup>31</sup> and a book details the medical services for the NZEF.<sup>32</sup> Other works cover a range of different health conditions.<sup>33–36</sup>

There is evidence of persisting disabilities after the war from the war pension data for New Zealand. As of 31 March 1921, a total of 40,227 veterans had lodged claims for war pensions for war-related disability and 17,612 dependents had also lodged war pension claims (for the period September 1915 to 1921).<sup>37</sup> Of all these claimants, 51,711 (or 89% of the total of 57,839) were granted war pensions (with this proportion not given separately for veterans vs dependents). Studies have also indicated elevated post-war morbidity in the veteran population. A cohort study following returned NZEF personnel across their remaining lifetimes found that 1.7% committed suicide.<sup>38</sup> Those who had been wounded, sick or medically discharged were found to have a significantly higher chance of suicide. Another study reported elevated suicide rates among these veterans compared to civilian men in the same age cohort during the 1920s and subsequent decades.<sup>39</sup> Other work has found death certificates of veterans that are suggestive of post-war deaths from suicide and alcoholism that could have been war related, along with deaths associated with operations on wounds and “war disability”.<sup>15</sup>

But despite all this work, it remains unclear what the overall injury/disease burden was for the New Zealand military personnel in this war. Similarly, for detail on the seriousness of the conditions e.g., as determined by hospitalisation. We therefore aimed to assess this burden with an in-depth examination of a random selection of military personnel from a national military force: that for Aotearoa New Zealand.

By way of further background, the NZEF mainly fought in Europe on the Western Front, but was also part of campaigns in the Middle East (Gallipoli and Palestine).<sup>40</sup> After its experience of fierce fighting at Gallipoli (1915), the newly formed New Zealand Division was sent to the Western Front in early 1916. It was initially assigned to a relatively quiet sector of the front at Armentières. This was to allow the troops to acclimatise and to familiarise themselves with the new warfare

conditions on the Western Front. Following this, they were then dispatched to significant sectors of the Western Front, participating in major battles such as those at the Somme (1916), Messines (1917), Passchendaele (1917), the German Spring Offensive (1918) and the Hundred Days final offensive. These were among the most intense and pivotal campaigns of WWI. The last military action on the Western Front for the New Zealanders was the liberation of the town of Le Quesnoy (where the New Zealand Liberation Museum will be opened in October 2023). A map showing relevant areas for the New Zealand military on the Western Front is available here: <https://nzhistory.govt.nz/media/photo/western-front-1916-17-map>.

## Methods

### Sample selection

The sample was derived from a previous study on a random sample of NZEF participants in WWI.<sup>17</sup> From this larger sample we randomly selected 200 personnel for the in-depth analysis of their morbidity experience (for further details see the Appendix).

### Data collection

All the socio-demographic data (including ethnicity and occupational class) were collected, as per the previously published study,<sup>17</sup> as were military rank and participation in previous and subsequent wars. Added to this were data on new diagnoses, hospitalisations for new conditions and discharges from the military on medical grounds (all from the online archive of military files<sup>41</sup>). These files were almost all hand-written, often in difficult conditions at battalion or similar level.

On occasions, the paucity of details in the military files on health conditions required some assumptions, as follows:

- Where a condition could plausibly have been related to subsequent relapses or sequelae, we did not count these sequelae conditions separately. For example, a reference to “debility” that was followed several months after “influenza” or “dysentery” was assumed to be sequelae of one of these earlier diagnoses.
- For hospitalisations, we also distinguished between those for new conditions as opposed to those related to transfers to other facilities (e.g., from hospital to convalescent facility) or ongoing treatment for a

previously identified condition. We collected data on all admissions to hospitals, hospital ships and convalescent care facilities, but did not count visits to field ambulance units or casualty clearing stations that did not result in hospitalisation. To facilitate the data collection process, a detailed list of terms and acronyms used in the military files was compiled beforehand (see the Appendix).

- Where a particular diagnosis was first made after military service was completed e.g., a diagnosis of “shell shock” by a medical board after the war, we assumed that this condition had commenced while still in military service.
- The timing of “frontline” status was established by military file entries such as: “joined battalion” or battery or similar frontline unit (typically after periods in training or in the “rear”).

Other data sources that were occasionally consulted were online obituaries (e.g., in the dataset: Papers Past [<https://paperspast.natlib.govt.nz/>]).

### Inter-observer reliability assessment for data collection

As the data extraction was first done by a single author, two other authors with experience in work with NZEF records each independently re-examined 10 randomly selected additional files each (to make up a 10% sample). The assessment compared the new diagnoses, the new hospitalisations and samples of extracted numerical data.

### Data analysis

Data were collated in a Microsoft Excel file and univariate analyses were conducted using EpiInfo v7.1.5.2. Lifespan comparisons for different groups used analysis of variance (ANOVA).

### Ethics statement

Ethical approval for this study was provided through the University of Otago Human Ethics Committee process (Category B Approval, D22/030).

## Results

### Inter-observer reliability assessment

Based on the two subsequent observers independently examining a 10% sample of the data, the following sensitivity estimates were obtained

for the first and main observer (when the “true” denominator is assumed to be that from all observers combined): 89% (41/46) for the number of new conditions; 91% (39/43) for the number of hospitalisations for new conditions; 84% (21/25) for the number of war theatres; 100% (19/19) for the correct date of death (when available from this source); and 100% (20/20) for length of stay overseas. Errors were made by the main observer for an incorrect “unfit status” (5%, 1/19) and for one diagnosis (2%, 1/46, where the words disability and diabetes were confused with each other).

### Characteristics of the studied population

The average age of this randomly selected sample was 25.4 years (at the start of the war) and they were nearly all of European ethnicity (i.e., only 2.5% were Māori) (Table 1). The occupational class was dominated by the lower three groupings (54%) and military rank was predominantly in the lowest rankings (88%). By the end of 1916, 48% had been to a frontline position, and by the end of the war, 91.5%. The mean length of war participation was 2.6 years and the most common theatres of war were the Western Front (74%) and then the Middle East (Egypt, Sinai and Palestine) at 22%.

### Morbidity burden

The great majority (94%) of this study population had at least one non-fatal new condition diagnosed and 89% had at least one hospitalisation for a new condition (Table 2). Indeed, the average participant had 2.4 new diagnoses and 1.8 hospitalisations for new conditions during their military service. This equated to 0.9 new conditions and 0.7 hospitalisations for new conditions per year of military service.

In terms of specific conditions, 42% of the personnel experienced at least one conflict-associated injury event (Table 3; Figure 1). Injuries from chemical warfare (gas poisoning) were experienced by 6% of personnel. But most of the new diagnoses were for infectious diseases, followed by the grouping of “other causes” (e.g., mental health) and then conflict-related injuries (117, 74 and 50 cases per 100 personnel respectively).

Respiratory conditions (including influenza, pneumonia, bronchitis and tuberculosis) alone impacted around a third of personnel (33%), with influenza being diagnosed in 19%. Sexually transmitted infections affected 14% of personnel (16 cases per 100 personnel), with gonorrhoea being the most common specified type.

Diseases typically reflecting hazardous environmental conditions were relatively common

**Table 1:** Demographic characteristics and military experience of the random selection of 200 male New Zealand military personnel participating in the First World War (for those travelling overseas, who were alive on 1 January 1919, and for whom age at death could be established).

Characteristic	Number	Other data
<b>Demographics</b>		
Mean age (years) at the start of the war (28 July 1914)	25.4	SD=6.95
Median age (years) at the start of the war (28 July 1914)	23.9	IQR=19.2 to 30.1
Māori ethnicity assumed (e.g., te reo Māori language in name)*	5	2.5%
Non-Māori ethnicity (nearly all European/Pākehā)	195	97.5%
<b>Occupational class*</b> (based on occupation at enlistment)		
Highest 3 groupings (i.e., least deprived)	11	5.5%
Middle 3 groupings	81	40.5%
Lowest 3 groupings (i.e., more deprived)	108	54.0%
<b>Military service</b>		
<b>Other war service</b>		
Prior participation in the South African War (1899–1902)	5	2.5%
Subsequent participation in the Second World War (WWII; 1939–1945), albeit not necessarily in an overseas or frontline role	18	9.0%
<b>Military rank on enlistment*</b>		
Commissioned officers (i.e., from officer cadet to field marshal)	4	2.0%
All non-commissioned personnel (excluding the lowest ranks) (i.e., from lance corporal to warrant officer class one)	21	10.5%
The lowest ranks (e.g., gunner, trooper, sapper, signaller, private)	175	87.5%
<b>Timing of frontline service:</b> Year of first arrival at the front line (excluding the n=17 who never went further than the United Kingdom or who worked on hospital ships)		
1914	1	0.55%
1915	40	21.9%
1916	47	25.7%
1917	61	33.3%
1918	34	18.6%
Total to front line	183	91.5%
Mean length of foreign military service (outside of New Zealand)	2.1 years	SD=342 days
Mean length of total military service—including time in New Zealand	2.6 years (965 days)	SD=341 days

**Table 1 (continued):** Demographic characteristics and military experience of the random selection of 200 male New Zealand military personnel participating in the First World War (for those travelling overseas, who were alive on 1 January 1919, and for whom age at death could be established).

Characteristic	Number	Other data
<b>Theatres of war</b> (with these results not summing to 100% due to participation in multiple theatres by many personnel)		
Any time in France or Belgium	148	74.0%
Any time in Gallipoli/Dardanelles	37	18.5%
Any time in Egypt/Sinai/Palestine	43	21.5%
Any time in Samoa (this was in combination with at least one other theatre—see exclusions in the <i>Methods</i> )	3	1.5%
Only United Kingdom	10	5.0%
Other (e.g., only at sea when away from New Zealand)	2	1.0%

\* See the *Methods* in the related study of lifespan in a larger random sample of NZEF personnel.<sup>17</sup>  
SD = standard deviation; IQR = interquartile range.

**Figure 1:** New Zealand General Hospital No.1 (Headquarters) Brockenhurst (fracture ward). Qualis Photo Coy (ca. 1915). Auckland War Memorial Museum | Tāmaki Paenga Hira. PH-TECH-925-286 (no copyright).



**Table 2:** The overall morbidity burden based on diagnoses and hospitalisations during military service (non-fatal injuries and diseases) for the random selection of 200 New Zealand military personnel participating in the First World War.

Characteristic	New condition diagnosed*		Hospitalisation for new condition	
	N	%	N	%
Nil event per person	13	6.5%	22	11.0%
1 per person	58	29.0%	69	34.5%
2 per person	46	23.0%	65	32.5%
3 per person	38	19.0%	25	12.5%
4 per person	25	12.5%	12	6.0%
5+ per person (maximum was 8 for diagnoses, 6 for hospitalisations)	20	10.0%	7	3.5%
	Key number	Other	Key number	Other
Total number	480	240 per 100 cases	358	179 per 100 cases
Mean number	2.40	SD=1.61	1.79	SD=1.21
Median number	2.00	IQR=1.00 to 3.00	2.00	IQR=1.00 to 2.00
Estimated number of events per year of exposure to military service (total service, including training)**	0.92		0.69	

\* See Table 3 for these conditions and the *Methods* for how related subsequent diagnoses were excluded.

\*\* Calculated based on the average 2.6 years of military service detailed in Table 1.

e.g., for dysentery/gastroenteritis at 12% and scabies at 5% of personnel. Less common were “trench” diseases (i.e., trench fever, trench foot, trench mouth), and there were no identified cases of typhoid and typhus.

Diagnoses suggestive of post-traumatic stress disorder (PTSD) were present in 10% of the personnel (9.5 cases per 100 personnel). The most common term used was “disordered action of the heart” (DAH), followed by neurasthenia and shell shock.

Due to either injuries or illnesses, most of the personnel were deemed “unfit for military service” by a military medical board (59%) at

some point in their military service (Table 3).

### Associations between morbidity and lifespan

The comparisons in Table 4 suggest no statistically significant differences between the various groups. Nevertheless, the pattern was for slightly lower lifespan among those with more diagnosed new conditions, more hospitalisations for new conditions, having had a STI diagnosis and being declared unfit at some point. The exception was for having a mental health diagnosis, which was associated with a slightly higher lifespan (albeit also not statistically significant).

**Table 3:** The specific non-fatal conditions identified among the random selection of 200 New Zealand military personnel participating in the First World War.

Conditions	Individuals having any occurrence (not including multiple such events)		Cases per 100 people (capturing multiple events per person)
	N	%	
<b>Injuries</b>			
Non-fatal injury event associated with conflict (counting multiple injuries received on one occasion as one injury event; includes chemical warfare injuries; and not counting subsequent sequelae relating to injuries e.g., further complications and operations)	83	41.5%	49.5
Chemical warfare injury (gas poisoning)	12	6.0%	6.0
“Accidental” injuries during military service (e.g., ankle sprain, fall from a horse, from lifting heavy weights)	19	9.5%	9.5
Other injuries	1	0.5%	0.5
All of the above injuries	103	51.5%	59.5
<b>Diseases typically associated with hazardous environmental conditions</b>			
Dysentery/gastroenteritis/“enteritis”/diarrhoeal illness not otherwise specified	23	11.5%	13.0
Scabies	10	5.0%	5.5
Mosquito-borne diseases: malaria, dengue	6	3.0%	3.0
Trench fever (a bacterial infection transmitted by body lice)	5	2.5%	2.5
Trench foot (a condition from prolonged exposure of the feet to cold, damp and often unsanitary conditions)	3	1.5%	1.5
Trench mouth (in modern terminology: acute necrotising ulcerative gingivitis)	2	1.0%	1.0
Other conditions (e.g., trachoma, paratyphoid)	2	1.0%	1.0
All of the above diseases	51	25.5%	26.0
<b>Sexually transmitted infections (STIs)</b>			
Gonorrhoea (one STI only)	16	8.0%	8.0
Syphilis (one STI only)	1	0.5%	0.5
Chancroid/soft chancre (one STI only)	1	0.5%	0.5
Pubic lice (one STI only)	1	0.5%	0.5
“Venereal disease” not otherwise specified (one STI only)	6	3.0%	3.0
Multiple STIs	3	1.5%	3.5
All the above STI categories	28	14.0%	16.0

**Table 3 (continued):** The specific non-fatal conditions identified among the random selection of 200 New Zealand military personnel participating in the First World War.

Conditions	Individuals having any occurrence (not including multiple such events)		Cases per 100 people (capturing multiple events per person)
	N	%	
<b>Other infectious diseases</b>			
Any respiratory condition (influenza, pneumonia, bronchitis, tuberculosis)	65	32.5%	45.0
Influenza (including pandemic influenza in 1918–1919)	38	19.0%	24.5
Tuberculosis (pulmonary or not stated)	6	3.0%	3.0
Measles, mumps or rubella	16	8.0%	8.5
Fever of unknown origin (“pyrexia of unknown origin” or PUO)	16	8.0%	8.5
Diphtheria	8	4.0%	4.0
Other (not detailed above e.g., extra-pulmonary tuberculosis, “jaundice”—probably infectious hepatitis)	15	7.5%	9.0
All of the above diseases	105	52.5%	66.0
<b>Mental health conditions</b>			
Any form of PTSD (see the Appendix for a full list of terms related to this)	19	9.5%	9.5
“Disordered action of the heart” (DAH)	9	4.5%	4.5
Neurasthenia	6	3.0%	3.0
Shell shock	4	2.0%	2.0
Other mental health conditions (i.e., depression)	1	0.5%	0.5
All of the above conditions	20	10.0%	10.0
<b>Other health conditions</b>			
All other conditions (including some pre-war conditions and others potentially not always directly related to military service e.g., asthma)	69	34.5%	52.0
Musculoskeletal condition (e.g., rheumatism possibly not related to a specific injury)	10	5.0%	6.0
Oral health conditions (excluding trench mouth—see above)	10	5.0%	5.0
<b>Impact of health outcomes on further military service</b>			
Deemed unfit for any further military service at any point during service (albeit in 2 cases the individual subsequently returned to service, 1 re-enlisted for home service, and 1 was assigned base duties)	117	58.5%	58.5
Not deemed unfit for military service	83	41.5%	41.5

**Table 4:** Lifespan of the veterans in this study in relation to selected morbidity profiles and different exposures during military service.

Characteristic	Mean lifespan of group of interest (years)	Mean lifespan of the rest of the sample (years)	P-value (ANOVA)
<b>Morbidity-related exposures</b>			
3 or more new conditions (n=83) (as per Table 3) vs fewer conditions (n=117)	68.5	70.3	0.3960
3 or more hospitalisations for new conditions (n=44) (as per Table 3) vs fewer hospitalisations (n=156)	67.4	70.2	0.2773
Having any mental health diagnosis (n=20) vs no such diagnosis (n=180)	72.0	69.3	0.4368
Having any STI diagnosis (n=28) vs no such diagnosis (n=172)	65.9	70.2	0.1578
Being declared unfit at some point of service (n=117) vs those never declared unfit (n=83)	69.3	69.9	0.7642
<b>Exposures during military service</b>			
Participating in Gallipoli (n=37) vs any other frontline theatres (n=151)—and excluding those not in such theatres	69.1	70.2	0.6905
Going to the frontline before 1917 (n=88) vs later (n=95)	68.5	70.9	0.2657

## Discussion

### Main findings and interpretation

The major finding of this work was the very high morbidity burden of this military force—with 94% having at least one new condition diagnosed. The high level of personnel hospitalised (89%) also attests to the relative severity of most conditions, as does the majority (59%) of personnel being deemed no longer fit for further military service at some stage. These high proportions contrast with the official number of personnel wounded or suffering illness as detailed in the *Introduction* (41,317 personnel, equivalent to 39% of all NZEF personnel).

However, our estimate for diagnosed conditions will still be an under-estimate as it will not have captured more minor conditions. For example, nearly all of these personnel probably had a lice infestation<sup>35</sup> and many would have had symptom-

atic influenza during the pandemic in 1918–1919<sup>22</sup> without it necessarily being recorded in the military files. We also did not count as hospitalisations the admissions to field ambulance units or casualty clearing stations, some of which were for several days, if the soldier returned to the unit.

That infectious disease diagnoses were over twice as common as conflict-related injuries (117 vs 50 cases per 100 personnel respectively) is in contrast to the mortality burden for the NZEF in this war. That is, direct conflict-related deaths were 89% of all deaths compared to 8% dying of “disease”.<sup>18</sup> But in the preceding war involving New Zealand military personnel (the South African War), 59% of deaths were from disease.<sup>13</sup>

Condition severity was sometimes such that injuries were likely to have resulted in life-long disabilities (e.g., for head injuries and amputations). One of the personnel in this study had severe facial injuries that was officially deemed a factor in his suicide soon after the war. Some of the

various infectious diseases listed in Table 3 could also result in adverse long-term sequelae e.g., tuberculosis, syphilis and malaria. Fortunately, there were no cases of typhoid identified in this sample, possibly a reflection of most of these personnel being vaccinated against it. Similarly, there were no cases of typhus, which was a major cause of death in Eastern Europe during this war.<sup>7</sup>

The overall cumulative incidence of STIs in this study (16 cases per 100 personnel) was fairly similar to that estimated previously by an Australian medical historian: at 130 per 1,000 for New Zealand personnel vs 158 per 1,000 for Australian personnel.<sup>35</sup> Further work is needed to estimate if such differences by country related to efforts by New Zealand military leadership in STI control, along with the advocacy efforts of Ettie Rout,<sup>42</sup> which contributed to condom distribution from late 1917.

The finding of 10% of personnel being given a likely PTSD diagnosis is also probably an under-estimate, given how this condition was poorly understood at the time.<sup>29</sup> Indeed, a study of Vietnam War veterans in New Zealand reported that 20% had PTSD.<sup>43</sup> A more recent study of serving and retired New Zealand military personnel identified 30% with scores indicative of post-traumatic stress.<sup>44</sup>

None of the lifespan results in this study provide statistical evidence of a link with morbidity experiences during the war. But the results were generally in the direction of such an association and so larger studies could consider exploring these issues further. An Australian study of WWI veterans did find statistically significant increased mortality after 1921 for those who were: discharged as medically unfit, discharged as partially/totally permanently disabled and being discharged due to “venereal disease”.<sup>45</sup>

### Study strengths and limitations

A strength of this study is that it is the first relatively in-depth analysis of morbidity in a random sample of New Zealand military participants of WWI (to our knowledge). The research benefitted from the individual military records being available online and from the researchers having extensive experience (from previous studies) in interpreting the archival military records of the NZEF, knowledge of the WWI military environment and knowledge of medical terminology. Nevertheless, various limitations with our study need to be considered. In particular:

- Despite involving random sampling,

the study sample was only “fairly representative” of all military personnel in the NZEF given various exclusions. These exclusions are detailed further in the Appendix, but the major ones involved not going overseas to fight, being female, being Pasifika, and not surviving the war. As such it does not reflect the morbidity experience of these particular groups (and indeed, those killed in the war could also have had a worse morbidity profile in the period up until their deaths than other participants).

- We could not account for conditions not detailed in the military files. This under-recording was probably common, especially for more minor conditions that did not involve treatment by medical personnel (e.g., lice infestation and milder cases of pandemic influenza as discussed above). Indeed, one New Zealand soldier contributed a satirical poem to the “Chronicles of the N.Z.E.F” about the how wounded men were entitled to wear a gold stripe on the left sleeve, yet there was no formal recognition for “little ills” like “dysent’ry”, fever, septic sores, shell shock, frost-bite, rotting feet and being gassed.<sup>46</sup> Also, some conditions may not have been self-reported (e.g., symptoms of a STI) given the punitive approaches that could be taken by the military authorities.<sup>25</sup> Similarly, such “sensitive” diagnoses relating to STIs or mental health may have not been recorded by staff on purpose, so as to protect the reputation and future career of the patient. Finally, dental records were relatively sparse in the individual military files, suggestive that such records were held separately.
- There was a lack of specificity to some of the conditions as shown by the “pyrexia of unknown origin” category in Table 3. Such fever symptoms could have potentially arisen from many different infectious diseases.
- We may have missed some relevant data due to misinterpreting the hand-written text/acronyms/abbreviations in the archival military files. This is because of the highly cursive handwriting styles typically used and due to the complexity of some of the records (e.g., one was 189 pages long, and some were mixed up with WWII records). Nevertheless, the inter-observer assessment study suggested reasonable results for

sensitivity and specificity to the extent these can be estimated. Indeed, the values (such as 84% for the lowest end of the sensitivity range) might be under-estimates since the first author also did subsequent logic checks on the entire dataset and identified additional data items that could then be included in the final dataset version.

### **Possible lessons for governments and further research possibilities**

It has taken over 100 years for the morbidity burden for WWI personnel to be established in terms of new conditions and hospitalisations for new conditions. This highlights the need for governments to properly document such health burdens from past wars. Such documentation could better inform the need for conflict prevention (e.g., via diplomacy) as well as for ongoing maintenance of high health status among serving military personnel, provisioning them with appropriate equipment and ensuring high-quality

medical services to protect and treat them.

Further research could be done, including studies that explore the relationship between health conditions and the proximity to frontline combat in various theatres of WWI. Similarly for health risks associated with different roles in the military (e.g., being a health worker, being a private or officer, etc.) and for cross-country comparisons (e.g., New Zealand vs Australian military personnel). Māori or Pasifika researchers could also be funded to study the health burden in a random sample of these ethnic groups of military personnel.

### **Conclusions**

The overall morbidity burden of this military force in WWI was very high, and much higher than the previous official estimates. A wide range of conditions were found in this study, but as with preceding conflicts the cases of infectious diseases were more frequent than those from conflict-related injuries.

**COMPETING INTERESTS**

None declared.

**ACKNOWLEDGEMENTS**

The authors thank Christine Clement (genealogist) for assistance with determining the dates of birth and death for this cohort. Auckland War Memorial Museum kindly provided a copy of the Cenotaph records that assisted with sampling.

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## Appendix: Additional methods and acronyms, abbreviations and terms list used in this study

### Additional methods—sample selection

The sample was derived from a previous study on NZEF participants in WWI.<sup>1</sup> In summary, this former work involved the following steps:

- In February 2021, data were downloaded on all NZEF participants in WWI from the Auckland War Memorial Museum's Cenotaph website database.<sup>2</sup> This was 104,993 individual names, which was 99.1% of war participants according to an official estimate of 105,986.<sup>3</sup>
- Within this dataset we randomly selected a 5% sample of personnel (the random number generator in Microsoft Excel was used for all randomisation processes). From this sample the following were then excluded:
  - a. Non-veterans (defined as those dying in the war and subsequent weeks up to 31 December 1918), with this group being 18.2% of the sample.
  - b. Female participants (who were nurses and volunteers), with this being 0.47% of the sample.
  - c. Pasifika military personnel who came from South Pacific Islands to join the NZEF, with this group being 0.50% of the sample. This grouping was excluded given the focus of this former study was on veterans from New Zealand and because there is large heterogeneity in backgrounds for Pasifika populations (in demography and culture).
- Then, given the focus of the previous study being on NZEF veterans exposed to war overseas, a random subset of 1,000 personnel were further examined to exclude the following:
  - a. Being a non-veteran (as per the definition above) on closer examination of the records.
  - b. Not seeing active war service overseas (e.g., not actually leaving New Zealand, deserting on route or being deemed medically unfit prior to war exposure).
  - c. Only serving in Samoa (since this theatre of the war involved no conflict with Germany).
  - d. Being part of a non-New Zealand military force (e.g., the Australian Imperial Force

(AIF), or the Royal Navy of the United Kingdom [UK]).

The above process left 887 personnel in the sample out of the subsample of 1,000. Of these, the age at death could be ascertained from archival sources in 96.6% (857/887). Then, out of this group of 857 personnel with lifespan data (to ensure that they survived the war), we randomly selected 200 personnel for the in-depth analysis of their morbidity experience.

### Exclusions from the sample

In 14 cases (7.0%) the selected individuals in the sample of 200 had to be excluded. These included those subsequently found on close examination to be ineligible for inclusion (i.e., only went to Samoa [n=1]; participated in another military force [n=1]; the military file was completely missing [n=2], or because a section of the military file was missing [n=10]). These individuals were then replaced with others from the sub-sample of 857 personnel to remake up the 200 sample for this morbidity study.

### Acronyms, abbreviations and terms (of potential relevance to future researchers)

The following acronyms, abbreviations and terms were derived from a range of sources, including:

- Official New Zealand sources: <https://nzhistory.govt.nz/war/ww1-abbreviations-acronyms> and <https://natlib.govt.nz/researchers/guides/first-world-war-medical-services/>
- A New Zealand genealogical resource: <https://freepages.rootsweb.com/~sooty/genealogy/ww1abbreviations.html>;
- A UK source: <https://www.longlongtrail.co.uk/soldiers/a-soldiers-life-1914-1918/common-british-army-acronyms-and-abbreviations-of-the-first-world-war/>.

### List of acronyms, abbreviations and terms

- 1AAH = 1st Australian Auxiliary Hospital, Luna Park, Cairo
- 1AGH = 1st Australian General Hospital
- 2nd Australian Depot Weymouth; used for convalescence; available from <https://birtwistlewiki.com.au/wiki/Weymouth>

- AFB = Army Form B
- AS = “Active Service”
- A/H = Admitted hospital
- Abbasich = Canadian Stationary Hospital, Alexandria
- Abbassia = Hospital, Cairo
- Ad Hosp or “Adm Hosp” = for admission to hospital.
- AGH = Australian General Hospital
- Alder Hay = Liverpool Orthopaedic Centre, Liverpool
- Amb = Field ambulance
- Ampt or Amp = Amputation
- Aotea Home/House = a convalescent facility in Heliopolis, Cairo, Egypt (not classified as a hospital in this current study); available from <https://natlib.govt.nz/records/22564172>
- Aquitania = a hospital ship
- ASH = Australian Stationary Hospital
- Aus CCS = Australian Casualty Clearing Station
- Balmer Lawn = A part of No.1 New Zealand General Hospital (Brockenhurst)
- BRC = British Red Cross
- BRCH = British Red Cross Hospital
- Bright’s disease (also just “Bright”); in modern terms this is acute or chronic nephritis (a kidney disease)
- Brighton = New Zealand officers and nurses convalescent homes
- B’hurst = see Brockenhurst
- Brock = see Brockenhurst
- Brockenhurst = No.1 New Zealand General Hospital (Hampshire, England)
- BW = Bullet wound
- C/F = Compound fracture
- Can CCS = Canadian Casualty Clearing Station
- Can GH = Canadian General Hospital
- Can Stat Hosp = Canadian Stationary Hospital
- Cas = Casualty
- Cashmere Military Sanatorium, Christchurch = New Zealand military hospitals and convalescent homes
- CCH = Casualty clearing hospital
- CCS = Casualty clearing station
- Classified A (disabled officer or nurse) = Fit for general service
- Classified A1 = Fit for active service
- Classified B (disabled officer) = Fit for service in a garrison or labour unit abroad
- Classified B1 = Able to be made fit by medical treatment
- Classified C (disabled officer or nurse) = Fit for home service: (i) active duty with troops
- Classified C (disabled officer or nurse) = Fit for home service: (ii) sedentary employment only
- Classified C1 = Likely to become fit for service overseas after special training
- Classified C2 = Permanently unfit for active service but fit for service in New Zealand
- Classified D = Permanently unfit
- Classified D (disabled officer or nurse) = For admission to a command depot
- Classified E (disabled officer) = Requiring indoor hospital treatment: (i) in an officers military of auxiliary convalescent hospital
- Classified E (disabled officer) = Requiring indoor hospital treatment: (ii) in an officers hospital
- Classified F (disabled officer or nurse) = Permanently unfit for any further military service
- Consumption = an archaic name for tuberculosis
- Coy = Company
- CPDI = Chronic-Pulmonary Disease, Indeterminate
- CPT = Chronic pulmonary tuberculosis
- CSM = Cerebrospinal meningitis
- DAH = Disorderly action of the heart; this was also sometimes called “effort syndrome” or “soldier’s heart”; often the result of stress or fatigue, it does not imply there was any organic disease; available from <https://www.longlongtrail.co.uk/what-were-vdh-and-dah/>
- Dang ill = On dangerously ill list
- DAS = Died at sea
- DDS = Defence Dental Service
- DI = Dangerously ill (e.g., placed on dangerously ill list)
- DOD = Died of disease
- DOI = Died of illness
- DOW = Died of wounds
- DRS = Divisional rest station
- EGH = Egyptian General Hospital
- Endell St = Endell Street Military Hospital, London
- Fd/Fld Amb = Field ambulance
- FA = Field ambulance
- Fargo = “Fargo Military Hospital” at Larkhill on Salisbury Plain
- Forest Park = A part of No.1 New Zealand General Hospital (Brockenhurst)
- Gas hysteria and “gas neurosis” = Anxiety during a gas attack<sup>4</sup>

- Gen/Genl H or GH = General hospital
- Gezirah = Anglo American Hospital, Cairo
- Ghajn Tuffieha = Convalescent camp, Malta
- Ghizel = Red Cross Hospital, Cairo
- GSW = Gunshot wound
- GSW RWU = Gunshot wound, remaining with unit
- H'church/Hch = New Zealand convalescent hospital (Hornchurch) in London, England
- Heliopolis = Heliopolis Palace: 1st Australian General Hospital, Egypt (see Aotea, a convalescent home also at Heliopolis)
- Helouan = Convalescent hospital, Egypt
- Hornchurch = New Zealand convalescent hospital (London)
- Hos = Hospital
- HS = Hospital ship
- ICT = Inflammation of the connective tissue
- IDK = Internal derangement of the knee
- Isol Hosp = Isolation hospital
- Isolation H = Isolation hospital
- Kantara = the 24 Stat Hospital Kantara Egypt
- KIA = Killed in action
- King George V Hospital, Rotorua = New Zealand military hospitals and convalescent homes
- Lady Godley's = Convalescent hospital, Egypt
- M I Hospital = Military infectious hospital
- M/U = Medically unfit
- Maheno = A hospital ship (New Zealand)
- Manor Hospital, Epsom = Epsom, Surrey; from 1916 became Manor War Hospital
- Marama = A hospital ship (New Zealand)
- MB or Med/B = Medical board
- MDS = Main dressing station
- Mental = a mental health condition
- MG = Machine gun
- MGB = Machine gun bullet
- MH Tidworth = Tidworth Military Hospital (in the UK)
- Mt Felix = NZEF Hospital, near 2nd General Hospital, Walton-on-Thames
- Mudros/Moudros = a port on the island of Lemnos, Greece
- NYD = Not yet diagnosed
- NYDN = Not yet diagnosed
- NZ Con Depot = New Zealand convalescent depot
- NZ Con Hom = New Zealand convalescent home
- NZGH = New Zealand General Hospital
- NZGH Brockenhurst = No.1 New Zealand General Hospital, Brockenhurst, England
- NZGH Codford = No.3 New Zealand General Hospital, Codford, England
- NZGH W on T = No.2 New Zealand General Hospital, Walton-on-Thames, England
- NZHS = New Zealand hospital ship
- P de K = New Zealand General Hospital, Pont de Koubbeh, Cairo; later 2nd New Zealand Stationary Hospital
- P/U or PU = Permanently or physically unfit
- Phthisis = an archaic term for any disease that causes wasting of the body, especially pulmonary tuberculosis; in this study it is generally assumed to be pulmonary tuberculosis
- PIE = Proximity to the battle, Immediacy of treatment and Expectancy of recovery, including return to duty<sup>5</sup>
- Pnt de K = New Zealand General Hospital, Pont de Koubbeh, Cairo; later 2nd New Zealand Stationary Hospital
- Pont de Koubbeh/Kubb = New Zealand General Hospital, Pont de Koubbeh, Cairo; later 2nd New Zealand Stationary Hospital
- Post-concussion syndrome (PCS) and post-concussional disorder (PCD)
- POW = Prisoner of war
- PTB = Pulmonary tuberculosis
- PTSD = Post-traumatic stress disorder (see terms for "shell shock" and DAH)
- PUO = Pyrexia (fever) of unknown origin (described in the UK context as "*medical term usually applied to Trench Fever*")
- Queen Mary Hospital = Hanmer Springs, New Zealand; used for rehabilitation for mental and nervous conditions, particularly shell-shock
- Ramleh = Hospital, Alexandria, Egypt
- RAP = Regimental aid post
- Ras El Tin = Military hospital, Alexandria, Egypt
- Rotorua = May refer to King George V Military Hospital in Rotorua
- Rouen = New Zealand embarkation camp and hospital, Rouen
- Salah El Din (Saladin) = Citadel Hospital, Cairo
- Scabies = a mite infestation that could result in hospitalisation
- SC = soft chancre (an STI; the modern term is chancroid)
- Segregation = Isolation (for infectious disease)
- Ser ill = On seriously ill list
- SH or Stat Hos or Sty or Sty H = Stationary hospital

- Shell shock synonyms; Wikipedia gives these other terms for “shell shock”: “Bullet wind”, “soldier’s heart”, “battle fatigue”, “operational exhaustion”. Wikipedia gives these other terms for “Da Costa’s syndrome” (another outdated term): “soldier’s heart”, “cardiac neurosis”, “chronic asthenia”, “effort syndrome”, “functional cardiovascular disease”, “neurocirculatory asthenia”, “primary neurasthenia”, “subacute asthenia” and “irritable heart”. Wikipedia also details combat stress reaction: also known as “combat fatigue”, “battle fatigue”, or “battle neurosis”. Words used in the text by Carbery: concussion neurasthenia, psychasthenia, hysteria or neurasthenia (in: <http://nzetc.victoria.ac.nz/tm/scholarly/tei-WH1-Medi-t1-g1-t1-body-d14.html#n353>). Also by Carbery: “Mental States”; see also “DAH” in this glossary. Terms from Horrocks:<sup>6</sup> nervous conditions variously described as “shell shock”, concussion neurasthenia, hysteria, exhaustion, pithiatism, and psychasthenia. Other possible terms include: “combat stress reaction” (CSR), “war neurosis”, “war strain” and “battle fatigue”.
- Shoubra = Infectious diseases hospital, Shoubra, near Cairo
- SI = Seriously ill (Placed on SI list)
- SI List = Seriously ill list
- SIW = Self-inflicted wound
- Soft sore = Chancroid, a sexually transmitted infection
- SOS or Str off str = Struck off strength (although this might not necessarily be health related): “*A soldier no longer capable of active service is removed from the list of soldiers available for serving at the front*”
- Southwark = Southwark Military Hospital, East Dulwich, Greater London
- SW = Shrapnel wound
- TAT = Temporary ambulance train
- TB = an abbreviation for tuberculosis, but in some contexts it may be “Temporary Base (medical)”
- Trench fever = a bacterial disease (*Bartonella quintana*) transmitted by body lice; also known as “five-day fever”, “quintan fever”
- Trench foot/feet = a condition resulting from prolonged wet feet; it could result in hospitalisation, amputations and death
- Trench mouth = In modern day terms it is “acute necrotizing ulcerative gingivitis” (ANUG), a mixed bacterial condition; in the WWI context it was probably related to poor living conditions, malnutrition, smoking and extreme psychological stress; see also Vincent’s gingivitis in this glossary
- TU = Temporarily unfit
- VD = Venereal disease (in modern terminology: “sexually transmitted infection”) e.g., gonorrhoea or syphilis
- VD Section = Venereal disease section (attached 3rd New Zealand General Hospital, Codford)
- VD Ward = Venereal disease ward
- VDC = Venereal disease, chancre (modern term is chancroid)
- VDG = Venereal disease, gonorrhoea
- VDH = Valvular disease of the heart
- VDS = Venereal disease, syphilis
- VDSC = Venereal disease, soft chancre (modern term is chancroid)
- Ven Hosp = Venereal disease hospital
- Ven Section = Venereal disease section (attached 3rd New Zealand General Hospital, Codford)
- Vincent’s angina = an archaic term for pharyngitis and tonsillitis together
- Vincent’s gingivitis = an archaic term for necrotising ulcerative gingivitis; see “trench mouth” in this glossary
- W RWU = Wounded, remaining with unit
- Walton/Walton-on-Thames = No.2 New Zealand General Hospital, Walton-on-Thames, England
- Whitlow = an infection of the finger and especially the fingertip that is typically caused by infection of a virus (such as the herpes simplex virus)
- WIA = Wounded in action
- Wnd = Wound or wounded
- Woodcote Park = Military convalescent hospital, Epsom, Surrey (in use in 1915)
- WWCS = Walking wounded collecting station

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# The spectrum of paediatric uveitis in New Zealand

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## ABSTRACT

**AIMS:** To describe the aetiology, complications, treatment and outcomes of paediatric uveitis.

**METHODS:** This was a retrospective chart review including all paediatric participants presenting with uveitis to a tertiary referral hospital in Auckland, New Zealand between January 1997 and March 2020.

**RESULTS:** Two hundred and twenty-four eyes of 143 participants were included. One hundred and three (46.0%) eyes were found to have uveitis without the child reporting any symptoms. Non-infectious uveitis occurred in 97 (67.8%) participants and infectious aetiology occurred in 46 (32.2%) participants. One hundred and twenty-six (56.3%) eyes developed complications by final follow-up, including ocular hypertension (60 eyes, 26.8%), cataract (55 eyes, 24.6%) and glaucoma (21 eyes, 9.4%). Conventional disease modifying anti-rheumatic drugs (DMARDs) were required in 58 (59.8%) participants, and biologic disease modifying anti-rheumatic drugs in 31 (32.0%) participants with non-infectious uveitis. Participants who were younger at presentation were more likely to require a DMARD (OR 0.896  $p=0.032$ ). Vision loss of 6/15 or worse occurred in 38 (17.0%) eyes.

**CONCLUSIONS:** Infections are an important cause of uveitis in this age group. Asymptomatic presentation and complications commonly occur. A large proportion of children with non-infectious uveitis will require steroid sparing immunosuppression.

Paediatric uveitis is uncommon, constituting around 5–10% of all cases of uveitis.<sup>1</sup> It represents a significant challenge, however, to ophthalmologists, as children may present late due to difficulty reporting symptoms, may be asymptomatic in the early stages (especially juvenile idiopathic arthritis [JIA]) and can be difficult to examine.

There appears to be geographic variation in the identifiable causes of paediatric uveitis. Additionally genetic, ethnic and environmental factors contribute to disease patterns.<sup>2</sup> In American, European, Australian and Indian cohorts, JIA is the most common associated systemic disease,<sup>2–5</sup> while in Japan the most common systemic association is Behçet's disease.<sup>6</sup> Behçet's disease is also more common in the Middle East<sup>7</sup> and Turkey,<sup>8</sup> while Vogt–Koyanagi–Harada disease is more common in Saudi Arabia.<sup>9</sup> Of infective causes, toxoplasmosis is a common cause of infectious uveitis in Europe,<sup>4</sup> while in India tuberculosis was the most common cause of infectious paediatric uveitis.<sup>2</sup>

Uveitis is a heterogeneous group of entities causing intraocular inflammation. When assessing patients with uveitis, a focussed history and examination is necessary, and a variety of investigations contribute to establishing a diagnosis. It is vital that these investigations are tailored to the history, examination findings and clinical suspicion. For

this, an awareness of local disease patterns and prevalence rates is necessary.<sup>10</sup>

Therapies can also be challenging to administer in this age group, with some therapies requiring general anaesthetic and corticosteroid increasing the risk of cataract, glaucoma<sup>1</sup> and growth retardation.<sup>1,11,12</sup> Disease occurring during the amblyogenic period can lead to guarded visual outcomes. Vision impairment in the paediatric population leads to lifelong visual disability,<sup>2</sup> hindering a child's ability to learn.

The primary objective of this study was to describe the causes of uveitis in the paediatric population in a tertiary referral centre at Auckland, New Zealand. The secondary objectives included visual outcomes, complications and treatment modalities.

## Methods

### Subject selection

This study received ethics approval from the Auckland District Health Board Review Committee (AH1339) and adhered to the tenets of the Declaration of Helsinki. Subjects were identified from the Auckland Inflammatory Eye Disease Registry between January 1997 to March 2020, and paediatric participants were taken as subjects 16 years of age or younger at first presentation.

## Data collection

A retrospective chart review was performed for all participants, with relevant case details transcribed onto a standardised proforma, including demographics, anatomic location of uveitis, cause of uveitis, ocular and systemic treatment, complications and surgical interventions. Post surgical and post trauma uveitis were only included if the uveitis persisted three months or more. Location of uveitis was graded according to the Standardization of Uveitis Nomenclature (SUN) classification.<sup>13</sup> Complications of band keratopathy, posterior synechiae, ocular hypertension, glaucoma, hypotony, cataract, cystoid macular oedema (CMO), retinal detachment, epiretinal membrane (ERM), macular hole, macular scar, vitreous hemorrhage, optic neuropathy, choroidal neovascular membrane (CNVM), phthisis, visual impairment and death were recorded. Hypotony was defined as an intraocular pressure (IOP) of 6mmHg or less on two consecutive occasions, and ocular hypertension was defined as an IOP of 24mmHg or greater.<sup>13</sup>

Presenting and final visual acuity were typically noted using Snellen acuity; these were converted to LogMAR for the purpose of analysis. For visual acuity of counting fingers or worse, the following conversion was used: counting fingers, 2.0 LogMAR; hand movements, 2.3 LogMAR; light perception, 2.6 LogMAR; no light perception 2.9 LogMAR.<sup>14</sup> Severe vision loss (SVL) was defined according to the SUN criteria as a permanent reduction in best corrected visual acuity (BCVA) of 6/60 or worse and moderate vision loss (MVL) as a BCVA of 6/15 or worse.<sup>13</sup>

## Analysis and statistics

Data were entered into an Excel spreadsheet (Microsoft Corp., Redmond, WA) and analysed in STATA version 15.0 (Stata Corporation, College Station, TX). Values were reported as n (%) or median (interquartile range [IQR]). Logistic regression and Cox proportional hazards were used to analyse risk of complications of uveitis. A p-value of  $\leq 0.05$  was considered significant.

## Results

### Demographics

During the study period from January 1997 to March 2020, 2,751 people were reviewed with uveitis, of which 143 (5.2%) were aged  $\leq 16$  at presentation. Disease was bilateral in 81 (56.6%) participants, with a total of 224 eyes included in

the study. Median presenting visual acuity was 6/7.5 (IQR 6/6–6/15). Participant demographics and diagnoses are listed in Table 1. Age distribution is shown in Figure 1.

### Causes

Non-infectious uveitis was the most common cause, occurring in 97 (67.8%) participants. Causes of uveitis are shown in Table 1 and Table 2. Idiopathic uveitis (29.4%) was the most common non-infectious aetiology.

Twenty-five (17.5%) participants had JIA related uveitis. The median age of diagnosis was 5.0 years (mean 6.0, range 1.6–14.4) and 17 (68.0%) subjects were female. Twenty-one (84.0%) subjects were antinuclear antibody (ANA) positive.

Forty-six (32.2%) participants had an infectious aetiology. Seven (4.9%) subjects had varicella uveitis, of which four had anterior uveitis due to primary varicella infection (chickenpox) and the remaining three subjects due to herpes zoster.

### Presenting symptoms

Presenting symptoms are shown in Table 3. Self-reported symptoms were documented for 121 (54.0%) eyes.

One hundred and three (46.0%) eyes were found to have uveitis without the child reporting any symptoms. This included 12 children who presented with symptoms in one eye but were found to have bilateral uveitis. Uveitis was detected in 18 (17.5%) eyes following referral based on parental concern, 32 (31.1%) eyes based on other referrer concern (including the child's general physician, optometrist, teacher or nurse). Six (5.8%) eyes were found to have uveitis following a failed B4 School Check, a New Zealand nationwide health initiative designed to screen a child's health and development that is conducted at four years of age.

Of the asymptomatic children, four (3.9%) eyes were referred for assessment of possible squint and two (1.9%) eyes were referred regarding concerns for leukocoria.

Twenty-five participants had JIA associated uveitis, of which 19 (76.0%) subjects were asymptomatic, with uveitis diagnosed on screening alone.

### Complications

Complications occurring at initial presentation and final follow-up are shown in Table 4. There was no significant association between complications present at initial presentation and vision loss (OR 1.249,  $p=0.163$ ).

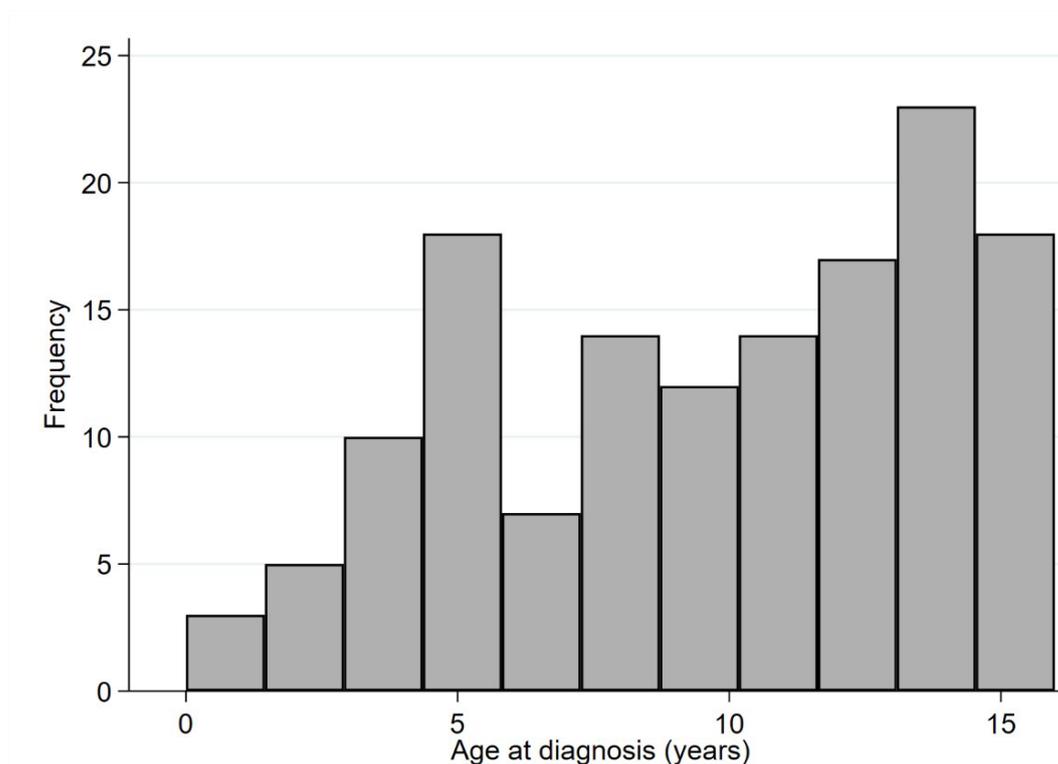
**Table 1:** Demographics and diagnosis of paediatric uveitis.

<b>n=143</b>	
<b>Age</b>	Median 10.3 (IQR 5.8–13.9)
<b>Female</b>	86 (60.1%)
<b>Ethnicity</b>	
Caucasian	74 (51.7%)
Indian	13 (9.1%)
Other Asian	12 (8.4%)
Māori	20 (14.0%)
Pacific Islander	20 (14.0%)
Other	4 (2.8%)
<b>Anatomical classification of uveitis*</b>	
Anterior	88 (61.5%)
Intermediate	18 (12.6%)
Panuveitis	19 (13.3%)
Posterior	23 (16.1%)
Scleritis	4 (2.8%)
Peripheral ulcerative keratitis	1 (0.7%)
<b>Uveitis diagnosis</b>	
<b>Non infectious</b>	<b>97 (67.8%)</b>
• Idiopathic	42 (29.4%)
• Juvenile idiopathic arthritis	25 (17.5%)
• HLA-B27 positive uveitis	9 (6.3%)
• Tubulointerstitial nephritis	5 (3.5%)
• Post-surgical	4 (2.8%)
• Psoriatic arthritis	1 (0.7%)
• Vogt–Koyanagi–Harada syndrome	1 (0.7%)
• Behçet’s disease	1 (0.7%)
• Granulomatosis with polyangiitis	1 (0.7%)
• Sympathetic ophthalmitis	1 (0.7%)
• Crohn’s disease	1 (0.7%)

**Table 1 (continued):** Demographics and diagnosis of paediatric uveitis.

<b>Uveitis diagnosis</b>	<b>n=143</b>
• Granuloma annulare	1 (0.7%)
• Sarcoidosis	1 (0.7%)
• Small vessel vasculitis	1 (0.7%)
• Post-trauma	1 (0.7%)
• Unspecified neurological disease	1 (0.7%)
• Multifocal choroiditis	1 (0.7%)
<b>Infectious</b>	<b>46 (32.2%)</b>
• Toxoplasmosis	15 (10.5%)
• Bartonella	5 (3.5%)
• Varicella zoster	7 (4.9%)
• Cytomegalovirus	3 (2.1%)
• Herpes simplex	3 (2.1%)
• Acute retinal necrosis	2 (1.4%)
• Post-streptococcal	3 (2.1%)
• Post-viral	3 (2.1%)
• Toxocara	3 (2.1%)
• Tuberculosis	1 (0.7%)
• Unspecified infection	1 (0.7%)

\*Note some participants had more than one anatomical classification.

**Figure 1:** Age distribution of paediatric participants.**Table 2:** Diagnosis based on age subcategories.

	Age (years)		
	0-6	7-11	12-16
<b>Uveitis diagnosis (n=143)</b>			
<b>Non infectious</b>	<b>28 (19.5%)</b>	<b>25 (17.5%)</b>	<b>44 (30.8%)</b>
• Idiopathic	7 (4.9%)	13 (9.1%)	22 (15.4%)
• Juvenile idiopathic arthritis	18 (12.6%)	4 (2.8%)	3 (2.1%)
• HLA-B27 positive uveitis	0 (0.0%)	1 (0.7%)	8 (5.6%)
• Tubulointerstitial nephritis	0 (0.0%)	1 (0.7%)	4 (2.8%)
• Other	3 (2.1%)	6 (4.2%)	7 (4.9%)
<b>Infectious</b>	<b>12 (8.4%)</b>	<b>22 (15.4%)</b>	<b>12 (8.4%)</b>
• Toxoplasmosis	4 (2.8%)	4 (2.8%)	7 (4.9%)
• Bartonella	0 (0.0%)	4 (2.8%)	1 (0.7%)
• Varicella zoster	2 (1.4%)	4 (2.8%)	1 (0.7%)
• Toxocara	2 (1.4%)	1 (0.7%)	0 (0.0%)
• Other	4 (2.8%)	9 (6.3%)	3 (2.1%)

**Table 3:** Symptoms of uveitis.

Symptoms	n eyes (%)
<b>Self-reported</b>	121 (54.0%)
• Redness	67 (55.4%)
• Pain	64 (52.9%)
• Reduced vision	51 (42.1%)
• Photophobia	33 (27.3%)
• Watering	11 (9.1%)
• Floaters	10 (8.3%)
<b>Asymptomatic</b>	103 (46.0%)
• JIA screening programme	35 (34.0%)
• Other referrer concern	32 (31.1%)
• Parental concern	18 (17.5%)
• Asymptomatic but symptomatic in contralateral eye	12 (11.7%)
• B4 School Check	6 (5.8%)

† Some subjects had more than one self-reported symptom

‡ Other referrer, including General Physician, Optometrist, Teacher, Nurse

**Table 4:** Complications of paediatric uveitis.

Complication	Initial n=224 eyes	Final n=224 eyes
Any complication	48 (21.4%)	126 (56.3%)
Band keratopathy	7 (3.1%)	22 (9.8%)
Posterior synechiae	14 (6.3%)	33 (14.7%)
Ocular hypertension	3 (1.3%)	60 (26.8%)
Glaucomatous optic neuropathy	1 (0.4%)	21 (9.4%)
Hypotony	3 (1.7%)	8 (3.6%)
Cataract	8 (3.6%)	55 (24.6%)
Cystoid macular oedema	6 (2.7%)	19 (8.5%)
Retinal detachment	5 (2.2%)	12 (5.4%)
Epiretinal membrane	1 (0.4%)	6 (2.7%)
Macular hole	0 (0.0%)	1 (0.5%)

**Table 4 (continued):** Complications of paediatric uveitis.

Complication	Initial n=224 eyes	Final n=224 eyes
Macular scar	6 (2.7%)	11 (4.9%)
Vitreous haemorrhage	2 (0.9%)	3 (1.3%)
Optic neuropathy	2 (0.9%)	3 (1.3%)
Choroidal neovascular membrane	1 (0.4%)	5 (2.2%)
Phthisis	0 (0%)	2 (0.9%)
Moderate visual loss (6/15–6/60)	5 (2.2%)	12 (5.4%)
Severe visual loss ( $\leq$ 6/60)	15 (6.7%)	26 (11.6%)

† Some eyes had more than one complication

‡ NA=not applicable

At one-year, median visual acuity had improved to 6/6 (IQR 6/6–6/9, n=167), and this remained fairly stable at five years (median 6/7.5, IQR 6/6–6/12, n=78) and at 10 years (median 6/7.5, IQR 6/6–6/9, n=37). Final visual acuity was 6/6 (IQR 6/6–6/9); with a mean, follow-up was  $5.2 \pm 5.4$  years (median 3.0 years).

Despite the good median visual acuity, MVL occurred in 12 (5.4%) eyes and SVL occurred in 26 (11.6%) eyes at final follow-up. Six (50.0%) eyes with MVL were due to infectious causes—three (50%) from toxoplasmosis, one (16.7%) from herpetic acute retinal necrosis and one (16.7%) from Bartonella, one (16.7%) from Herpes simplex anterior uveitis. Twelve (46.2%) eyes with infectious uveitic aetiology developed SVL—six (50.0%) toxoplasmosis, three (25.0%) eyes from toxocara, one (8.3%) cytomegalovirus, one (8.3%) Herpes zoster anterior uveitis, one (8.3%) Bartonella.

By the final follow-up, eight (5.6%) participants were bilaterally vision impaired or blind. Four (2.8%) participants developed SVL in both eyes, and four participants (2.8%) developed SVL in one eye and MVL in the fellow eye at final follow-up.

One (0.7%) subject died during follow-up due to an undifferentiated systemic small vessel vasculitis. This was a 10.5-year-old girl who initially presented with a bilateral simultaneous episcleritis, and subsequently developed a bilateral panuveitis just prior to death.

## Medical management

Topical steroid was used in 218 eyes (97.3%) and topical IOP lowering was required in 51 eyes (22.8%).

Periocular steroid was used in 15 eyes (6.7%) with a total of 31 injections, and intraocular steroid was used in three eyes (1.3%) with a total of six injections. All paediatric participants requiring periocular and intraocular steroid injections required a general anaesthetic for the procedure.

Conventional disease modifying anti-rheumatic drugs (cDMARDs) were required in 58 subjects (59.8%) with non-infectious uveitis, with methotrexate the most common choice, used in 53 participants. Azathioprine was used in six participants, mycophenolate mofetil in five participants, cyclosporine A in five participants, sulphasalazine in two participants and cyclophosphamide in two participants.

Biologic DMARDs (bDMARDs) were used in 31 (32.0%) participants with non-infectious uveitis: infliximab in 23 participants, adalimumab in 16 participants, tocilizumab in two participants and rituximab in two participants, golimumab in one participant and abatacept in one participant.

Some participants were treated with more than one DMARD. Participants who were younger at presentation were more likely to require a DMARD (OR 0.896 p=0.032).

Three (9.7%) participants were able to stop bDMARDs during follow-up without recurrence

of uveitis. Sixteen (27.6%) participants stopped cDMARDs, and 5 (31.3%) had recurrent uveitis once DMARD treatment had ceased.

### Surgical management

Twenty-six eyes (11.6%) required cataract surgery, 12 (46.2%) of which had a primary intraocular lens inserted at the time of cataract surgery. All cataract operations were performed with an anterior approach under general anaesthesia.

Twenty (8.9%) eyes required incisional glaucoma surgery with either trabeculectomy (5 eyes, 2.2%) or glaucoma drainage device (15 eyes, 6.7%). All trabeculectomy surgery was augmented with either mitomycin C or 5-fluorouracil. Three (60.0%) trabeculectomies failed; one eye underwent subsequent glaucoma drainage device and cyclodiode laser, and two underwent subsequent glaucoma drainage devices. Two eyes (40.0%) with mitomycin C enhanced trabeculectomies had complete success in managing intraocular pressure without needing further surgical or medical glaucoma intervention during the follow-up period. Two eyes (13.3%) treated with glaucoma drainage devices needed further intervention with cyclodiode laser.

Band keratopathy developed in 22 (9.8%) eyes and, of these, four (18.2%) required EDTA chelation.

Vitreotomy was performed in 11 (4.9%) eyes: one (9.1%) for a tractional retinal detachment secondary to toxoplasma panuveitis, two (18.2%) eyes with rhegmatogenous retinal detachments due to ARN, three (27.3%) eyes for toxocara posterior uveitis, one (9.1%) eye due to an unspecified infective panuveitis and four (36.4%) eyes with idiopathic uveitis.

### Discussion

Paediatric uveitis is an uncommon but important entity that can lead to lifelong visual disability. Moreover, children have higher rates of complications and vision loss compared to adult-onset uveitis.<sup>1</sup> We describe the causes, management, complications and outcomes of 224 eyes of 143 paediatric participants with uveitis seen at a tertiary referral centre (Auckland, New Zealand). There was a high rate of infectious aetiologies (46 subjects, 32.2%). Asymptomatic presentation was common, occurring in 103 (46.0%) eyes. Steroid sparing immunosuppression was frequently required, with cDMARD used in 58 (59.8%) participants and bDMARDs in 31 (32.0%)

participants with non-infectious uveitis.

There tends to be disproportionately more infectious uveitis in the paediatric population.<sup>15</sup> In this study 46 (32.2%) subjects had an infective cause, with toxoplasmosis being most prevalent (15 subjects, 10.5%). Toxoplasmosis can be acquired in utero or as a primary infection during childhood. There is a high rate of seropositivity for *Toxoplasma gondii* in healthy individuals in New Zealand<sup>16</sup> but, as yet, toxoplasmosis is not routinely tested for during pregnancy. Congenitally acquired toxoplasmosis ocular lesions can develop as late as 12 years after birth; lesions occurring at a younger age tend to be located at the macular, while those that develop later in childhood are more peripheral.<sup>17</sup> In this study, as well as being the most common cause of infectious uveitis, toxoplasmosis was also an important cause of MVL and SVL.

Varicella virus uveitis occurred in 7 (4.9%) participants. Varicella infection can occur as either primary varicella infection (chickenpox) or reactivation of latent infection (herpes zoster).<sup>18</sup> Children with eye pain, floaters, redness or reduced vision in the setting of chickenpox should have an ophthalmic assessment, especially if these symptoms persist for more than a week after onset of rash.<sup>18</sup>

Herpes zoster infection is most prevalent in the fifth to seventh decade of life and is uncommon in those younger than 40 years.<sup>19</sup> Infection in younger individuals has historically prompted investigation for underlying immunosuppression, including HIV and malignancy, as a cause of reduced cellular immunity. Rising rates of childhood herpes zoster in immunocompetent children in recent years may be attributed to acquiring primary varicella infection in utero or early infancy when immunity is not fully developed.<sup>20</sup> Clinical manifestations of herpes zoster infection may give clues as to which affected children should be screened for underlying immunosuppression. Gupta et al.<sup>21</sup> characterised the spectrum of disease in young patients based on immune status. Young immunocompetent subjects presented with localised, less severe disease with better response to medical therapy, while HIV positive subjects had greater severity and prolonged course of disease, poorer visual outcomes, superimposed bacterial infections and post herpetic neuralgia.<sup>21</sup> HIV testing may therefore be considered in children who present with herpes zoster infection if they present with poor vision and severe disease.

It is important to consider and rule out

infective causes for uveitis in any child presenting with uveitis. This includes less recognised entities such as post-streptococcal uveitis syndrome (PSUS). PSUS occurred in three (2.1%) participants; however, it is not commonly considered or tested for. It is usually seen one to four weeks after streptococcal infection.<sup>22</sup> Diagnosis requires a high degree of clinical suspicion, particularly given the temporal association with infection, and also the subclinical nature of infection in some affected individuals. Anti-streptolysin O (ASO) titers are high in almost all cases described in the literature and is considered the most useful test.<sup>22</sup> Increasing awareness is necessary and testing with ASO titers in the paediatric population is recommended.

JIA associated uveitis occurred in only 25 (17.5%) participants. The incidence of JIA uveitis has decreased over recent years, attributed to the improved availability and earlier institution of immunomodulatory therapies for arthritis.<sup>23,24</sup> Additionally, this serves as a reminder that JIA is not the only cause of uveitis in children. Other conditions such as HLA-B27, sarcoidosis and Behçet's disease can also be associated with arthropathy and should be considered.

Treatment of uveitis in the paediatric population has a unique set of challenges. Systemic corticosteroids are known to induce growth retardation in prepubescence,<sup>1,11,12</sup> due to premature closure of the epiphyseal plates.<sup>25</sup> Treatment can also increase the risk of ocular hypertension and cataract.<sup>1</sup> Topical corticosteroid increases the risk of cataract independent of active uveitis; a dosing of three times daily or less is associated with an 87% lower risk of cataract formation compared to eyes treated with greater than three drops daily (relative risk=0.13, 95% confidence interval: 0.21, 0.69,  $p=0.02$ ).<sup>26</sup> If children require frequent corticosteroid dosing for control, it is imperative to consider DMARD treatment to reduce the risk. Local steroid injections also carry increased risk of cataract and glaucoma, and can even rarely cause severe ocular adverse effects, including retinal and choroidal emboli,<sup>27</sup> and in the paediatric population they tend to require general anaesthesia to be administered, posing a further procedural risk.<sup>12</sup> Eighteen eyes (8.0%) required local steroid injections, and all required general anaesthesia for administration.

In more recent years, early use of steroid sparing immunomodulatory therapy such as methotrexate has been advocated to obviate steroid side effects and improve visual outcomes

by controlling inflammation.<sup>28,29</sup> cDMARDs like methotrexate have also been associated with delayed development of cataract requiring surgery.<sup>24</sup> Fifty-eight (59.8%) participants with non-infectious uveitis required cDMARDs and 31 (32.0%) participants with non-infectious uveitis required bDMARDs. Additionally, younger age at first presentation was associated with greater likelihood of requiring a DMARD (OR 0.896,  $p=0.032$ ). Steroid sparing immunosuppression should be considered early in the management of paediatric uveitis in children with difficulty tapering steroid, and in JIA.<sup>28</sup> DMARD screening should be considered at first presentation in the paediatric population, given the high number requiring these medications. Once disease remission has been achieved, limited data exists to guide cessation of these medications. The PRINTO study<sup>31</sup> showed that relapse-free survival following methotrexate withdrawal for JIA was more likely in those treated for greater than three years ( $P=0.009$ ), aged over eight years at time of withdrawal ( $P=0.003$ ) and with a period of disease quiescence of at least two years ( $P=0.003$ ). The Australian and New Zealand JIA-Uveitis Working Group recommend trial cessation of systemic immunosuppression once JIA associated uveitis has been inactive for 24 months.<sup>30</sup> Further study into the indications for successfully discontinuing second line immunosuppression is required.

Children develop uveitic complications more readily than adults.<sup>1</sup> One hundred and twenty-six (56.3%) eyes developed any complication at final follow-up. Twelve (5.4%) eyes developed MVL and 26 (11.6%) had SVL at final follow-up. Nine eyes (23.7%) had vision loss from toxoplasma. Additionally, younger age at onset and longer duration of disease have been shown to be associated with poorer outcomes.<sup>32</sup> Risk factors for poor visual outcome include male sex, posterior and panuveitis, infectious uveitis, severe disease and complications at presentation.<sup>33-35</sup>

Lifelong visual disability impacts on education, employment prospects and social development.<sup>36</sup> Health economic studies are required to examine the cost of childhood blindness to enable better calculations for future medications. Paediatric uveitis is an uncommon but important disease. Vision loss at a young age leads to many years of disability, which can impact on the overall development of the child. Results of this study highlight the need to consider infectious aetiology for paediatric uveitis and early institution of DMARDs where necessary.

**COMPETING INTERESTS**

No conflicts of interest to declare.

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# The use of neonatal bubble Continuous Positive Airway Pressure in a rural hospital setting

Glenn A Barker

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## ABSTRACT

**AIM:** This retrospective review examined the introduction of bubble Continuous Positive Airway Pressure (bCPAP) in resuscitating neonates in a rural hospital environment.

**METHODS:** A retrospective audit of all emergent neonatal presentations to a rural emergency department (ED) over a 5-year period prior to (pre) and a 3.5-year period following the introduction of bCPAP (post).

**RESULTS:** Sixty-seven neonatal resuscitations (31 pre- and 36 post-introduction of bCPAP) were reviewed, having an average gestation of 37.4 weeks and birth weight of 3,110g, with no significant difference in characteristics between groups. Time in the ED was significantly longer post-bCPAP (202±93 vs 156±70 mins), but time applying T-piece assisted ventilation was significantly reduced (55±40 vs 94±84 mins). There was an 11% reduction in the use of aeromedical retrieval and an 18% reduction in admissions to the regional level III neonatal intensive care unit (NICU) with a corresponding increase in admissions to local level II NICU.

**CONCLUSION:** The introduction of bCPAP into a rural hospital setting is technically feasible and results in less time spent on technically demanding hand ventilation, fewer admissions to level III neonatal intensive care units and a reduction in the use of aeromedical retrieval assets.

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In Western healthcare settings, 3–8% of all births will require some form of neonatal resuscitation with respiratory support.<sup>1</sup> In Australasia, 2.9–3.7% of all live births will be admitted to a level III neonatal intensive care unit (NICU), with over 90% of these admissions for ongoing respiratory support.<sup>2</sup> Initial neonatal resuscitation algorithms emphasise the application of positive airway pressure in situations of respiratory distress, hypoxia and bradycardia.<sup>3</sup> This is commonly applied via a facemask and T-piece arrangement for the initial resuscitation (e.g., Neopuff™) with a transition to non-invasive ventilatory (NIV) equipment, or intubation and ventilation for ongoing respiratory distress.

The use of NIV modes of support is usually confined to dedicated neonatal units, reflecting the higher intensity of nursing care required. The use of NIV outside of these settings is limited and largely confined to specialised neonatal retrieval teams. In rural settings, neonates requiring retrieval can experience prolonged waits for the arrival of specialised retrieval teams. Timeframes of many hours would not be unusual, and it leaves little choice for rural medical teams but to continue to provide prolonged pressure support with a T-piece device. The effective and consistent application

of T-piece pressure support can be technically challenging to the occasional practitioner.<sup>4</sup> Furthermore, in rural hospitals with limited staffing, the delivery of ongoing facemask pressure support can be a significant drain on resources and may lead to delay in further care interventions.

Bubble Continuous Positive Airway Pressure (bCPAP) provides continuous positive pressure that improves lung functional residual capacity, oxygenation and work of breathing.<sup>5</sup> There has been a trend towards an increased use of bCPAP and other non-invasive modalities in preference to intubation- and ventilator-driven positive pressure ventilation.<sup>2</sup> Bubble CPAP does not require a ventilator, is relatively inexpensive and is simple to use. Within emergency departments (EDs) the increasing use of adult and paediatric NIV (i.e., nasal humidified high flow cannula [HFNC], CPAP and Bilevel Positive Airway Pressure [Bi-PAP]) has improved both the expertise and comfort of staff with equipment and concepts common to neonatal bCPAP delivery.

In this study we describe the introduction of bCPAP via a protocol (Appendix) incorporating a step down to HFNC for ongoing respiratory support to neonates in a rural New Zealand hospital prior to transfer to higher care facilities. Taupō Hospital

has a primary midwife-led birthing unit delivering approximately 170 planned low-risk births per year. There is no onsite paediatric or obstetric support, with the nearest such service 85km away at Rotorua (including a level II NICU) and tertiary neonatal support services 150km away at Hamilton (level III NICU). The immediate response to neonatal emergencies is via a co-located ED staffed with rural hospital medicine specialists and/or emergency physicians. The introduction of bCPAP and a protocol to determine ongoing respiratory support, mode of transfer and receiving destination was an attempt to improve pre-retrieval neonatal care. The development of management and retrieval protocols with the ability to de-escalate interventions may provide flexibility in retrieval options, important in saving system resources and unnecessary transfers.

## Methods

A retrospective chart audit was conducted based upon a search of records for all attendances for those aged 2 days and under at the Taupō Hospital Emergency Department from January 2014 until

July 2022. All medical records, including electronic and paper, were individually interrogated for demographic, intervention and outcome data. Supplemental review of electronic records from other facilities were reviewed when available.

Presentations not requiring any form of resuscitative intervention were removed from the audit. The remaining patients were divided into two groups; those that were seen prior to January 2019 and those after. This corresponds to the time point at which bCPAP became an operational possibility in our department.

Pearson's 2-tailed t-Test was performed to determine any significant differences with  $p < 0.05$ . This study was granted ethics approval by the Te Whatu Ora Lakes Research and Ethics Committee.

## Results

There were 67 neonatal resuscitations over the study period. Demographics of the entire cohort and the pre- and post-bCPAP groups are shown in Table 1. All but one baby was born in the Taupō Birth Suite.

During the pre-bCPAP era, there were eight transfers that utilised respiratory support, all via

**Table 1:** Demographic data of total group and pre- and post-bCPAP introduction.

	Total	Pre	Post
<b>Neonates</b>	<b>67</b>	<b>31</b>	<b>36</b>
Gestation, weeks (SD)	37.4 (3.7)	37.7 (3.5)	37.2 (3.9)
Birthweight, grams (SD)	3,110 (856)	3,139 (833)	3,085 (887)
Apgar, 5 minutes (SD)	8.3(1.8)	8.3 (1.8)	8.2 (1.8)
Temperature on arrival ED (°C)	36.3 (1.0)	36.2 (1.2)	36.5 (0.8)
<b>Term (37+) (%)</b>	<b>48 (71.6)</b>	<b>22 (71)</b>	<b>26 (72.2)</b>
Moderate pre-term (32–36+6) (%)	13 (19.4)	8 (25.0)	5 (13.9)
Very preterm (28–31+6) (%)	4 (6.0)	0	4 (11.1)
Extreme (<28) (%)	2 (3.0)	1 (3.2)	1 (2.8)
<b>D/C diagnosis*</b>			
TTN	34	15	19
RDS	10	10	7
Mec asp	6	2	4
Other	17	11	6

\*Diagnosis on electronic discharge from admitting hospital.

TTN = transient tachypnea of the newborn; RDS = respiratory distress syndrome; Mec asp = meconium aspiration.

helicopter, including four intubations, one on HFNC and three on bCPAP. Of the road transfers, 12 received no documented respiratory support during transfer and seven received low-flow oxygen via nasal prongs. In contrast, during the bCPAP era 27 of the 32 patients received respiratory support during the retrieval; 19 transferred on HFNC and nine on bCPAP, with one intubated and five with no respiratory support in place.

## Discussion

This retrospective audit demonstrates an 11% reduction in the use of the regional helicopter

retrieval service, with an accompanying 18% reduction in admissions to a level III NICU for babies older than 32+0 weeks following the introduction of bCPAP and HFNC into a rural hospital. Furthermore, the ability to provide bCPAP results in a 40% reduction in the time spent applying T-piece respiratory support. Although the protocol resulted in a significantly longer 40-minute length of stay, fewer babies required a higher level of care and 6% were able to avoid transfer to a NICU altogether.

Current practice in New Zealand dictates all babies under 32 weeks gestation be admitted to a level III facility for ongoing care. Babies older than

**Table 2:** Time in ED total and by mode of retrieval, time on Neopuff.

	Pre	Post
<b>Neonates</b>	<b>31</b>	<b>36</b>
Time in ED, minutes (SD)	156 (70)	202 (93)*
Time in ED helicopter	209 (76)	252 (111)
Time in ED ambulance	133 (54)	179 (75)
Time on Neopuff, minutes #	94 (84)	55 (40)*
Time on bCPAP (SD)	n/a	131 (109)

#Neopuff duration less than 10 minutes not included in analysis.

\*Significant difference ( $p \leq 0.05$ ).

**Table 3:** Numbers of neonates by destination and retrieval mode, pre- and post-bCPAP introduction.

	Pre	Post
<b>Admission destination</b>		
<32week Level III Waikato	1	4
≥32week Level III Waikato	8 (27%)	3 (9%)
≥32week Level II Rotorua	22 (73%)	27 (84%)
d/c	0	2 (6%)
<b>Retrieval mode (≥32 weeks)</b>		
Helicopter	8 (27%)	6 (19%)
Road ambulance	22 (73%)	24 (75%)
d/c		2 (6%)

d/c = discharged home.

32+0 weeks may be admitted to a level II facility. In our region, due to equipment constraints, current practice is to aeromedically retrieve all babies—irrespective of gestational age—who are receiving bCPAP. A majority of these will be transferred to the level III facility, likely because this is logistically easier for the retrieval team. Our protocol allows for the potential step down onto HFNC following a period of bCPAP if improvement is seen in neonates older than 36 weeks. This necessarily prolongs their stay in the ED but allows for transfer by road ambulance using an incubator (Dräger Isolette TI500) and local nurses as escorts rather than using a dedicated regional aeromedical neonatal retrieval team. The ability to step down to HFNC did reduce the number of both aeromedical and level III NICU retrievals, and thereby reduces the burden on specialised regional retrieval assets as well as keeping patients and families closer to their homes.

The resuscitation of a neonate is resource intensive and requires continual input from at least one senior doctor and at least one nurse. This may well be the entirety or majority of departmental staff in a rural hospital. The need to provide ongoing respiratory support via T-piece is technically demanding and essentially locks the practitioner into ongoing airway management exclusively. The introduction of bCPAP reduced T-piece ventilation from 94 to 55 mins on average; this would have a dramatic impact on resource management within a rural department, freeing staff for other interventions and often for the care of other patients.

There is an increasing familiarity with non-

invasive ventilation technologies in EDs, such that the application of CPAP, BiPAP and HFNC to both adults and children is usually familiar to most emergency practitioners. The extension of these technologies to neonates within such departments should be technically feasible. In our experience, a crucial element of introducing bCPAP is the ongoing technical, logistical and moral support from appropriate colleagues within the receiving facilities. Our protocol governing the use of both bCPAP and HFNC for neonates has undergone iterative refinement with regular feedback and case review from paediatricians and neonatologists. Each case is managed with real-time telehealth or phone guidance and oversight by on-call neonatologists/paediatricians at the receiving facility. While not a specific focus of the retrospective review, there were no cases of iatrogenic harm or complications arising from the application of bCPAP in our department.

In summary, there are technical and logistical benefits to the introduction of bCPAP into rural facilities. Although not directly measured, there are likely to be physiological benefits in applying best practice interventions earlier in the treatment of neonatal respiratory distress. We have shown that rurality and lack of onsite specialist neonatal services should not be seen as a barrier to implementing appropriate care. Rural EDs are already dealing with neonatal resuscitations and have familiarity with many modalities of non-invasive ventilation already. With appropriate tertiary support the introduction of bCPAP into rural hospitals is feasible and in line with best practice treatment of neonatal distress.

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**COMPETING INTERESTS**

Nil.

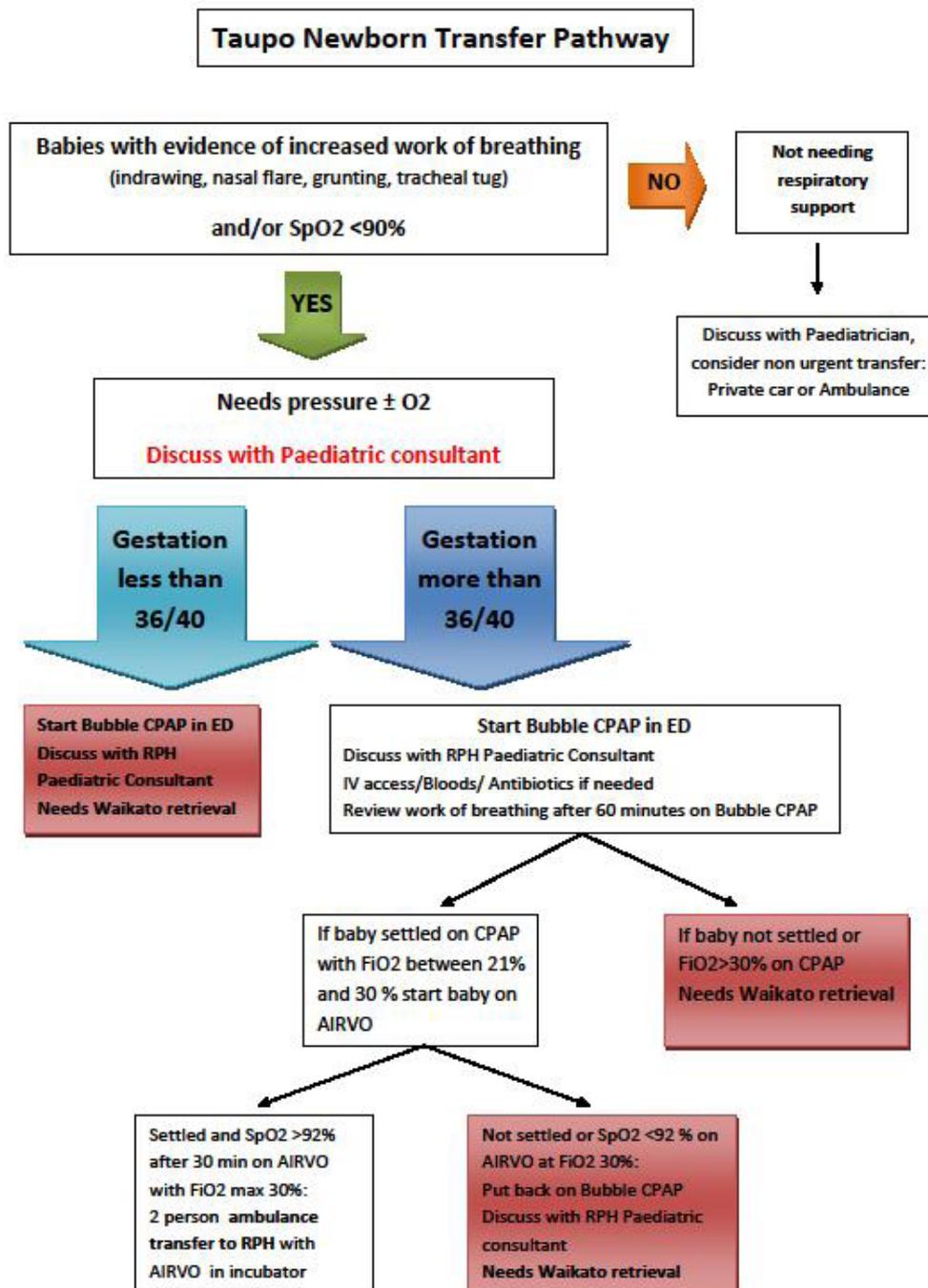
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## Appendix



November 2019, draft version

# Cannabis and methamphetamine in New Zealand: a Kaupapa Māori literature review

Erena Wikaire, Te Hirea Doherty

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## ABSTRACT

**AIM:** This literature review aims to identify and review through a Kaupapa Māori lens the current knowledge base related to cannabis and methamphetamine, and Māori.

**METHODS:** A Kaupapa Māori research approach was utilised to identify, review and critique literature about cannabis and methamphetamine in New Zealand. Literature contents were categorised via publication type, population focus, substance focus, research approach, methods used and whether lived experience voices were centralised. Substance engagement was categorised within prevention, use or treatment contexts.

**RESULTS:** Thirty literature sources were included in this review. The majority were journal articles, utilised quantitative survey data collection methods, focussed on large population groups and investigated individual characteristics of users of cannabis and/or methamphetamine. Most articles took a general population approach, briefly mentioning Māori, or measured differences in drug use between Māori and others. More recent research led by Māori, or with a critical lens, highlighted the value of focussing on drug use, rather than drug users.

**CONCLUSIONS:** Understandings of cannabis and methamphetamine use in New Zealand are reliant on research insights and academic literature. Literature focussed mainly on individuals fuels negative stereotypes of Māori and lacks critical Kaupapa Māori insights. To address cannabis and methamphetamine harms experienced by Māori, future research should make an explicit commitment to be of benefit to Māori and implement Kaupapa Māori-consistent research approaches.

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Prior to European arrival in New Zealand, traditional Māori health systems (Rongoā Māori), derived from mātauranga Māori (Māori knowledge systems), maintained community wellbeing in an admirable state of flourishing.<sup>1</sup> Māori health has been heavily impacted by colonisation, the broader determinants of health and systemic factors that prevent access to equitable health and wellbeing.<sup>2</sup> Medicinal, recreational and dependent forms of substance use (e.g., alcohol, cannabis and methamphetamine) in New Zealand are now present, having been introduced through the process of colonisation by European and other migrants.<sup>3</sup> Māori experience significant harms related to addictive substance availability. The failure of the Crown and its agents to protect Māori from such harmful substances constitutes a breach of Te Tiriti o Waitangi, which guarantees Māori the right to health equity.<sup>4</sup>

Addiction to or dependence on substances like cannabis and methamphetamine are priority health issues in New Zealand.<sup>4</sup> The way that literature frames cannabis and methamphetamine use in New Zealand, and for Māori, is a key driver

of social and systemic perception; and ultimately, solution creation. Historically, research about addiction has adopted a victim-blame analysis, often framing individual choice as the cause of substance use problems. In recent years, those working in mental health and addiction services have called for a re-framing of drug use as a “health”, not “criminal”, problem.<sup>5</sup> There is also substantial evidence that “punishment approaches” such as incarceration and criminal conviction do little to reduce drug dependence.<sup>3</sup>

Māori experience higher rates of harm from substance use, and harm from the way that justice and social systems deal with addiction (i.e., as a criminal problem).<sup>6</sup> While Māori are affected at higher rates from cannabis and methamphetamine, expert commentary, solution development and theoretical discourse to date are likely to have been led by others, lacking insight into Māori worldviews and realities. As well as this, research about Māori by non-Māori has historically been driven by Western research paradigms. Conversely, Kaupapa Māori epistemology and research principles aim to be of benefit to Māori, operating in ways that

are consistent with Māori worldviews. It is timely to canvas available literature to identify to what extent Māori research principles are evident, if Māori voices are present, the drivers and focus of current literature and theories about why Māori are affected at disproportionate rates. This literature review aims to identify, summarise and critique through a Kaupapa Māori lens the current knowledge base related to Māori, and cannabis and methamphetamine.

## Methodology

A Kaupapa Māori literature review of cannabis and methamphetamine use in New Zealand, with a focus on Māori, was completed. Kaupapa Māori is a well-established research paradigm that draws on Te Ao Māori (Māori worldview) pedagogies, foregrounds Māori collective aspirations and rangatiratanga (self-determination) and aims to benefit Māori.<sup>7</sup> In this context, Kaupapa Māori means that the research is centred on Māori wellbeing, is led by Māori, supports Māori workforce development, critiques literature through a critical Kaupapa Māori lens and uses explicit “non-victim blame” and “non-cultural deficit” analyses. Such an approach explicitly rejects discourse that “blames Māori” for substance use and related harms and looks at structural power imbalances and the influence of historical trauma and colonisation within context. The broader social, political, economic, cultural, historical and commercial determinants of Māori health are also considered.<sup>8</sup>

## Methods

Literature was identified via database searches in December 2022 within the Medline, PubMed, Otago University, Google Scholar and Google search engines and included journal articles, government and non-government reports, media publications and publicly available datasets/data summaries. Initial searches specific to Māori and cannabis or methamphetamine produced limited results. The search was widened to include New Zealand and international literature that focussed on addiction, substance use and other Indigenous peoples. This produced an exponential amount of literature, much of which was focussed on other Indigenous peoples. Key search concepts included: “Indigenous concept” (Indigenous, Māori, tangata whenua, mana whenua, African American, Native American, Hawaiian, First

Nations, Aboriginal); “cannabis concept” (cannabis, weed, dope, pot, marijuana); “methamphetamine concept” (methamphetamine, meth, P, crystal); and “experience concept” (experience, reason, story, perspective, mental health, trauma and medication).

A total of 216 articles were initially identified using various combinations of these keywords and were reviewed for relevance to the research topic by article title and citation, availability of full text and in the English language. Articles were then allocated into “yes = definitely include” (n=49), “no = exclude” (n=51) and “maybe = possibly include” (n=116) groups. Most of the “maybe” list was related to international Indigenous populations, did not include Māori as a focus or were focussed on the psychiatric links of drug use and alcohol use, and were outside the scope of this review. The “yes” and “maybe” list abstracts were reviewed by two Māori researchers and further refined down to a final 30 “yes” articles. Inclusion criteria in the final group were: the research was based in New Zealand, focussed mainly on cannabis or methamphetamine; included reference to Māori; and was relevant to the research topic. A Kaupapa Māori analysis approach was utilised that prioritised Māori worldviews and Kaupapa Māori-consistent research approaches and applied a critical discourse analysis of the way Māori, cannabis and methamphetamine were framed within literature. All articles were reviewed, and content was categorised via the following variables: type of publication (e.g., article, report), year published, substance of focus (e.g., cannabis), evidence of Māori research leadership (yes/no), focus of research (e.g., health, justice), stage of engagement (e.g., initiation, prevention), evidence of Kaupapa Māori-consistent research methods (e.g., structural analysis) and whether whānau (family) or lived experience voices were present (Table 1).

## Results

A total of 30 articles were included. Table 2 presents a summary of literature sources (herein referred to as articles) parameters. Most were journal articles (n=20, 67%).<sup>9–28</sup> Also included were four reports,<sup>29–32</sup> four theses<sup>3,33–35</sup> and two magazine articles.<sup>36,37</sup> Nearly two thirds (60%) were published within the last 5 years (2018–2022).<sup>3,9–13,15,22–24,27,30–35,37</sup> While all articles included some content about Māori, clearly identifiable Māori research leadership (e.g., Māori primary

**Table 1:** Description of categorisation terms.

<b>Categorisation term</b>	<b>Description</b>
<b>Main article focus</b>	Sector/framing of issue to be addressed
Individual risk factors/monitor	Linking individual risk factors of drug users/monitoring trends
Health	Drug use as a health issue/health impacts/treatment services
Justice/policy/crime	Crime/convictions/gangs/policies/legislation and justice
Economy/market	Sale, supply and demand
Inequities/Māori	Addressing inequities and/or Māori aspirations
<b>Stage of engagement</b>	Different periods of drug use highlighted in each article
Initiation	Drug use had begun or when it was encouraged
Addiction	Drug use was current and/or addiction was a focus
Treatment	Treatment or quitting was a focus
<b>Kaupapa Māori approach</b>	Utilises an explicit Kaupapa Māori perspective/research approach
Māori research leadership	E.g., Māori primary author, Māori health research centre
<b>Method</b>	What is the method used to collect data in the reports?
Quantitative	Based on numerical data (surveys, census, etc.)
Qualitative	Data collected based on people's experiences (e.g., interviews)
Descriptive	Neither qualitative or quantitative methods were used
<b>Whānau lived experience</b>	Qualitative data from first-hand experience as whānau of drug users
<b>Personal lived experience</b>	Qualitative data from first-hand experience as drug users

author, located within Māori research centre) was evident in 11/30 of the articles.<sup>18,19,22,23,36</sup>

Nearly half (n=14) of the articles focussed only on cannabis; the main focus from these articles were around the cannabis referendum and Māori views of decriminalisation and/or legalisation.<sup>9,10,13,15–17,19,20,22,23,25,32,36,37</sup> Three articles focussed only on methamphetamine,<sup>11,12,24</sup> 11 included both cannabis and methamphetamine and seven included other substances as a focus (e.g., alcohol and tobacco—briefly mentioning cannabis and/or methamphetamine) (Table 2).

Table 3 shows that the main focus of articles was individual “user” characteristics or “risk factors” (n=10); or health (n=11). Seven articles focussed mainly on justice, crime and policy, and 11 were focussed on inequities and/or Māori. Along the

contextual pipeline, “current use” (n=21, 70%) was the most common “timeframe” of focus, followed by treatment/recovery or initiation/prevention. Seven articles took an explicit Kaupapa Māori-consistent methodological approach. This was indicated by one of more of the following: framing of Māori health issues within a colonial context, explicit mention of Kaupapa Māori methods, evidence of critical anti-colonial analysis and investigation of ethnic inequities and structural determinants.

More than half (n=16) of the articles used quantitative methods (e.g., self-report surveys). Notably, five articles were derived from the same Christchurch Health and Development Study data.<sup>13,14,16,17,20</sup> Nine articles were descriptive, drawing from other sources to collate information, and eight used qualitative methods. Whānau partici-

**Table 2:** Description of New Zealand literature about cannabis, methamphetamine and Māori.

Description of available literature	Number of articles (/30)
<b>Type of publication</b>	
Journal article	20
Thesis	4
Report	4
Magazine article	2
<b>Year published</b>	
Last 5 years (2022–2018)	18
Last 10 years (2017–2014)	3
More than 10 years (2013–1998)	9
<b>Māori research leadership</b>	
Yes	11
No	19

pants were present in six of the articles and eight included data drawn from those with personal lived experience of substance use.

Table 4 provides a summary of the content associated with each article based on the categories and contexts. The discussion and main findings of the articles were reviewed in relation to content specifically related to Māori. We note that most articles were focussed on the New Zealand population overall and many utilised national survey data; however, these included some data about Māori, and hence made some comments that interpreted research findings in relation to Māori.

The main findings of the reviewed literature were related to Māori and cannabis and methamphetamine in New Zealand, as follows. Māori were more likely to use cannabis than other ethnic groups and are more at risk of being incarcerated because of it.<sup>14,17,27</sup> Methamphetamine was also more readily available in rural areas compared to cannabis and this was linked to buying from gang members or other Māori.<sup>27</sup> Environmental factors were another component to consider as influential to Māori drug use initiation. Some articles spoke to school life, and experiences with friendships and life at home;<sup>9,11,14,20</sup> primarily, a decreasing interest in

school, which was linked to negative experiences with learning, increasing risk of “delinquent” behaviour and associated engagement in drug use.<sup>11,12</sup> Dance (2018) highlighted that people are more likely to begin drug use during problematic periods of time.<sup>33</sup> Recent literature also highlighted the ongoing declining rates of substance use by youth/rangatahi, and the importance on focussing on prevention at this critical development stage.<sup>9,23</sup> In perspective, articles also redirected attention to alcohol and tobacco as much more prevalent and harmful than methamphetamine and cannabis, as well as the increasing concerns around vaping.<sup>9</sup>

*“It is important to note that the majority of Māori, rainbow, and low socio-economic status adolescents in Aotearoa do not smoke, binge drink or take other drugs. Nor is substance use exclusive to these groups.”<sup>9</sup>*

Methamphetamine initiation was associated with its ready availability in rural communities and significantly lower costs than cannabis.<sup>27</sup> However, Dance suggested that people were more likely to begin using methamphetamine after experiencing issues with poly-drug use.<sup>33</sup>

**Table 3:** Summary of article content.

<b>Content in literature</b>	<b>Number of articles (/30)</b>
<b>Substance of focus</b>	
Cannabis only	14
Methamphetamine only	3
Both cannabis and methamphetamine	11
Other (e.g., general substance use)	7
<b>Main focus*</b>	
Individual user risk factors/monitor	10
Health	11
Justice/crime/policy	7
Economy/market	2
Equity/Māori	11
<b>Stage of engagement</b>	
Initiation/prevention	4
Current use/addiction	21
Treatment/recovery	5
<b>Kaupapa Māori research approach</b>	
Yes	7
No	23
<b>Method<sup>^</sup></b>	
Quantitative	16
Qualitative	8
Descriptive	9
<b>Whānau lived experience</b>	
Yes	6
No	24
<b>Personal lived experience</b>	
Yes	8
No	22

\*Equity/Māori focus is not mutually exclusive from other main focus categories.

<sup>^</sup>Categories are not mutually exclusive.

**Table 4:** Summary of all articles included in literature review.

Author/year	Literature parameters				Substance			Research approach/methods						Main focus					
	Journal article	Report	Thesis	Magazine article	Cannabis	Methamphetamine	Other substances	Quantitative	Qualitative	Descriptive	Māori research leadership	Kaupapa Māori approach	Whānau voice	Lived experience	Link individual factors/monitor	Health	Justice, crime and policy	Economy	Māori/equity
Lewer, 2022			•		•	•	•			•							•		
Rapana, 2022	•				•			•			•	•					•		•
Dempster, 2022	•				•			•				•					•		•
Ball, 2022	•				•		•	•			•				•				
Bax, 2022	•					•		•					•	•	•				
Walton, 2021		•				•				•	•		•	•		•			
Theodore, 2021	•				•					•	•	•				•			•
Bax, 2021	•					•		•	•				•	•	•				
Swinton, 2020			•		•	•		•					•			•			
Wilson, 2020		•			•					•								•	
Boden, 2020	•				•			•							•				
Gordon, 2019			•			•		•						•		•			
Walker, 2019		•			•	•	•			•	•	•				•			•
Wang, 2019	•					•		•								•			
Ball, 2019	•				•			•			•				•				•
Dance, 2018			•			•		•					•	•		•			
Wilkins, 2018	•				•	•		•									•		
McClure, 2018				•	•					•				•				•	•
McLachlan, 2015	•						•			•	•	•				•			•
Robertson, 2014		•			•	•	•	•	•					•			•		
Kaa, 2014				•	•					•	•	•					•		•

**Table 4 (continued):** Summary of all articles included in literature review.

Author/year	Literature parameters				Substance			Research approach/methods						Main focus					
	Journal article	Report	Thesis	Magazine article	Cannabis	Methamphetamine	Other substances	Quantitative	Qualitative	Descriptive	Māori research leadership	Kaupapa Māori approach	Whānau voice	Lived experience	Link individual factors/monitor	Health	Justice, crime and policy	Economy	Māori/equity
Wilkins, 2010	•				•	•		•									•		
Wells, 2009	•				•			•			•					•			
Marie, 2008	•				•			•							•				•
Boden, 2006	•				•			•							•				
Wilkins, 2005	•				•	•		•							•				
Fergusson, 2003	•				•			•							•				
Huriwai, 2002	•						•			•	•	•				•			•
Fergusson, 2000	•				•			•							•				
Huriwai, 1998	•				•		•	•	•		•		•	•		•			•

Among the 14 articles focussed mainly on cannabis in New Zealand, most were relatively recent and primarily centred around the 2020 cannabis referendum, indicating a political motivation.<sup>13,15,23</sup> These articles included Māori beliefs and perceptions about cannabis and its regulation,<sup>13</sup> likely designed to gauge the New Zealand public's stance on cannabis regulation and inform areas requiring investment in regulation and management.

On the other hand, articles focussed on methamphetamine took a different approach and primarily addressed the justice system, and whānau wellbeing.<sup>11,12,24,27,28,31,33,34</sup> While cannabis has been widely used in New Zealand for decades, methamphetamine continues to have lower rates of use, holds more severe judicial penalties and is related to higher rates of harm, particularly in the Māori population.<sup>5</sup> Those articles focussed on methamphetamine therefore focussed on the impacts and legal issues.

Interestingly, a large proportion of articles in this review drew data from national surveys or longitudinal studies and fulfilled a measurement and monitoring function.<sup>13,14,16,17,20</sup> That is, much of the research sought to assess the scale of cannabis and/or methamphetamine use, and to outline other characteristics of those members of the public most impacted through direct or indirect engagement.

## Discussion

This article presents a Kaupapa Māori literature review specific to Māori and cannabis and methamphetamine. A total of 30 New Zealand-based articles were included, representing a mixture of topics specific to cannabis, methamphetamine, both cannabis and methamphetamine and substance use in general. Many articles made mention of their research in relation to Māori; however, only 11 articles showed clear Māori research leadership,

and less than half of the articles were specifically focussed on Māori/equity and their realities in relation to cannabis and methamphetamine use. Given the inequitably higher rates of harm Māori experience related to cannabis and methamphetamine, and the impacts of these inequities on whānau wellbeing, this Kaupapa Māori study aimed to identify, summarise and critique through a Kaupapa Māori lens the current knowledge base related to Māori experiences of cannabis and methamphetamine use.

In addition to summarising the literature content and parameters, our review sought to comment on the extent to which Māori rangatiratanga (power and control) over the research was present, whether research approaches and framing were consistent with Kaupapa Māori principles, and thereby, the position of Māori in terms of driving best-practice solutions.

Interestingly, much of the research had been responsive to political movements such as the 2020 cannabis referendum.<sup>15,23,32</sup> Another major focus of the literature has been the monitoring and reporting of individual cannabis and methamphetamine use through national surveys and longitudinal studies.<sup>14,16,25</sup> Qualitative methods were used in several articles to draw on lived experiences of individuals and their whānau in relation to substance use.<sup>11,33,35</sup>

Longitudinal retrospective analysis that identifies individuals who report methamphetamine or cannabis use and then seeks to link this with other individual factors has concluded that the “who” of cannabis and methamphetamine use are more likely to be Māori, male, hold criminal convictions, have low socio-economic status and have experienced significant trauma.<sup>9,14,16,17,19</sup> While individual-level analysis can potentially identify those at higher risk of drug harm, this method rarely considers structural power imbalances and the influence of historical trauma and colonisation.

Bax (2022; 2021) conducted in-depth interviews with ex-meth users and their whānau and identified several life-course events, trauma experiences and exposures that participants said were related to drug use.<sup>11,12</sup> Of note were trajectories through high school that started positively and ended negatively, experiences of victimisation in all areas and social sector environments. This approach considers the broader determinants of health; however, the discourse within many of these articles lacks critical Kaupapa Māori insights and tends to perpetuate victim-blame

mentality.<sup>20</sup> For example, Bax (2022; 2021) utilises the term “delinquency” to describe students whose educational environment has not been conducive to their success. Moreover, there remains a focus on monitoring of trends, rather than solution development and action.

Swinton (2020) also explains that the repeat linking of individual characteristics to drug use operates to enforce stigmatisation of the “drug user” rather than the “drug use”.<sup>35</sup> This is reflected in the bulk of articles in this review being focussed on “drug user” investigation, criminal convictions, availability of and access to illicit drugs in communities, economic gain from drug dealing and involvement in gangs.

Several articles in this review focussed mainly on Māori wellbeing, equity, solution development and political and economic benefit. For example, Rapana et al. (2022) utilised cannabis conviction data to demonstrate that “discretionary” policies fail to eliminate inequitable criminalisation of Māori.<sup>22</sup> Similarly, Theodore et al. provided much needed commentary to the cannabis referendum, foregrounding the harms of cannabis for rangatahi Māori (Māori youth) within a colonial context. McLachlan et al. (2015) and Huriwai (2002) call for culturally congruent alcohol and other drug treatment services that adopt whānau-centred approaches, acknowledging the complex layers of determinants of drug use, and the realities of the whānau context.<sup>21</sup>

Interestingly, literature specific to cannabis presented somewhat of a double standard. In essence, the framing of Māori and cannabis use in relation to criminal convictions, illegal activity and gang activity functions to position Māori as “delinquent”.<sup>14,26–28</sup> On the other hand, the recent focus on the cannabis referendum, and the about-turn of Western medicine from one of condemnation of cannabis use, to one of support for “medicinal purposes”, have required the gathering of policy support—including that of Māori. While Māori have been noted as supporting decriminalisation, Te Kaa (2014) clarifies that rather than legalisation of cannabis, Māori simply want access to a fair judicial system that ceases to inequitably criminalise us.<sup>36</sup> Literature discussing cannabis use/sale for therapeutic or economic benefit then excludes Māori from the potential benefits of this market despite long-term leadership in this area.<sup>36,37</sup> Notably, the current medicinal cannabis regulations explicitly prevent “those with drug-related or dishonesty convictions” from participating in the medicinal cannabis market.<sup>39</sup>

Finally, notwithstanding Theodore et al.'s comprehensive discussion on the harms associated with cannabis, and the lived experience insights shared by Dance, Gordon (2019) and Swinton,<sup>33,34,35</sup> there is a pressing need to comprehend the lived experience of Māori whānau concerning both cannabis and methamphetamine use, distinct from those directly resulting from the ways in which justice and social systems address drug-related issues.<sup>6,33,35</sup>

Moreover, in a broader colonial context, it is essential to consider that cannabis and methamphetamine may potentially be perceived as providing therapeutic benefits to those most deprived. For example, one internationally recognised advantage of cannabis use is its potential in pain management.<sup>37</sup> Despite acknowledging that Māori individuals are disproportionately exposed to higher rates of both macro- and micro-trauma, there has been insufficient acknowledgment of the possibility that “illegal” drug use may serve as a mechanism for addressing unmet emotional pain.<sup>38</sup> Additionally, there has been a dearth of discussion regarding the inherent functioning of public systems that perpetuate the disconnection of Māori individuals from their whānau (extended family) and hinder their access to broader society, consequently leading to enduring emotional and psychological distress. It appears the existing literature, and subsequent social or media rhetoric, often portray Māori drug use as a deliberate delinquent action, while neglecting to consider the possibility that Māori individuals may turn to drug use as a coping strategy or a means of pain management.

In more recent literature, attention has turned towards illuminating various factors that play a

pivotal role in substance use among Māori. These factors include systemic racism, identified as a determinant of drug use,<sup>22,33,35</sup> the shortcomings of Western mental health systems in catering to Māori needs,<sup>4</sup> the historical introduction of methamphetamine-related pharmaceutical medications, such as diet pills, to New Zealand patients<sup>3</sup> and the suppression of traditional Māori “medicines” that potentially hold the key to addressing numerous health issues.<sup>1</sup> This critical approach is indispensable for a re-evaluation of Māori realities and an exploration of the systemic origins of substance use.

## Conclusions

This Kaupapa Māori study reviewed literature pertaining to the experiences of Māori in the context of cannabis and methamphetamine use. Mainstream research often overlooks Māori perspectives or the potential implications of their findings for Māori communities. Several studies seek to establish links between cannabis and methamphetamine use and individual “risk factors” factors. Recent research has started to place greater emphasis on capturing the lived experiences of Māori, adopting a critical lens to analyse findings and exploring the role of systemic institutions within the context of drug-related harm. To effectively address the harms associated with cannabis and methamphetamine use among Māori, future research must explicitly commit to benefitting Māori and employ research approaches consistent with Kaupapa Māori principles. An essential focus should be on prevention, addressing root causes, taking decisive action and not just measurement alone.

**COMPETING INTERESTS**

Nil.

**ACKNOWLEDGEMENTS**

The authors thank Ngā Pae o Te Māramatanga who supported Te Hīrea Doherty through a New Horizons Summer Internship 2022/2023, and the Health Research Council of New Zealand who supported Erena Wikaire through a Hōhua Tutengaehe Postdoctoral Research Fellowship.

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# Planning and executing a national point prevalence study: a blueprint for the future

Sally A Roberts, Ruth Barratt, Arthur J Morris, Nikki Grae

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## ABSTRACT

Healthcare-associated infections (HAIs) are a significant risk for patients and a burden on the health system. In 2021, the Te Tāhū Hauora Health Quality & Safety Commission New Zealand Infection Prevention and Control Team undertook a national HAI point prevalence survey (PPS) across all 20 district health boards (DHBs). We describe the process that was undertaken to plan for and execute the PPS. The key stages of this project were planning, communication and engagement, piloting and then refining the process, training surveyors, delivering the full PPS, and finally, data analysis and reporting. Support for the PPS was received at a national level from clinical and non-clinical management. The sharing of this information may support other health provider groups to use similar methodology to better understand the epidemiology of both infectious and non-infectious diseases locally. It provides a useful planning strategy for those considering similar surveys.

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At any one time in New Zealand district hospitals, 6.6% of adult patients, or one in every 15 patients, has a healthcare-associated infection (HAI).<sup>1</sup> HAIs impact on a patient's wellbeing, require additional interventions delaying discharge and add to the cost of healthcare. HAIs are associated with increased mortality.<sup>2</sup> Understanding both the overall burden and the common types of HAIs allows for focussed quality improvement initiatives to reduce these events.

Point prevalence surveys are useful for estimating disease burden and costs. They have been shown to be a cost-effective means of providing a "snap-shot" of HAI burden and antimicrobial use.<sup>3</sup> Strict criteria should be applied to ensure that the survey is of good design and executed well.

In 2021, the Te Tāhū Hauora Health Quality & Safety Commission New Zealand (Te Tāhū Hauora) Infection Prevention and Control (IPC) Team undertook a national point prevalence survey (PPS) across all 20 district health boards (DHBs; now known as districts) to determine the burden of HAIs in adult inpatients. We describe the process that was undertaken to plan for and execute the PPS. We reflect on what aspects of the process would require revising for future HAI PPS. The key stages of this project were planning, communication and engagement, piloting and refining the process, training surveyors, delivering the full PPS, and data analysis and reporting.

## 1. Preparation and planning

Planning commenced in August 2019, 14 months before the pilot, which was delayed due to the COVID-19 pandemic. Planning included reviewing and selecting the methodology, establishing an efficient means for data collection, reviewing ethical and privacy requirements, determining the logistical support required, estimating the overall budget and developing a communication strategy.

### 1.1 Methodology

An important first step was to choose an existing programme with readily accessible resources. The European Centre for Disease Prevention and Control (ECDC) first ran the European Union (EU) wide PPS of HAI and antimicrobial use over a period of 2 years (12 countries in 2011 and 21 countries in 2012).<sup>4</sup> In 2017, a further survey was undertaken and in 2022–2023 the third EU-wide survey will be held.<sup>5</sup> The method has been validated and standardised and now provides reliable data that can be used at local, regional and national levels to raise awareness, improve HAI surveillance structure, identify common problems, set priorities for quality improvement initiatives and evaluate the effect of these initiatives. The ECDC definitions for HAIs were used for the New Zealand PPS.<sup>5</sup>

The PPS team collaborated with colleagues in Singapore and Australia who had undertaken

a PPS using the ECDC methodology in the last 5 years.<sup>6,7</sup> PPS data were collected and managed using REDCap, an electronic data capture tool hosted on a local server at Te Tāhū Hauora.<sup>8</sup> The PPS tool was developed by the team in Singapore and subsequently modified for the Australian PPS. This tool was shared with the New Zealand PPS group and modified to collect New Zealand health data. Using a tablet, a two-factor authentication process was used to record data directly into REDCap.

## 1.2 Ethical and privacy considerations

The key objectives of the PPS were to estimate the total prevalence of HAIs among adult inpatients and to use this information to inform the selection of future quality improvement (QI) initiatives. For this reason, during the early planning phase in 2019, the PPS was considered a QI project and it did not meet the national requirements for ethical review at that time. Despite this, an Out of Scope application was submitted to the New Zealand Health and Disability Ethics Committee and approved.

However, coinciding with the planning for the PPS, the National Ethics Advisory Committee developed the National Ethical Standards for Health and Disability Research and Quality Improvement in May 2019.<sup>9</sup> The Standard provides guidance for QI projects when considering confidentiality and privacy issues arising from accessing and sharing health information.

The *Privacy Act 2020* specifies how organisations should collect, use, disclose, store and give access to personal information and the *Health Information Privacy Code 2020* sets specific rules for how health information is collected, used, held and disclosed by health agencies and takes the place of the information privacy principles for the health sector.<sup>10,11</sup>

Health information on all adult inpatients was accessed on the day of the survey and identifiable patient information was collected to allow for access to clinical records for those patients with suspected HAIs. For this reason, a privacy impact assessment (PIA) application was submitted to, and approved by, the Northern Region Information Governance and Privacy Group. DHBs participating in the pilot reviewed and endorsed the PIA.

Once all the data had been verified, they were matched with the National Minimum Dataset and a de-identified dataset was used for the analysis.

## 1.3 Funding

A business case was developed and put to the

board for funding of the PPS. The overall budget for the PPS was \$175,000 NZD. The costs included fixed term salaries for two of the three surveyors, development of training material and delivery of training, travel and accommodation for the surveyors and clinical leads to the DHB sites, purchase of tablets for data capture and costs associated with the site visits.

The IPC team at Te Tāhū Hauora contributed to the delivery of the PPS, providing operational, logistical and analytical support as part of the IPC programme; this resource was not included in the budget. DHBs were responsible for internal funding and resourcing associated with the PPS visit.

## 1.4 Communication and engagement with DHBs

Participation and engagement at each DHB were necessary to undertake the survey. To gain senior leadership support, presentations were made to the DHB chief executive officers, chief medical officers, chief nursing officers and chief information officers during the planning phase to gain endorsement. Subsequently, once all 20 DHBs agreed to participate, they were required to nominate a project lead familiar with project management/quality improvement as well as having wide networks in the hospital. This person was the principal point of contact for Te Tāhū Hauora for the planning and dissemination of survey information and was responsible for establishing the DHB's local PPS team.

The local PPS team was resourced by each DHB and comprised representation from the IPC team, the Business Intelligence Unit, communication teams and, in some DHBs, the quality team. Although local teams were universally represented by their IPC teams, there was varied attendance from other key IPC stakeholders such as infectious disease clinicians, clinical microbiologists, other senior medical and nursing staff, and quality and safety teams. Having a nominated representative for communications, business intelligence and project management proved to be invaluable.

In addition to attendance at up to five virtual pre-visit planning meetings, the local team also provided IT and logistical support for the surveyors on the days of the site visits.

## 1.5 Pilot

The PPS process was piloted at three DHBs (one small, medium and large DHB) in October and November 2020. During a 1-day visit to each site, a sample of adult patients from medical, surgical

and intensive care wards were surveyed. Each hospital was required to provide a comma-separated values (CSV) file containing patient demographics for the wards to be surveyed, and the local IPC teams were required to provide support for the surveyors. Additionally, the ward staff were asked to manually collect patient medical device usage on a template paper form before 8:00 am on the day of the survey.

The pilot allowed the PPS team to test and make process changes. The time taken to survey each patient was recorded to estimate the duration of the PPS for each DHB, and to determine the resource required.

The pilot also identified challenges with collecting the medical device data, as the information recorded by the DHB clinical staff was often incorrect or incomplete. This remained an issue throughout the survey, and for any future PPS an alternate strategy needs to be considered.

## 2. Delivery of the PPS

The PPS took place from late February to late June 2021. The length of time required for each DHB visit was estimated from the pilot. This ranged from 1 to 5 days and between 1 and 5 surveyors per DHB visit.

DHBs selected their preferred dates for the PPS team visit and a schedule was drawn up covering 19 weeks. The DHB leads were tasked with communicating the dates that the PPS was being performed on. During the survey the pre-planned schedule was adjusted to accommodate a nurses' union strike, and a COVID-19 lockdown in the Auckland Region.

The survey was planned to avoid the winter months and although it was undertaken during the COVID-19 pandemic, at the time of the visits, all DHBs were operating with normal patient admissions and surgery lists. Visits were scheduled on weekdays between 8:00 am and 4:30 pm.

### 2.1 Clinical governance

An internal group within Te Tāhū Hauora provided clinical governance over the delivery of the PPS. A system was established for reporting incidents and adverse events. An incident was defined as an event occurring during the collection of patient data by the surveyors or any other event arising during the surveyor's time at the DHB hospital, e.g., concerns by a staff member that patient confidentiality was being breached or with the surveyors accessing medical records.

An adverse event was defined as a clinical issue related to the delivery of clinical care, e.g., lack of recognition by the clinical team that the patient had an HAI. No incidents were reported. Adverse events were very uncommon and promptly responded to by the clinical teams.

### 2.2 Survey team

Three surveyors, of which two were experienced IPC practitioners, were recruited to collect the data for all sites. The two clinical leads for the IPC programme at Te Tāhū Hauora participated with data collection at larger DHBs. The surveyors and clinical leads underwent an extensive training programme. An experienced IPC practitioner and educator prepared a 60-page training manual and delivered training focussing on surveillance methodology, HAI definitions and learning to use the REDCap tool. Following the 10 days of classroom training, 2 days of practical training occurred at Auckland City Hospital.

### 2.3 DHB participation

Support from the local PPS team was essential to arrange security access for the surveyors, booking of meeting rooms, organising the completion of the medical device template and sending the CSV file of included patients each morning. The local DHB PPS team also arranged for an IPC team member to accompany and support the surveyors. This was essential to facilitate the interactions with key staff in the clinical areas, and to access patient information for the surveyor, avoiding the need for surveyors to obtain formal permission to access DHB patient information systems. This created an opportunity for DHB team members to expand their knowledge about surveillance and HAIs. They were provided with a certificate recognising their contribution, which some used for their professional development portfolio.

On the day of the survey there was an entry meeting for all the participants to discuss the format of the day. The DHB Business Intelligence team was required to securely send an 8:00 am census of basic patient demographics via a secure CSV file to the Health Quality Intelligence (HQI) team at Te Tāhū Hauora, who then uploaded this data within the normal security system into REDCap. The electronic medical record (EMR) was accessed on a ward computer by the DHB staff, and the required information was recorded into REDCap on a tablet using a secure VPN connection by the surveyor.

## 2.4 Case detection

While all patients were reviewed, an in-depth review was only required for those patients who had one or both of the “triggers” for HAI; temperature  $>38^{\circ}\text{C}$  in the previous 24 hours, and receiving antimicrobials on the day of the survey. Not all data, such as pathology or radiology reports, were available on the day of the visit. The Te Tāhū Hauora PPS team followed up with the local DHB IPC teams for this data after the visit. All proposed cases of HAI were discussed with the clinical leads daily. Where there was uncertainty as to whether the case met the HAI definition, further information was sought.

## 2.5 Data management and reporting

The uploaded data were reviewed by the HQI team at Te Tāhū Hauora and where there was uncertainty, clarification was sought from the surveyors or DHB team. Incomplete data were followed up by the surveyors. A data analyst was available during the data collection periods to troubleshoot data entry or IT problems.

Data verification was performed to ensure that the data gathered were as accurate as possible, and to minimise human and data migration errors. A random sample of patients was used to assess how consistently the surveyors judged a patient’s HAI status. The inter-rater reliability (IRR) was calculated using the agreement coefficient proposed by Gwet.<sup>12</sup> Patients were assigned to the IRR group by daily random sampling from pre-determined wards. IRR was measured across the three main surveyors. The medical records of IRR patients were independently reviewed, and data entered by each surveyor on site.

The DHBs received a brief verbal report of HAIs identified during the visit at the exit meeting. Preliminary results were then reported within 4 weeks of the visit and, subsequently, a more in-depth summary was provided. A national summary report, *National point prevalence survey of healthcare-associated infections – Tiro Whānau ā-motu mō te maimoa hauroa-mate urutā*, was published on the Te Tāhū Hauora website in May 2022<sup>13</sup> and formally published in 2023.<sup>1</sup>

## 2.6 Actions resulting from the data

The data collected by the PPS will support the development of a national strategy to reduce HAIs. QI interventions will be established to reduce the risk of HAIs. A national collaboration to support the implementation of evidence-informed guidance for safe insertion, access and removal of peripheral

intravascular devices (PIVC) is in progress. This was established in response to the high rates of device utilisation identified in the PPS and increasing rates of healthcare-associated *Staphylococcus aureus* bacteraemia attributed to these devices.<sup>14</sup> Subsequent PPS undertaken at regular intervals will determine the success and sustainability of these interventions.

The data will also be used to estimate the likely economic burden of HAI to inform resource and funding decisions at national, regional and local levels.

## 3. Lessons learned and modification to the process for future PPS

The focus on effective communication and logistics ensured that there were minimal issues on the actual days of the PPS. As this was the first national HAI PPS performed in New Zealand, we planned to engage with relevant stakeholders within each DHB with an exit meeting at the end of the last day of the survey. Waiting for the preliminary results to be reported often delayed the timing of this meeting and attendance was variable. While the exit meetings were valuable, alternative strategies for receiving and providing feedback on the delivery of the PPS and the sharing of preliminary results may need to be considered.

We have subsequently had better engagement with key stakeholder groups such as the Royal Australasian College of Surgeons, the Australian New Zealand College of Anaesthetists, and Clinical Leader Groups within district hospitals.

Having access to an existing PPS programme with readily accessible resources was very helpful, and in addition our Australian colleagues participated in several online meetings to clarify some aspects of their process. While the sharing of the data collection tool was very helpful, for several HAIs the data programme logic applied to the HAI definitions did not capture all HAI. We will continue to collaborate with our colleagues to improve the logic for HAI diagnosis in the data collection tool.

Future PPS projects should consider formal ethical review as the results of the PPS will inform national QI initiatives but may not be directly linked with the subsequent QI activity. Also, as it is likely that the results will be presented and published beyond the immediate environment in which they were collected, ethical review is required for these activities.

It will also be essential to determine the scope of EMR use as this will be helpful when determining the time required for the PPS. Access to EMR increased the efficiency of the process as it avoided the need for surveyors to be competing with clinical teams for access to patient records. It will reduce both the time required and staff resources for the PPS.

The capture of recent surgical history and medical device utilisation was challenging, and it will be essential to investigate other means of capturing this information. If patient management systems could accurately record this information, it could be uploaded with the CSV file.

Using the same team of surveyors, investing time in training and undertaking daily reviews of all suspected HAI cases resulted in high-quality data as evidenced by the high IRR.<sup>1</sup> This should remain the standard for future PPS. However, we under-estimated the resources required for data analysis both in real-time, when the PPS was in progress and upon completion. An expectation that a preliminary summary be provided for the exit meeting may have been unrealistic as it often delayed the timing of the exit meeting. This may

have been one of the reasons why attendance at these meetings was variable. Alternative strategies for sharing preliminary data should be considered.

## Conclusions

From an organisational perspective, the PPS for HAI achieved its goal of determining the overall burden of HAI in adult inpatients. It was well received and supported by senior leadership, quality and IPC teams. The data were reliable and will be used to inform QI initiatives to reduce HAI events. The processes followed during the planning and implementation of the HAI PPS can be used as a model to look at other areas of concern such as antimicrobial utilisation and specific disease-related issues, not just HAI.

This viewpoint summarises the key processes that need to be addressed by such surveillance activities. It provides a useful set of considerations for other healthcare provider groups wanting to understand the burden of disease in their local or national setting. At a national level, using the prevalence of disease to calculate the incidence and economic burden will allow better informed resource and funding decisions.

**COMPETING INTERESTS**

Nil.

**ACKNOWLEDGEMENTS**

We would like to thank the other members of the HQSC IPC team who reviewed drafts of the manuscript.

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# Coronary artery aneurysms: the chest pain “zebra”

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## ABSTRACT

Coronary artery aneurysms (CAAs) are defined as entire wall dilatation to 1.5 times the size of the adjacent normal vessel. They can present as chest pain with electrocardiogram (ECG) changes, mass effects or rupture with tamponade. This case describes the presentation of a patient with a ST elevation myocardial infarction and concurrent end stage renal failure, and the options for treatment in this rare condition.

Coronary artery aneurysms (CAAs) are defined as entire wall dilatation to 1.5 times the size of the adjacent normal vessel.<sup>1,2</sup> The incidence of CAAs is 0.8% and is more commonly seen in males, those with coronary artery disease (CAD) or previous myocardial infarction.<sup>1</sup>

## Case report

A 51-year-old male presented with chest pain. He had end stage renal failure due to membranous nephropathy and interstitial nephritis. He also had hypertension, thromboangiitis obliterans and was an ex-smoker with 15 pack-year history. His electrocardiogram (ECG) showed V2–V6 ST elevation and an echocardiogram showed apical and lateral wall akinesis.

Angiography revealed an occluded left anterior descending (LAD) aneurysm and a patent right coronary artery (RCA) aneurysm (Figure 1). One attempt at angioplasty of the LAD identified possible fistulation to the coronary sinus; further attempts at restoration of blood flow were abandoned in favour of illuminating the anatomy.

The patient proceeded to CT coronary arteries (CTCA), which showed a 57mm proximal-mid LAD thrombosed CAA and a 38mm mid RCA coronary aneurysm with 70% pre-aneurysm and 50% post-aneurysm stenosis. No fistula to the coronary sinus was identified.

Due to his acuity with regards to his ongoing ischaemia and concerns for stability with positioning, his internal mammary artery grafts were ruled out. His radial arteries were also likely to be needed for future AV fistula formation; therefore, his definitive management was saphenous vein grafting. His first graft was to LAD and the diagonal, and the second was to the RCA.

Due to the risk of distal embolization from the aneurysms, subsequent distal and proximal ligation of the aneurysms was performed (Figure 2). This also prevents future rupture. This was initially an off-pump surgery; however, due to significant instability on RCA arteriotomy, this was converted to an on-pump beating heart approach.

In ICU he required noradrenaline and argipressin. This was weaned, and he was stepped down to ward level care on day 2 post-operation. He was discharged on day 8 post-operation with an anticoagulation plan for 12 months of Ticagrelor 90mg BD and lifelong aspirin 100mg OD.

## Discussion

Coronary artery aneurysms have been reported to have an incidence of between 0.3% and 12%, dependent on definition of CAA used and population studied. A recent study gave an incidence of 0.8% from a sample size of 51,555 over 11 years.<sup>1</sup> The LAD is most commonly affected, with the RCA coming second.<sup>1</sup>

The presence of CAAs have been associated with active tobacco smoking (67%), hypertension (65%), dyslipidaemia (65%), diabetes mellitus (28.5%) and obesity (25%).<sup>1</sup> In 6.25% another arterial aneurysm had already been identified, and 49.6% had already had concomitant CAD diagnosed.<sup>1</sup>

The presentation is most commonly via ischaemic symptoms from associated CAD, thrombosis or distal embolization. Stress-induced ischaemia due to microvascular dysfunction without obstruction can also be seen. Other presentations can include mass effect or rupture leading to tamponade.<sup>2,3</sup>

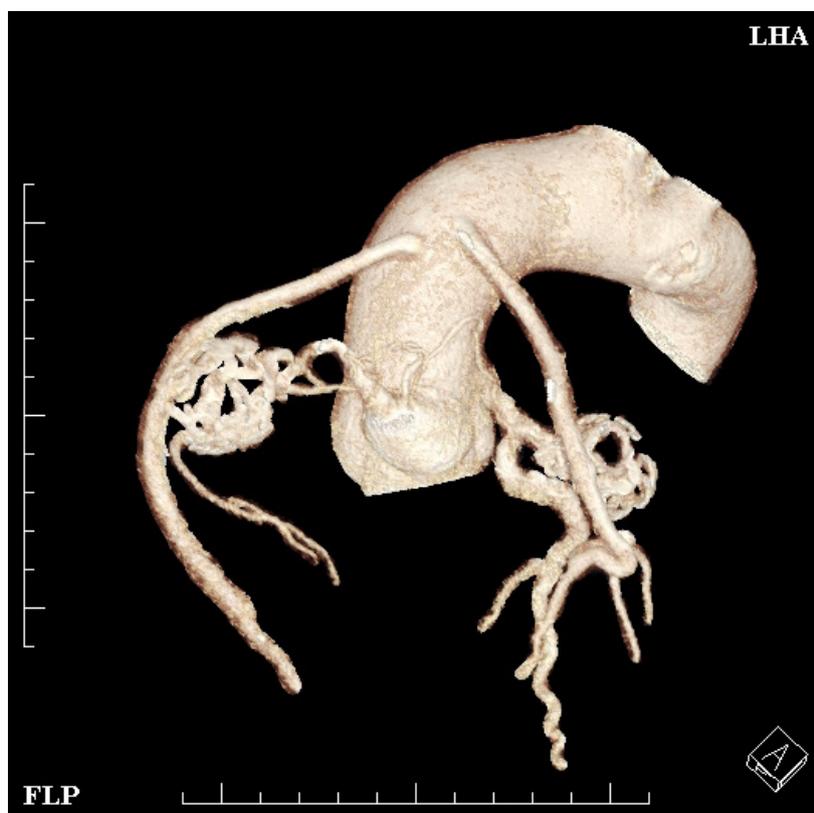
**Figure 1a:** Angiographic image of the occluded LAD aneurysm.



**Figure 1b:** Angiographic image of the patent RCA aneurysm.



**Figure 2:** 3D reconstruction of post coronary artery bypass grafting CT coronary arteries, detailing both saphenous vein grafts and the native coronary artery aneurysms 9 months post his cardiac surgery.



The pathophysiology is thought to be most commonly atherosclerotic in origin. The development begins with destruction of the arterial media, thinning of the arterial wall, increased wall stress and subsequent progressive dilatation of the vessel.<sup>2</sup> Kawasaki disease results in the majority of paediatric CAAs.<sup>2</sup> Other mechanisms include mechanical injury such as during stent insertion, genetic susceptibility, autoimmune disease and infection.<sup>2</sup>

Treatment course is a decision based on the presentation, the patient's anatomy and their other comorbidities.

Medical management includes aggressive risk factor modification, including smoking cessation, lifestyle change and reduction in cholesterol level.<sup>2</sup> Other options include antiplatelet therapy and anticoagulation, neither of which have high-quality evidence for their benefit.<sup>1,2</sup>

Interventional options will depend on size

and length of the lumen and CAA, respectively. If an aneurysm is distant from side branches, then a covered stent can exclude the aneurysm; additionally, embolization coils can be used concurrently.<sup>2,3</sup> Interventionally approached CAAs with STEMIs are associated with increased mortality and in-stent re-stenosis during intermediate follow-up.<sup>3</sup>

Surgical options include excision, marsupialisation with interposition graft, or ligation at the proximal and distal extents with bypass grafting.<sup>2</sup> These surgeries are so uncommon that there is little evidence of the superior surgical technique.<sup>3</sup>

This unusual case of coronary artery aneurysms presenting as a STEMI illustrates the importance of awareness of niche differentials for seemingly straightforward presentations. With swift diagnosis and surgical intervention this patient has benefited from an excellent outcome.

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**COMPETING INTERESTS**

Nil.

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# Hapū with Omicron—the Wellington experience. Maternal and neonatal outcomes of pregnant people diagnosed with COVID-19

Judy Ormandy, Noor Al-Shamma, Sara Filoche

International research demonstrated that pregnant people had more severe illness and pregnancy outcomes when infected with COVID-19.<sup>1-3</sup> However, much of these data were obtained prior to the availability of vaccinations. COVID-19 vaccination and booster doses were made available in Aotearoa in 2021 and were recommended for pregnant people.

In Wellington, the first COVID-19 outbreak to significantly affect pregnant people occurred in early 2022, when the predominant strains were the Omicron variants BA.1 and BA.2.<sup>4</sup> This cohort of pregnant people differed from those described in international literature as vaccination was mandated and over 90% of the eligible population were vaccinated,<sup>5</sup> but presumed to have no natural immunity.

In Wellington (Capital & Coast District Health Board [CCDHB]), from February to June 2022, pregnant people diagnosed with COVID-19 were notified to hospital maternity services and followed up as required with phone calls, clinical review and an additional third trimester ultrasound. Hospital obstetric staff reviewed all notifications and contacted pregnant people, liaised with community midwives and general practitioners and provided follow-up as required.

We aimed to describe the obstetric and neonatal outcomes of pregnant people diagnosed with COVID-19 between February and June 2022 in CCDHB.

## Methods

A retrospective review of paper and electronic records was undertaken of pregnant people diagnosed with COVID-19 and notified to hospital maternity services between February and June 2022. Select demographic information, vaccination status and clinical outcomes were collected from multiple data sources (Table 1). Self-identified

ethnicity was classified in the clinical records according to Manatū Hauora – Ministry of Health prioritised ethnicity.<sup>6</sup> If a customised birthweight centile was not available, a customised GROW chart was created retrospectively, and the baby's birthweight plotted. Where there was variation in data such as body mass index (BMI), the perinatal information management system (PIMS) information was used. If clinical information differed, it was cross checked against clinical coding and medical records, including radiology findings.

We did not have a control group to compare our data to, as some people would have had asymptomatic or unreported infections or had COVID-19 during their pregnancy but not within the five months we collated data from.

Medical records of pregnant people who were admitted to hospital with COVID-19 were reviewed retrospectively, and the COVID-19 was classified by an obstetrician (JO) as being coincidental to admission, contributing to admission or the direct cause of the admission. Coincidental admissions were events such as labour or planned caesarean section. COVID-19 contributed to the admission when someone had a pre-existing condition made worse by COVID-19 (e.g., hyperemesis) or was directly responsible for the admission when a previously well person developed symptoms attributed to COVID-19, e.g., pneumonia.

This was classed as a service evaluation and approval was granted by the CCDHB Women's Health Service Research and Audit Committee.

## Results

Obstetric services were notified of 532 pregnant people diagnosed with COVID-19. Pregnancy outcomes were obtained for 514/532 pregnant people (97%) and 520 babies (the cohort included six sets of twins). Three pregnant people had

**Table 1:** Data sources and variables.

Data source	Obstetric or neonatal variable
Medical App Portal (MAP)	Age, pregnant person ethnicity, BMI, gestation at diagnosis of COVID-19, COVID-19 vaccination status, hospitalisation with COVID-19, ICU admission, mode of birth, gestation at birth, diagnosis of preeclampsia, birthweight centile
Perinatal Information Management System (PIMS)	Age, parity, BMI, induction of labour, mode of birth, blood loss at birth, gestation at birth, NICU admission, birth weight centile
Community radiology providers	Additional third trimester ultrasound
Hospital coding	Hospital admission, gestation at birth, birth outcome, mode of birth, induction of labour, birthweight, pre-eclampsia, BMI, ICU admission, venous thromboembolism (VTE)
NZDep2018 online map tool <sup>7</sup>	Area deprivation based on residential address

**Table 2:** Ethnicity and deprivation quintiles of our cohort of those diagnosed with COVID-19 in pregnancy and the total 2022 CCDHB birthing population.

	Cohort of people diagnosed with COVID-19 in pregnancy		Total CCDHB birthing population	
	N	%	N	%
<b>Deprivation quintile</b>				
1 Least deprived	144	27.1	930	28.9
2	105	19.7	568	17.7
3	98	18.4	547	17.0
4	69	13.0	640	19.9
5 Most deprived	116	21.8	532	16.5
<b>Prioritised ethnicity</b>				
Māori	97	18.2	504	15.7
Pasifika	81	15.2	327	10.2
Asian	46	8.6	361	11.2
Indian	38	7.1	241	7.5
NZ European	199	37.4	1,291	40.1
Other European	48	9.0	375	11.7
Other	23	4.3	118	3.7
	532		3,217	

**Table 3:** Pregnancy outcomes for people diagnosed with COVID-19 and total for CCDHB in 2022.

	Cohort of people diagnosed with COVID-19 during pregnancy		Total CCDHB birthing population	
	N	%	n	%
Hypertensive disorders of pregnancy (gestational hypertension and pre-eclampsia)	22	4.3	201	6.2
Caesarean section	152	29.6	1,182	35.3
Postpartum haemorrhage $\geq 1,000\text{mL}$	49	9.5	328	10.2
Induction of labour	126	24.5	852	26.5
Pre-term birth (<37 weeks)	30	5.8	205	6.4
NICU admission	58	11.2 <sup>a</sup>	530	16.5
Total	514		3,217	

<sup>a</sup>There were 520 babies (six sets of twins), so the denominator here is 520.

COVID-19 twice in the five-month follow-up period. Of this cohort, 39 (7.3%) were unvaccinated, 7 (1.3%) had received one dose of vaccine, 197 (37%) 2 doses, 287 (53.9%) 3 doses and 2 (0.4%) 4 doses.

Ethnicity data and deprivation quintiles of those diagnosed with COVID-19 in pregnancy are shown in Table 2, alongside those of the total 2022 CCDHB birthing population.

There were no maternal deaths, intensive care admissions or diagnosed thromboembolisms in our cohort. Thirty-seven pregnant people (7%) were admitted to hospital. COVID-19 was deemed the direct cause of hospitalisation for three, contributed to admission in 16 cases (e.g., hyperemesis exacerbated by COVID-19) and was coincidental (e.g., at time of labour) in the remaining 18 admissions. Of the 3/514 people admitted to hospital with COVID-19 classed as the direct cause of their hospitalisation, they were admitted for a maximum of 2 nights in hospital. One person had received 1 dose of vaccine, one person 2 doses and one person 3 doses. Seventy-nine percent of the 385 people eligible for a third trimester growth scan had one. Eight percent of babies (40/520) were small for gestational age or low birth weight (defined as a birthweight <2,500g or <tenth customised centile on a GROW chart). There were two stillbirths.

Rates of caesarean sections, pre-term birth, induction of labour, post-partum haemorrhage >1,000mls, hypertensive disorders and NICU admission are shown in Table 3 alongside total rates for the 2022 birthing population within CCDHB (over the same time of the study period).

## Conclusions

Wrap-around care, planning and cooperation between primary and hospital services and high vaccination rates of a recently vaccinated population allowed most pregnant people diagnosed with COVID-19 between February and June 2022 to be managed in the community, and likely contributed to mitigating the adverse outcomes seen overseas.<sup>1-3</sup> Our findings differed from the INTERCOVID 2022 data cohort describing pregnancy outcomes when Omicron was the dominant strain.<sup>8</sup> This study reported COVID-19 in pregnancy was associated with an increased risk of maternal morbidity and mortality, although unlike in our cohort, one third of this population were unvaccinated.

Strengths of this dataset were obtaining birth outcomes for 97% of people reported to have had COVID-19 during the study period and a high representation of non-Pākehā ethnicities.

We acknowledge the limitations of our data

cohort. All data was collected retrospectively. Direct comparisons with pregnant people who did not contract COVID-19 were unable to be made, as it is not known how many pregnant people experienced asymptomatic infections or if every case diagnosed with COVID-19 was referred to maternity services. Some pregnant people will have been diagnosed with COVID-19 outside of the February to June study period. While birthing outcomes in this cohort were comparable to the Wellington birthing population, causality cannot be made from these findings. We have not been able to assess whether the timing of the COVID-19 infection or vaccination status influenced pregnancy outcomes. Despite these limitations, these data are noteworthy for the lack of serious complications experienced in this high-risk group

(pregnant people) of a diverse population in Aotearoa.

The data collection process was challenging, requiring the manual and time-consuming review of multiple databases. This highlights the need for a national, integrated maternity database, which would also allow ongoing epidemiological surveillance and outcome monitoring. We are not aware of any ongoing collection of pregnancy outcomes in Aotearoa in people who have had COVID-19 during their pregnancy, nor are we able to collect these data locally given the limitations of our current databases. As vaccination booster rates drop, we have some natural immunity and COVID-19 becomes endemic, it will be important to monitor and assess any ongoing impact of COVID-19 on birthing and childhood outcomes.

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**COMPETING INTERESTS**

Nil.

**ACKNOWLEDGEMENTS**

This research was completed as part of a summer studentship, sponsored by Graduate Women Wellington Charitable Trust.

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# The Subconscious Mind

By ARNOLD W. IZARD, M.A., M.D., B.C. (Cantab)

NZMJ, 1923 [excerpt]

During the war psychoneurosis caused a great wastage of man power. Much light has been thrown on the working of the unconscious by recent medical and psychological investigations into the nature of certain pathological states. These investigations have proved that many cases of mental disorder are due to the conscious repression of experiences with which intense and disagreeable emotions have been associated.

While the tendency to repress and try to forget any unpleasant complex of ideas is perfectly natural and normal, in certain pathological cases not only does the unpleasant complex become more or less completely split off or dissociated from the rest of consciousness, but a great part of the patient's previous experience may disappear, resulting in a dissociation of personality. During the war, for instance, this condition was frequently found in cases of "shell shock."

In cases of neurasthenia, contrasting with those of shell shock in that they were usually caused, not by a sudden shock, but by long continued worry or anxiety, the unpleasant experiences and emotions are repressed more imperfectly and assume various disguised or symbolic forms.

But it should be observed even when the break of personality is more or less complete, it is never absolutely so—a great deal of the past experience is subconsciously present and may, by the employment of appropriate methods, be raised to the level of consciousness. In many cases of disordered personality, whether the repression be incomplete, due to long-continued mental strain, or more or less complete, as the result of some sudden shock, a cure may be effected by making the patient especially conscious of the repressed experiences that have produced the disorder. When repressed experiences have been revealed and the patient has become fully conscious of them and of their relation to his disorder, a rapid improvement in his condition generally follows.

*Dejerine* has pointed out: (1) All functions of the body may be disturbed by the improper interference of the mind. It is in this way that functional manifestations are created. (2) This

interference of the mind has in almost every case some emotional cause for its origin. (3) Emotion may act by repeated actions. It then creates neurasthenia—the syndrome of emotional preoccupation. (4) Emotion may act by the sudden action of dissociation—under these conditions it results in hysterical symptoms. (5) The action of emotion can only take place on emotional soil. Neurasthenia, an affection of psychic origin, has nothing in common with the various asthenias of organic origin except its fatiguability.

Now it is a matter of common experience that when a strong emotion, such as fear, anxiety or apprehension enters consciousness it may be accompanied by physiological reactions, confusion of thought, vaso-motor disturbance, cardiac palpitation, increased perspiration, respiratory disturbance, tremors, muscular weakness, gastro-intestinal and urinary disturbances.

Now it may happen, and it often does, that one of these physiological disturbances may be so obtrusive as to be the predominant feature and mask the physical element, which may be overlooked—thus gastric or cardiac symptoms may not be recognised as manifestation of an emotion, but may be mistaken for true gastric or heart affections. This is more liable to happen in the anxiety neuroses—such as, for instance, fear of heart disease, of insanity, of cancer, of consumption, of syphilis and so forth—when the anxiety is spread over a long period recurring from time to time when awakened by some thought or stimulus.

*Darwin* in *The Expression of Emotions* has with master hand depicted the emotion of fear. "The frightened man at first stands like a statue, motionless and breathless, or crouches down as if to escape observation; the heart beats quickly and violently, so that it palpitates or knocks against the ribs; the skin becomes pale, due to constriction of the small arteries of the skin; perspiration exudes from it. This exudation is all the more remarkable as the surface is then cold; hence the term 'cold sweat.' The superficial muscles shiver; the breathing is shallow and hurried, the salivary glands act imperfectly; the mouth becomes dry. One of the most marked symptoms is the trembling of all the

muscles of the body, and this is often seen first in the lips. From this cause and from the dryness of the mouth the voice becomes husky or indistinct or may altogether fail. *Obstupui steteruntque comae et vox faucibus haesit.*"

*Mott*, who was in charge of the Maudseley, states:—"A large number of soldiers were admitted under my care suffering with severe neurasthenia. About 10 per cent. showed symptoms of Graves disease, palpable thyroids exophthalmos, van Graefe, and Mobius signs, fine tremors 9-10 per second (indistinguishable from the neurasthenic tremor), tachycardia, acrocyanosis, hyperidrosis and hyperacusis shown by the starting reflex. In most cases the blood pressure was higher than normal, especially in cases where there was an anxiety neurosis. There were indications, therefore, of an increased amount of adrenalin in the blood, as there was undoubtedly an increase of thyroid secretion in many cases."

That the increased secretion of adrenalin in the blood occurs as a result of fright has been shown experimentally by *Canon* and *Elliott*. This may be regarded as a bio-chemical defensive mechanism for self-preservation, for it raises the blood pressure and causes an increased quantity of glycogen to be converted into sugar—the energy substance of the muscles—thus enabling the animal to prepare for fight or flight. This is effected through the stimulus of the automatic centres in the medulla and splanchnic nerves. *Mott* asks: may not the increased activity of the thyroid gland be regarded as a bio-chemical defensive action to restore the exhausted neurons?

In the mental manifestations the emotional element is naturally the most prominent and consists of a curious mixture of dread, pain, terror and anguish, and may vary from a slight awkwardness to indescribable dread. Thus a man may show astonishing general courage in the face of real dangers, such a man may win a V.C. and yet be terrified at making an after-dinner speech.

As *Oppenheim* grandiloquently observes: "Courage can reign in splendour in the cerebrum, while anxiousness is exercising an imperious mastery in the pons." In the subconscious mind are the primitive instincts of which the three chief instincts are the sexual instinct, the instinct of self-preservation, and the instinct of nutrition. Some modern writers would add a fourth great primitive instinct, the herd instinct. There is much to be said in favour of the herd instinct—(1) Man is a gregarious animal. He is intolerant of solitude both in the mental and physical sphere; (2) he is more sensitive to the voice of the herd than to

any other influence, it can inhibit or stimulate his thoughts and conduct, it is the source of his moral code, his ethics and his philosophy; (3) he is subject to the passions of the pack in his mob violence, and the passions of the herd in his panics; (4) he is remarkably susceptible to leadership; (5) his relations with his fellows are dependent upon the recognition of him as a member of the herd. Incidentally it may be said that the herd instinct is one of the greatest moral forces in the world to-day. We have many synonyms for it—"bad form," "not playing the game," "it isn't done," etc. If further proof of the herd instinct be wanted go to one of the mental hospitals and study a case of dementia. There the patient sits, out of tune with his environment, taking no interest in his surroundings, apathetic, slovenly, dirty, filthy in his habits. The voice of the herd no longer appeals to him, he has lost the herd instinct—the man is mad.

In the animal world we recognise three distinct forms of herd instinct—the aggressive, as illustrated by the wolf; the defensive, as illustrated by the sheep; and the industrial or socialized, as illustrated by the bee. The whole object of education is sublimation—that is, the diversion of the psychic energy of the primitive instincts, crude, imperative, selfish, and often cruel, so that they must be harnessed on to an impersonal social sphere. The whole mental history of the individual is a series of conflicts between the primitive instincts, but a healthy person emerges from this series of conflicts by managing to replace the primary personal activities and interests by external social ones, and the mental energy of the former constitutes one of the main driving forces for the later acquired one, being one of the chief bases for the whole later character of a person. This replacement is sublimation, where the energies, desires and interests which were originally personal have been sublimated on to an impersonal social sphere.

"Without the refining influences of education a child would remain selfish, jealous, impulsive, aggressive, immodest, dirty, cruel, egocentric, conceited, inconsiderate of the needs of others, unmindful of the complicated social standards that go to make up civilised society."

Unfortunately the veneer of civilisation is very thin, and beneath it there remains throughout life a mass of crude, impulsive instincts, always struggling for expression. How thin this veneer is can readily be seen in children and in savages, during intoxication, in some forms of insanity, in chloroform and ether narcosis, and during hypnosis.