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Sociodemographic factors associated with attitudes towards abortion in New Zealand

Yanshu Huang, Danny Osborne, Chris G Sibley

In 2016/17, the New Zealand Attitudes and Values Study, a large survey of New Zealander's social attitudes, assessed support for legalised abortion in New Zealand. We found that New Zealanders hold high levels of support for legalised abortion when the woman's life is endangered. Additionally, our results showed that New Zealanders hold moderate-to-high levels of support for legalised abortion, regardless of the reason for seeking an abortion. These results suggest that New Zealanders are supportive of legalised abortion in New Zealand.

Acceptability of human papillomavirus self-sampling for cervical cancer screening in under-screened Māori and Pasifika women: a pilot study

Naomi Brewer, Sunia Foliaki, Collette Bromhead, Ioana Viliamu-Amusia, Litia Pelefoti-Gibson, Tegan Jones, Neil Pearce, John D Potter, Jeroen Douwes

Invasive cervical cancer remains an important public health problem. Despite the National Cervical Screening Programme (NCSP), new cases continue to occur, largely because not all women participate in the NCSP. We have done a small study (of 56 women) examining the acceptability of self-sampling for cervical-cancer screening in Māori, Pacific and Asian women through our collaborating partner, Porirua Union and Community Health Services (PUCHS). The women were asked to take a self-sample and complete a questionnaire about their experience. Our small study suggested that Māori, Pacific and Asian women may find self-sampling for cervical-cancer screening acceptable. Based on this pilot study, we have developed, in collaboration with Waitematā DHB, a much larger ongoing randomised controlled community trial to further examine the acceptability of self-sampling for cervical-cancer screening.

Counting the costs of complications in colorectal surgery

Laila Sheikh, Rowan Croft, Christopher Harmston

Surgery for bowel cancer in New Zealand is common. This study looked at the costs associated with surgery for bowel cancer looking specifically at how complications following surgery affects costs. Complications significantly increase costs associated with surgery and this increase is related to the severity of the complication.

Gestational weight gain in a multi-ethnic sample of pregnant women from Counties Manukau Health, Auckland, New Zealand

Silipa LS Naiqiso, Pernille M Christensen, Karaponi Okesene-Gafa, Lesley ME McCowan

This is the first study on pregnancy weight gain in a multi-ethnic population from Counties Manukau Health, where the majority of participants (70.5%) were overweight or obese and two-thirds resided in areas of very high deprivation. Of concern 70.7% of women gained excessive weight in pregnancy. Pacific women had increased probability of high pregnancy weight gain compared to European. Increasing weight gain in pregnancy was correlated with increasing birthweight and may contribute to the high rates of childhood obesity in Counties Manukau.

Sun protection policies and practices in New Zealand primary schools

Bronwen M McNoe, Anthony I Reeder

Self-reported sun protective policies and practices in schools have improved substantially since the last survey was conducted in 2009. Almost all primary schools have a policy on sun protection. Most schools had sufficient shade for passive activities like eating lunch, but few had sufficient shade for active activities (eg, playground)—there is no public funding available for schools to implement shade. Seventy-two percent of schools only allowed sun protective hats—28% allowed caps, which are not sun protective.

Inclusion of a molecular marker of bladder cancer in a clinical pathway for investigation of haematuria may reduce the need for cystoscopy

Peter J Davidson, Graham McGeoch, Brett Shand

If the urine test CxBladder Triage is negative in patients with blood in the urine, then it is unlikely that there is a serious bladder cancer as a cause. The test can therefore be used to rule out the need for a telescopic evaluation of the bladder.

The New Zealand *Government Inquiry Into Mental Health And Addiction*'s recommendations on substance use: some reflections from the science perspective

Benedikt Fischer, Sally Casswell

The publication provides comments on the substance use-related recommendations included in the recent New Zealand Government Inquiry on Mental Health and Addiction's final report from a science perspective, provided by two senior scholars with relevant (international) experience in the alcohol and drugs fields. The authors emphasise the need for joint consideration and addressing of addiction and mental health issues, given that these commonly co-occur especially in individuals with severe problems. Effective reductions in alcohol-related harms will require strengthened supply and marketing controls. A fundamental shift in the control of personal drug use from criminalisation to a health-centred approach is strongly advised; however, such a shift centrally requires corresponding reforms to and enshrining in core parts of the drug law. 'Decriminalisation' measures for problematic drug users, while often well-intended, should be evidence-based and consider important experiences from elsewhere, yet also need to ensure that they do not bring un-intended adverse consequences (eg, increased police or judicial discretion, net-widening or shifts rather than reductions in punishment). New Zealand urgently requires improved interventions and resources for the treatment of problematic substance use; at the same time, an overall concerted and integrated approach to policy and regulations across different areas of substance use is required. This is especially important with possibly impending cannabis legalisation, where use and supply regulations should be meaningfully coordinated with corresponding regulations for other drugs (eg, alcohol, tobacco).

The cost of colorectal complications in New Zealand

Tamara Mullaney, Timothy Eglinton

The rate of colorectal cancer (CRC) in New Zealand is among the highest in the developed world and CRC is the second highest cause of cancer death in New Zealand. A combination of the aging population and an increased rate of CRC diagnosis in young people mean that this will continue to be a health priority over the coming decades accounting for over NZD100 million by 2026.[1]

Screening for CRC is currently being introduced in order to identify CRC at an earlier and more resectable stage. This is expected to increase the volume of colorectal resections performed in New Zealand, leading, initially, to an associated increase in healthcare costs.

Risk factors for complications in major colorectal surgery include obesity, diabetes, age and comorbidity.[2] All of these are also steadily increasing, leading to an increased risk of perioperative complications. Acuity of surgery and pre-operative loss of condition also contribute to poorer post-operative outcomes.

Meanwhile, the costs of healthcare continue to exceed the available public funding, leading to a need for efficiency in healthcare spending. By definition, cost-efficiency in healthcare spending demands delivery of high-quality care, as anything less than this leads to poorer outcomes which accrue more cost.[3] In this issue, Sheikh et al[4] present a cost analysis of adult patients undergoing resectional colorectal surgery for malignancy in a regional New Zealand hospital between January 2011 and December 2016. The hospital-associated costs of those developing complications from their surgery were compared with the costs from those who did not. Three hundred and ninety patients were identified. Of these, 107 developed a complication (27.4%) and the median cost of hospital treatment per patient was $17,090. In those that developed a complication however, the median cost per patient was $28,483, compared to $14,697 for those that did not. The costs increased as the Clavien-Dindo grade of complication increased.

Internationally reported rates of complications vary but occur in as many as a third of cases, with up to 6% requiring return to theatre. Complications include wound issues such as superficial infections, haematomas and partial or full thickness dehiscence; about one in five of these cases will require return to theatre. Anastomotic leak or deep tissue space infections occur in between 3–10% of cases and account for almost a third of re-operations. Other complications include ileus (in up to a quarter of patients), obstruction, cardiorespiratory adverse events, post-operative bleeding, urinary complications or thrombotic events.[2,3,5] Apart from an increase in hospitalisation and perioperative costs, complications in colorectal surgery are also associated with ongoing morbidity, impaired quality of life and poorer oncologic outcomes with further economic costs which are more difficult to quantify. The present study focuses on direct hospital-associated costs. From a societal perspective, indirect costs of health conditions are important to consider. These include such factors as lost productivity, travel and carers, and can amount to as much as a third of total healthcare costs.[5] It is likely post-discharge direct and indirect costs would increase proportionally with the cost of complications, hence including them in the total cost of care would increase the magnitude of these findings even further.

For the above reasons, systematised strategies to reduce complications have been investigated. Probably the most exhaustive health system-wide example is

the introduction of the National Surgical Quality Improvement Program (NSQIP) by the American College of Surgeons (ACS) in 1994. The ACS NSQIP is an ongoing programme in which trained data-collectors collect demographic, procedural and 30-day outcome data on eight surgical specialties from participating institutions. Risk-adjusted outcomes are then derived, which allow comparison of outcomes between different centres. The introduction of NSQIP was associated with a significant reduction in 30-day morbidity (45%) and mortality (31%) between 1994 and 2005.[7] This effect appears to be sustained and possibly continuing to improve, supporting its continued role in healthcare quality.[8] The process of introducing NSQIP has identified that introducing intervention 'bundles' or systematised protocols designed to reduce specific complications (for example surgical site infection) appears to be more effective than any individual components of these protocols. A number of strategies to reduce individual complications have been described, including 'prehabilitation', enhanced recovery after surgery and 'surgical site infection bundles'.[7] A financial investment is required to participate in the ASC NSQIP, including the salary for each institute's data collector and a payment to the ASC. A recent pilot study was performed in Alberta, Canada assessing the cost of implementing this and the estimated cost-savings. An investment return of $4.30 for every $1 spent was calculated, leading to net savings of approximately $8.8 million.[9] Four centres in New South Wales (NSW), Australia have recently published a pilot study outlining their results and experience of enrolling in NSQIP.[10] It is anticipated that they will expand this programme within NSW in the future. Their risk-adjusted outcomes were compared with those of the broader NSQIP cohort and identified areas for potential improvement. Some of the outlying measures, such as the significantly higher readmission rate, can be understood within the different social contexts, where Australia provides free access to emergency departments and perhaps has less community-based support to prevent unnecessary readmissions. Reassuringly, mortality was better than average with an odds ratio of 0.95 possibly reflecting access to intensive care services in these centres.

In Australasia, the Bi-National Colorectal Cancer Audit (BCCA) has been in place since 2007, and the number of participating institutions has continued to expand. In 2017 approximately 13% of the total number of newly diagnosed colorectal cancers in Australasia were captured in the audit, which looks at primary key performance indicators (KPIs) including inpatient death, return to theatre, anastomotic leak, number of lymph nodes examined and circumferential resection margins (rectal cancer).[11] Secondary KPIs include the use of adjuvant chemotherapy, length of stay, 'surgical complication rate', permanent stoma rate and for rectal cancer, discussion at multidisciplinary meeting and magnetic resonance imaging for staging. For the wider general surgical community, participation in this audit is voluntary but facilitates ongoing monitoring of surgical quality and risk-adjusted benchmarking.

In New Zealand, the Bowel Cancer Quality Improvement Report[12] was recently released detailing the relative performances of the district health boards (DHBs) on six measures of surgical quality: 90-day mortality, rate of emergency surgery, length of stay, minimum of 12 lymph nodes examined and for rectal cancer, the receipt of adjuvant therapy and stoma free rate at 18 months. This demonstrated the diversity in presentation and types of treatment received across the different DHBs, although there is some debate over the relevance of some of the measures both in terms of their validity as measures of quality and the completeness of the data collected.

Cost-efficiency in healthcare delivery is a basic necessity in the current economic climate; the only way to ensure this is through prospective, relevant and ongoing audit. This requires a cohesive nationwide approach and investment in establishing a meaningful audit process. However, audit alone is insufficient to reduce complications. Audit should identify areas for improvement and inform the required systematic changes to minimise negative outliers, ultimately driving quality improvement and minimising the cost of complications.

Competing interests:
Nil.

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Sociodemographic factors associated with attitudes towards abortion in New Zealand

Yanshu Huang, Danny Osborne, Chris G Sibley

ABSTRACT

AIMS: The present study examined the sociodemographic correlates of support for legalised abortion in New Zealand.

METHOD: Data (*N*=19,973) were from the 2016/17 New Zealand Attitudes and Values Study, a national longitudinal panel sample of New Zealand adults aged 18 and older. The survey measured support for legalised abortion (a) regardless of the reason and (b) when the woman's life is endangered, as well as (c) focal sociodemographic correlates.

RESULTS: Our sample expressed moderate-to-high support for legalised abortion regardless of the reason and high support for abortion when the woman's life is endangered. Being religious, living in a more deprived neighbourhood and having more children all correlated negatively with support for both measures of abortion. Men were less supportive of abortion for any reason but did not differ from women's support for legalised abortion when the woman's life is endangered. Furthermore, age correlated negatively with support for abortion for any reason, but positively with support for abortion when a woman's life is endangered.

CONCLUSIONS: A majority of our respondents expressed high levels of support for legalised abortion. Several sociodemographic factors were significantly associated with support for legalised abortion.

According to the United Nations, access to reproductive rights, including abortion, is a basic human right.[1] However, abortion is currently only legal under a few circumstances in New Zealand. These include pregnancies that (a) pose a serious risk to life or physical health, (b) pose serious danger to a woman's mental health or (c) are a result of incest with a guardian.[2] Even within these circumstances, abortions are only granted following the approval of two certifying consultants appointed by the Abortion Supervisory Committee.[2,3]

Although abortion rates across Oceania have generally remained stable over the last decade,[4] New Zealand has seen a decline in abortions since the mid-2000s.[3] Indeed, 20.1% of all pregnancies in New Zealand ended in an abortion in 2007, yet the abortion rate fell to just 13.7% in 2017.[5] Of the 13,285 abortions performed in 2017, 97.3% were granted based on the pregnancy posing a danger to the mental health of the woman.[2] Nevertheless, seeking an abortion remains a difficult process. According to a study from 2010, women experienced an average delay of 24.9 days between seeking an abortion and undergoing the procedure.[6] In addition to time delays, there are geographical barriers to abortion. Specifically, abortion services may be unavailable in a given region, resulting in lengthy (and expensive) travel to another region where an abortion can be performed.[7] Numerous consultations may also be needed before women can successfully obtain an abortion, creating yet another obstacle for women who seek an abortion in New Zealand.[8]

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Finally, New Zealand remains one of the few developed nations with legislative restrictions to abortion.[9] Given these barriers, the United Nations Committee on the Elimination of Discrimination Against Women has recommended that New Zealand revisit its legislation regarding abortion to improve women's access to reproductive healthcare.[10]

The present study

Public opinion over the legality of abortion remains divisive across the globe. A recent study based on data from 51 countries revealed that public support for abortion is low-to-moderate (*M*=3.31, *SD*=2.80, scale range 1 [never justifiable]–10 [always justifiable]).[11] Nevertheless, abortion attitudes differ considerably across nations. For example, respondents from Pakistan express the least support for abortion (*M*=1.52), whereas Swedish respondents express the most support (*M*=8.00). Support for abortion across nations also differs by the restrictiveness of abortion laws within a given country such that those who live in countries with less restrictive abortion policies express higher support (*M*=4.09) than do those from countries with more restrictive abortion policies (*M*=2.55). As previously noted, abortion is only permissible under a few limited circumstances in New Zealand.[2] Given that public opinion can be a critical driver of policy change,[12] it is important to understand both New Zealanders' overall support for abortion, as well as the sociodemographic correlates of these attitudes.

To these ends, research from New Zealand broadly suggests that support for abortion has changed over the last 40 years. Early research from the 1970s suggested that around 15.6–31.5% of respondents agreed that abortion should be legal under any circumstance, whereas only 8.1–13.9% believed that abortion should be illegal, regardless of circumstance.[13] Data from the late 1970s yielded similar rates of support, with 35.3% of respondents reporting that abortion should be approved regardless of circumstance.[14] Yet more recent data from the New Zealand Election Study (NZES)[15] suggests that previously undecided people may be becoming more supportive of abortion (see Table 1). Polling data from 2017 further suggests that a majority of respondents are supportive of legalised abortion.[16] Together, New Zealanders' support for abortion may be increasing. However, current population levels of support for *legalised* abortion remains unknown, nor the demographic factors related to abortion attitudes.

The aim of this study is to assess population levels of support for legalised abortion in New Zealand using a national sample of adults. First, we assessed levels of support for legalised abortion under two conditions (namely, regardless of the reason and when the woman's life is endangered). Second, we examined sociodemographic factors associated with support for legalised abortion under these two conditions. Past research examining attitudes towards the legal status of abortion has overlooked a wide range of sociodemographic correlates associated with abortion attitudes.[16] As such, we aim to address this oversight by assessing rates of support for *legalised* abortion in New Zealand, as well as the sociodemographic correlates of abortion support.

Method

Sampling procedure

Participants from Time 1 (2009) of the New Zealand Attitudes and Values Study (NZAVS), an ongoing nation-wide panel study of New Zealand adults, were randomly sampled from the 2009 New Zealand Electoral Roll. Sampled participants were sent a postal questionnaire with the option to participate in the study. Booster sampling of adults aged 18–65 was also conducted to increase the sample size and address sample attrition. Specifically, random samples were drawn from the 2012, 2014 and 2017 New Zealand Electoral Rolls and then incorporated into the study at Time 4 (2011/12), Time 5 (2013/14) and Time 8 (2016/17), respectively. Additional participants were recruited from an unrelated survey featured on a New Zealand news website at Time 3 (2011). The full Time 8 sample retained 11,933 participants from the full Time 7 sample (85.6% retention rate from the previous year) and included 7,669 participants recruited from the booster sample (response rate = 9.7%).

Participants

Participants (*N*=19,973) were from Time 8 (2016/17) of the NZAVS and were limited to those for whom complete data were available for each regression analysis. Ethical approval

Table 1: Summary of support for abortion from surveys conducted by the New Zealand Election Study 2008–2017.[14]

2008	"Abortion is always wrong."	27.6	Strongly Disagree
		27.8	Disagree
		19.8	Neutral
		8.6	Agree
		13.4	Strongly Agree
		2.9	Don't Know
2014	"Abortion is always wrong."	40.2	Strongly Disagree
		20.2	Disagree
		14.8	Neutral
		8.5	Agree
		12.3	Strongly Agree
		4.1	Don't Know
2017	"Abortion is always wrong."	45.5	Strongly Disagree
		18.1	Disagree
		13.5	Neutral
		6.6	Agree
		10.7	Strongly Agree
		5.6	Don't Know

of the study was granted by the University of Auckland Human Participants Ethics Committee. See Table 2 for demographic characteristics and comparisons between the weighted and unweighted sample.

Measures

Support for legalised abortion

Participants were asked to report their support for legalised abortion with two items: "Legalised abortion for women, regardless of the reason" and "Legalised abortion when the woman's life is endangered",[17] using a 7-point Likert scale with anchors at 1 (Strongly Oppose) and 7 (Strongly Support).

Sociodemographics

A variety of sociodemographic variables were also measured. These included gender, age, ethnicity (European/Pākehā, Māori, Pacific descent, Asian descent), religious affiliation, parental status, number of children (given birth to/fathered/adopted), relationship status (serious romantic relationship), employment status, education (11-unit ordinal rank of qualifications),[18] population density (urban vs rural), birthplace (being born in or outside of New Zealand), area-level socioeconomic deprivation (NZ Deprivation Index 2013)[19] and socioeconomic status (NZSEI2013).[20]

Results

Analysis procedure

Regression analyses were conducted in *Mplus* version 8.0. Post-stratification sample weighting was applied to all analyses to adjust for sample biases in gender, ethnicity and region.[21] Due to the large sample size, we adopted a conservative criterion for determining statistical significance (ie, $p<.005$).

Table 2: Unweighted and weighted demographic characteristics of the sample (N=19,973; Time 8 (2016/17) of the NZAVS).

Characteristic (*n*)	**% (unweighted)**	**% (weighted)**
Gender		
Women (12,586)	63.0	54.3
Men (7,387)	37.0	45.7
Age (years)		
18–29 (2,086)	10.4	11.4
30–44 (4,604)	23.1	24.0
45–64 (10,935)	54.7	53.5
65+ (2,348)	11.8	11.1
Religious affiliation		
Yes (7,621)	38.2	41.3
No (12,352)	61.8	58.7
Parental status		
Yes (14,749)	73.8	72.6
No (5,224)	26.2	27.4
Relationship status (serious romantic relationship)		
Yes (15,145)	75.8	75.5
No (4,828)	24.2	24.5
Employment status		
Yes (15,751)	78.9	79.1
No (4,222)	21.1	20.9
Population density		
Urban (13,059)	65.4	68.9
Rural (6,914)	34.6	31.1
Born in New Zealand		
Yes (15,808)	79.1	68.9
No (4,165)	20.9	31.1
Number of children[a]		
No children (5,224)	26.2	27.4
One child (2,429)	12.2	12.4
Two to three children (10,206)	51.2	49.7
Four or more children (2,086)	10.5	10.5

Table 2: Unweighted and weighted demographic characteristics of the sample (N=19,973; Time 8 (2016/17) of the NZAVS).

Education		
No qualifications (577)	2.9	3.1
Partial/full secondary school (5,760)	28.8	27.8
Non-undergraduate tertiary qualifications (3,941)	19.7	19.5
Undergraduate qualification (5,292)	26.5	27.7
Postgraduate qualification (4,403)	22.0	21.8
Ethnicity[b]		
European/Pākehā (yes = 18,101, no = 1,872)	90.6	79.1
Māori (yes = 2,195, no = 17,778)	11.0	11.5
Pacific Nations descent (yes = 503, no = 19,470)	2.5	6.4
Asian descent (yes = 922, no = 19,051)	4.6	14.0
Area-level socioeconomic deprivation		
1–5 (Low deprivation; 12,616)	63.2	61.1
6–10 (High deprivation; 7,357)	36.8	38.9
Socioeconomic status (SES)		
10–49 (Lower SES; 7,645)	38.3	38.9
41–80 (Higher SES; 12,328)	61.7	61.1

[a]Number of children birthed, fathered or adopted (28 cases were not included in this table due to being outliers or due to irregularity in responses).
[b]Participants could identify with more than one ethnicity. Percentages reported represent the proportion of the full sample with identification with each individual ethnicity.

Overall support for abortion

Post-stratification sample weighted means, standard deviations and bivariate correlations across all measures are summarised in Table 3. Notably, our two measures of abortion attitudes were moderately positively correlated (r=.545). Accordingly, most participants expressed moderate to high levels of support for legalised abortion for any reason (M=5.080, SD=1.927, Mdn=6.00 [IQR=4.00–7.00]) and high levels of support for legalised abortion when the woman's life is endangered (M=6.281, SD=1.317, Mdn=7.00 [IQR=6.00–7.00]).

Sociodemographic correlates

Multiple linear regressions were conducted to examine the sociodemographic correlates of support for legalised abortion (a) regardless of the reason and (b) when the woman's life is endangered. Ethnicity was dummy-coded with European/Pākehā assigned as the reference category (ie, Māori, Pacific and Asian ethnicities were included as dummy-codes). Participants were allowed to identify with multiple ethnicities. The results from these analyses are summarised in Table 4. Unstandardised B coefficients in our regression models represent the amount of change in our dependent variables with one unit increase of our predictor variables.

Legalised abortion regardless of the reason

Men expressed less support than women for legalised abortion for any reason. Likewise, identifying with a religion, being older, a lower socioeconomic status, lower education, living in a more deprived neighbourhood and having a greater number of children correlated with less support for legalised abortion regardless of the reason.

In terms of ethnic group differences, when compared to European/Pākehā, Māori expressed more for abortion regardless of

Table 3: Descriptive statistics and bivariate correlations across sociodemographic factors and attitudes towards abortion.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Gender[a]	---																
2. Age	.106**	---															
3. Māori ethnicity[b]	.034**	−.015	---														
4. Pacific ethnicity[c]	.009	−.070**	.012	---													
5. Asian ethnicity[d]	−.036**	−.183**	−.096**	.020	---												
6. Religious affiliation[e]	−.045**	.106**	.011	.143**	.134**	---											
7. Parental status[e]	.013	.459**	.027**	−.036**	−.103**	.069**	---										
8. Relationship status[e]	.075**	.112**	−.076**	−.045**	−.031**	−.010	.329**	---									
9. Employment status[e]	.051**	−.237**	−.023*	−.005	.013	−.058**	−.049**	.093**	---								
10. Population density[f]	.000	−.123**	−.080**	.114**	.201**	.036**	−.119**	−.048**	.033**	---							
11. Born in New Zealand[e]	.006	.026**	.203**	−.045**	−.437**	−.113**	.015	−.053**	.009	−.151**	---						
12. Education[g]	−.063**	−.141**	−.129**	−.051**	.157**	.026**	−.076**	.078**	.143**	.169**	−.200**	---					
13. NZ Deprivation[h]	−.022*	−.050**	.160**	.165**	.028**	.066**	−.060**	−.181**	−.066**	−.112**	.029**	−.152**	---				
14. Socioeconomic status[i]	−.081**	−.033**	−.082**	−.053**	.061**	.010	.017	.110**	.103**	.142**	−.105**	.570**	−.168**	---			
15. Number of children[j]	.041**	.444**	.098**	.028**	−.137**	.130**	.724**	.231**	−.100**	−.142**	.059**	−.117**	.028**	−.032**	---		
16. Abortion – any reason[k]	−.026**	−.121**	.004	−.106**	−.134**	−.418**	−.123**	−.002	.064**	.011	.091**	.084**	−.103**	.091**	−.184**	---	
17. Abortion – life endangerment[k]	.003	.018	−.013	−.151**	−.129**	−.282**	−.019	.024*	.022*	−.026**	.077**	.070**	−.097**	.097**	−.073**	.545**	---
M	0.457	49.059	0.115	0.064	0.140	0.413	0.726	0.755	0.791	0.689	0.730	5.364	4.750	54.348	1.794	5.079	6.281
SD	0.498	13.975	0.319	0.244	0.347	0.492	0.446	0.430	0.406	0.463	0.444	2.723	2.779	16.326	1.521	1.973	1.317

Note. ** $p<.001$, * $p<.005$.
Weighted correlation coefficients, means and standard deviations.
[a]0 = women, 1 = men.
[b]Dummy-coded; 0 = no Māori identification, 1 = Māori identification.
[c]Dummy-coded; 0 = no Pacific identification, 1 = Pacific identification.
[d]Dummy-coded; 0 = no Asian identification, 1 = Asian identification.
[e]0 = yes, = 1 no.
[f]0 = rural, 1 = urban.
[g]11-unit ordinal rank of qualifications; 0 = no qualifications, 1-3 = partial/full secondary school, 4-6 = non-undergraduate tertiary qualifications, 7 = undergraduate degree, 8-10 = post-graduate qualifications.
[h]Area-level socioeconomic deprivation; 1 = least deprived, 10 = most deprived.
[i]Socioeconomic status (SES); 10 = lowest SES, 90 = highest SES.
[j]Children given birth to, fathered or adopted.
[k]1 = Strongly Oppose, 7 = Strongly Support.

the reason whereas Asians expressed less support. Those who were of Pacific descent did not differ from European/Pākehā.

Parental status, relationship status, employment status, population density and birthplace were unrelated to support for legalised abortion regardless of the reason.

Legalised abortion when the woman's life is endangered

Age, education and socioeconomic status correlated positively with support for legalised abortion when a woman's life is endangered. Conversely, identifying with a religion, living in a neighbourhood with higher deprivation and having a higher

number of children correlated negatively with support for abortion under this condition.

In terms of ethnic group differences, Asian and Pacific ethnicities expressed lower support for legalised abortion when the woman's life is endangered than did European/Pākehā, whereas those who identified as Māori did not significantly differ from European/Pākehā.

Gender, parental status, relationship status, employment status, population density and birthplace were uncorrelated with support for legalised abortion when the woman's life is endangered.

Discussion

We examined support for two measures of legalised abortion in New Zealand (namely, regardless of the reason and when the woman's life is endangered). Our participants expressed moderate-to-high support for legalised abortion regardless of the reason and expressed high support for legalised abortion for when the woman's life is endangered. Furthermore, support for legalised abortion across different circumstances were moderately positively correlated. Although we found (relatively) high levels of support for legalised abortion, there was nevertheless sociodemographic variability in abortion attitudes. Our analyses revealed that men, compared to women, were less supportive of legalised abortion regardless of the reason, whereas there were no gender differences in support for legalised abortion when the woman's life is endangered. Our results for gender differences in support for legalised abortion for any reason is consistent with international research from Northern Ireland,[22] the US[23] and overall global attitudes.[11] However, past New Zealand-based research yielded inconsistent results in terms of gender differences in abortion attitudes. Specifically, some research suggests that women are more supportive of abortion,[24] whereas

Table 4: Multiple linear regressions of sociodemographic correlates of support for legalised abortion (N=19,973).

	Model 1					
	Legalised abortion for women, regardless of the reason					
	B	99% CI	SE	β	z	VIF
Intercept	5.840	[5.550, 6.129]	0.112	2.961	51.983	---
Gender[a]	−0.130	[−0.210, −0.049]	0.031	−0.033	−4.128**	1.041
Age	−0.005	[−0.008, −0.001]	0.001	−0.032	−3.452*	1.486
Māori ethnicity[b]	0.175	[0.053, 0.296]	0.047	0.028	3.713**	1.093
Pacific ethnicity[c]	−0.284	[−0.562, −0.006]	0.108	−0.035	−2.629	1.083
Asian ethnicity[d]	−0.611	[−0.807, −0.416]	0.076	−0.107	−8.052**	1.334
Religious affiliation[e]	−1.508	[−1.594, −1.423]	0.033	−0.376	−45.236**	1.084
Parental status[e]	−0.042	[−0.182, 0.097]	0.054	−0.010	−0.781	2.359
Relationship status[e]	0.046	[−0.052, 0.145]	0.038	0.010	1.207	1.196
Employment status[e]	0.036	[−0.069, 0.141]	0.041	0.007	0.885	1.105
Population density[f]	0.048	[−0.030, 0.126]	0.030	0.011	1.581	1.121
Born in New Zealand[e]	0.099	[−0.010, 0.207]	0.042	0.022	2.349	1.319
Education[g]	0.038	[0.021, 0.056]	0.007	0.052	5.598**	1.601
NZ Deprivation 2013[h]	−0.039	[−0.054, −0.023]	0.006	−0.054	−6.391**	1.138
Socioeconomic status[i]	0.006	[0.003, 0.009]	0.001	0.053	5.462**	1.523
Number of children[j]	−0.157	[−0.200, −0.113]	0.017	−0.122	−9.361**	2.236

Table 4: Multiple linear regressions of sociodemographic correlates of support for legalised abortion (N=19,973) (continued).

	Model 2					
	Legalised abortion when the woman's life is endangered					
	B	99% CI	SE	β	z	VIF
Intercept	6.113	[5.896, 6.330]	0.084	4.643	72.649	---
Gender[a]	−0.016	[−0.076, 0.044]	0.023	−0.006	−0.681	1.041
Age	0.005	[0.003, 0.008]	0.001	0.054	5.111**	1.483
Māori ethnicity[b]	0.014	[−0.072, 0.101]	0.034	0.004	0.431	1.093
Pacific ethnicity[c]	−0.496	[−0.735, −0.257]	0.093	−0.092	−5.340**	1.082
Asian ethnicity[d]	−0.349	[−0.502, −0.196]	0.059	−0.092	−5.874**	1.334
Religious affiliation[e]	−0.669	[−0.732, −0.607]	0.024	−0.250	−27.486**	1.085
Parental status[e]	0.043	[-0.065, 0.152]	0.042	0.015	1.031	2.358
Relationship status[e]	0.014	[−0.058, 0.087]	0.028	0.005	0.514	1.194
Employment status[e]	−0.008	[−0.085, 0.069]	0.030	−0.002	−0.267	1.105
Population density[f]	−0.023	[−0.085, 0.039]	0.024	−0.008	−0.975	1.121
Born in New Zealand[e]	0.070	[−0.011, 0.150]	0.031	0.023	2.236	1.320
Education[g]	0.023	[0.010, 0.036]	0.005	0.048	4.585**	1.601
NZ Deprivation 2013[h]	−0.019	[−0.031, −0.007]	0.005	−0.040	−4.199**	1.137
Socioeconomic status[i]	0.006	[0.003, 0.008]	0.001	0.068	6.253**	1.523
Number of children[j]	−0.068	[−0.104 , −0.032]	0.014	−0.080	−4.902**	2.235

Note. *p<.005, **p<.001.
$R^2_{Model\ 1}$ = .222, p<.001, $R^2_{Model\ 2}$ = 0.119, p<.001.
Weighted regression coefficients.
Support for legalised abortion; 1 = Strongly Oppose, 7 = Strongly Support.
[a]0 = women, 1 = men.
[b]Dummy-coded; 0 = no Māori identification, 1 = Māori identification.
[c]Dummy-coded; 0 = no Pacific identification, 1 = Pacific identification.
[d]Dummy-coded; 0 = no Asian identification, 1 = Asian identification.
[e]0 = yes, = 1 no.
[f]0 = rural, 1 = urban.
[g]11-unit ordinal rank of New Zealand qualifications; 0 = no qualifications, 1-3 = partial/full secondary school, 4-6 = non-undergraduate tertiary qualifications, 7 = undergraduate degree, 8-10 = post-graduate qualifications.
[h]Area-level socioeconomic deprivation; 1 = least deprived, 10 = most deprived.
[i]Socioeconomic status (SES); 10 = lowest SES, 90 = highest SES.
[j]Children given birth to, fathered, or adopted.

other research suggests there are no gender differences.[25] These inconsistent findings may be due to a failure to account for religious affiliation,[23,26] as well as the possibility that support for abortion depends on the circumstance under which an abortion is sought—oversights which we addressed in the present study.

Our results also revealed that participants who identified with a religion expressed less support for both abortion support measures relative to those who were non-religious. These results are consistent with past international and New Zealand-based research showing that identifying with a Christian religion, church attendance and religiosity correlate negatively with support for abortion.[14,22–24,26]

Turning to other significant correlates of abortion support, we found that education correlated positively with support for both abortion measures. This finding is consistent with studies from Northern Ireland,[22] the US[23,26] and New Zealand.[24,25]

We also found that those living in areas with higher deprivation were less supportive of both forms of abortion. Similarly, socioeconomic status correlated positively with support for abortion under both conditions. Previous data from New Zealand suggested a similar pattern of results in terms of socioeconomic factors influencing abortion support. Specifically, one study revealed that participants from the lowest income quintile in their sample expressed less support for abortion than did those in the highest income quintile.[25] However, there were no differences in support for those from the middle-income brackets.

Our results also reveal that age correlated negatively with support for legalised abortion for any reason, but positively with support for legalised abortion when the woman's life is endangered. Past New Zealand-based research has found mixed results in terms of the relationship between and age and abortion attitudes. For example, one study suggested that age correlates positively[24] with opposition to abortion, whereas another study found that age is uncorrelated with abortion support.[27] However, these inconsistencies may be due to a failure to account for differential support across circumstances under which an abortion may be sought.

Although our data uncovered a number of sociodemographic correlates of abortion attitudes, we also identified factors that were not significantly associated with abortion attitudes (when adjusting for other demographics). Indeed, parental status was surprisingly unassociated with either measure of abortion support. However, there was a negative correlation between participants' number of children and support for both measures of abortion. Research from the US suggests that having more children is unassociated with abortion attitudes when accounting for religious affiliation.[26] However, our results are consistent with early New Zealand-based research which suggested that parity was negatively correlated with abortion support.[14]

Notably, relationship status did not correlate with abortion attitudes. This is consistent with past New Zealand-based research which suggested that marital status was uncorrelated with abortion attitudes.[24] In contrast, data from the US has been inconsistent, with some studies showing that marital status is unassociated with abortion attitudes,[26] or negatively correlated with abortion support.[23] Collectively, our results suggest that there may be important contextual/cross-national differences in how marital or relationship status affects abortion attitudes.

Turning to employment status, our data indicate that there were no differences in either measure of abortion support between those who are employed or unemployed. Whereas past research from New Zealand has been mixed, data from the World Values Survey suggests that being employed was associated with greater support for abortion relative to those who were unemployed.[25] However, there were no differences between those who were employed and those who were retired, a student or a homemaker. In contrast, data from the NZES suggested that employment status was unrelated to abortion attitudes.[24] Taken together, the association between employment status and abortion attitudes appears to be complicated. Future research should examine occupational levels in more detail to disentangle these inconsistencies.

Regarding population density, we did not find differences between those who lived in urban or rural areas in terms of either measure of abortion attitudes. These results are consistent with research from the US, which also failed to find regional differences in abortion support.[23,26] However, one study of Latinos in the US found that, people living in a rural community were less supportive of abortion than their urban counterparts.[28] Similarly, we found that either measure of abortion support did not differ depending on whether you were born in New Zealand or overseas. We did, however, find a significant negative bivariate correlation between religious affiliation and being born in New Zealand (see Table 2). As such, adjusting for religious affiliation in our focal analyses may explain why nativity was unassociated with abortion attitudes. Similarly, a previous study examining attitudes of Latinos in the US suggested that being born outside of the US was related to less support for abortion, even when accounting for religious affiliation.[28] Together, although nativity and population density were unrelated to abortion attitudes in our sample, further cross-cultural research may be needed to clarify cultural

and contextual differences in the relationships birthplace, immigration status and religion have with abortion attitudes.

Finally, in terms of ethnic group differences, we found that compared to European/Pākehā, those who identified as Māori were more supportive, whereas those who identified with as Asian were less supportive, of legalised abortion for any reason. Those who identified as Pacific did not differ from European/Pākehā in terms of their attitudes towards for abortion for any reason. In terms of support for legalised abortion in circumstances where the woman's life is endangered, those who identified as Pacific and/or identifying as Asian expressed less support than did those who identified as European/Pākehā. There was no difference between European/Pākehā and Māori for support for legalised abortion when the woman's life is endangered. Our results conflict with NZES data which suggested that Māori were more opposed to abortion relative to European/Pākehā.[24] However, consistent with our results, they also found that identifying with a Pacific and Asian ethnicity was associated with lower support for abortion.[24]

Implications

New Zealand women face geographical, temporal and institutional barriers in accessing abortion services.[6–8] In response, the United Nations has recommended that New Zealand change their abortion legislation to enable greater and easier access to abortion.[10] The results of our study reveal that such legislative changes would be well-received by the public, as most participants expressed support for legalised abortion. Decriminalising abortion may not only help to reduce the physical and institutional barriers present in abortion access in New Zealand,[6–8] it may also ameliorate the stigma women experience when seeking and obtaining an abortion.[29] Additionally, these findings provide insight regarding opinions on abortion as a medical procedure across different populations and communities in New Zealand. Past research suggests that women who obtain an abortion can feel stigmatised by society, their communities, families and various institutions.[30] As such, by considering the factors associated with less support for abortion identified in the current study, primary healthcare providers may be better able to provide specific counselling services for women who belong to these communities and choose to seek an abortion.

Concluding comments

The present study examined levels of support for legalised abortion. Our results reveal that the public express moderate-to-high levels of support for legalised abortion regardless of the reason and high levels of support for legalised abortion when the woman's life is endangered. Nevertheless, there were numerous socio-demographic differences in support for both forms of abortion. Men, being older and identifying with an Asian ethnicity was related to lower support for legalised abortion for any reason, whereas identifying as Māori was associated with higher support. Being older was associated with higher support for legalised abortion for when the woman's life is endangered whereas identifying with a Pacific and/or Asian ethnicity was associated with lower support. Finally, being non-religious, higher education, lower area-level deprivation, higher socioeconomic status and having fewer children was associated with higher support for legalised abortion across both measures. Together, these results suggest that the majority of New Zealanders are supportive of legalised abortion, but that important demographic variables are nonetheless associated with abortion attitudes.

Competing interests:
Nil.

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Acceptability of human papillomavirus self-sampling for cervical-cancer screening in under-screened Māori and Pasifika women: a pilot study

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ABSTRACT

AIM: To assess whether self-sampling for cervical-cancer screening is acceptable to New Zealand women.

METHODS: Māori, Pacific and Asian un- or under-screened women aged 30–69 years were asked to: 1) examine three self-sampling devices; 2) complete a questionnaire on demographics and experiences with the devices; and 3) take a self-sample. Samples were tested 'off-label' using the cobas® 4800 human papillomavirus (HPV) test (Roche Diagnostics NZ).

RESULTS: Thirty-one Pacific, 12 Māori, nine Asian and four women of other ethnicities participated (mean age, 39.5 years). Before trying any devices, 78% indicated a preference to self-sample, compared to 22% who preferred a physician-collected sample (PCS). After trying a device (HerSwab™, 91%; Delphi Screener™, 14%; cobas Swab, 13%; 12.5% used >1 device), fewer women (66%) preferred to self-sample next time, fewer (16%) preferred a PCS, while 18% expressed no preference. One of 32 samples with valid results (35 were tested) was positive for HPV 'other' oncogenic types.

CONCLUSIONS: This was the first New Zealand study to invite women, including Māori women, to take a self-sample for cervical-cancer screening. The pilot study suggests that un- and under-screened women generally find self-sampling acceptable and all sample types are suitable for use with the cobas HPV test.

In Aotearoa/New Zealand, there are long-term major ethnic inequalities in cervical-cancer screening, incidence and mortality, with Māori and Pacific women having lower screening and higher incidence and mortality rates than European New Zealanders.[1–5]

Reasons for low participation include cost, whakamā (embarrassment/shyness), tapu (sacred/taboo), access, models of care (eg, a lack of cultural appropriateness), and discomfort.[5–9] Actions to reduce these barriers have been undertaken; however, there has been little change in screening coverage.[2,10] Thus, novel strategies for increasing screening participation are needed.

Persistent infection of the cervix with any of 14 oncogenic human papillomavirus (HPV) genotypes can cause cervical cancer and its precursor lesions.[11] DNA testing for oncogenic types of HPV is more sensitive than cytology for the detection of high-grade lesions,[12] and is now recommended by the World Health Organization for early detection.[13] Therefore, primary HPV testing, rather than cytology, is being introduced in several countries,[14] and New Zealand will transition to HPV primary screening in 2021.[15]

One advantage of HPV-based screening is that, unlike cytology-based screening, it is possible for women to take a sample themselves. Internationally, offering

self-sampling has been shown to increase screening uptake,[16–21] but no New Zealand studies where women have taken a self-sample have yet been published. The study was undertaken to examine the acceptability of self-sampling in Māori, Pacific and Asian women, who have known low screening rates.[4] This pilot study aimed to: 1) examine the acceptability of self-sampling among un- and under-screened Māori, Pacific, and Asian women; 2) enquire about the level of comprehension of the instructions for self-sampling devices; 3) develop laboratory methods for processing cobas® *Chlamydia trachomatis/Neisseria gonorrhoeae* (CT/NG) swabs, Herswab™ and the Delphi Screener™ through the cobas 4800 HPV test; and 4) contribute ethnic-specific data to enhance the design of a national randomised controlled trial of the acceptability of self-sampling.

Methods

In New Zealand, cervical screening is recommended in women aged 20–69 years, but because the prevalence of HPV infections in women <30 years is high and most infections clear without causing cervical abnormalities, the usefulness of HPV testing in these women is limited.[22,23] Women aged 30–69 years who had ever been sexually active and who had not had a hysterectomy were therefore recruited. Eligible women were identified by Porirua Union and Community Health Service (PUCHS). Initially, recruitment was through mail, but this was replaced by recruitment through PUCHS nurses' community outreach and home visits, a presentation at a community health promotion meeting, and at the regular screening clinics. The number of women who were invited to participate was not recorded but feedback from the clinic staff indicated that the number of participants was determined by the availability of nurses rather than by the willingness of women to participate. Any woman who attended a screening clinic and was interested in and eligible for the study was enrolled when the nurses had sufficient time available.

Participants were asked to: 1) examine three different self-sampling devices; 2) complete a questionnaire (see Appendix); and 3) take a self-sample with at least one device (of their choice). The questionnaire was completed face-to-face followed by self-sampling and cytology at the clinic. Participants were given a package that included a brochure on cervical cancer and HPV infections, and three self-sampling devices, with written and illustrated instructions from the device manufacturers. The three self-sampling devices were: i) HerSwab (Eve Medical), ii) Delphi Screener (Rovers Medical Devices), and iii) cobas CT/NG Swab (Roche Diagnostics NZ).

The questionnaire was developed for this study, based partially on the one used for a Delphi Screener study in the US.[24] The questionnaire inquired about: i) general information such as age, occupation and ethnicity; and, ii) experience with the devices. The women were asked to answer questions both before and after using the devices to assess whether their actual experiences matched their expectations, and whether their experiences changed their preferences. The questionnaire also inquired about the clarity of the instructions for each device. The questionnaire consisted of multiple choice and open-ended questions.

The self-samples were stored at room temperature for up to 48 hours before laboratory analysis and tested 'off-label' using the cobas 4800 HPV Test. Samples were prepared for testing according to the type of collection device. Delphi Screener: the vial containing cells in saline was vortexed for 30 seconds and 1mL of resuspended cells were transferred to an 8mL tube (Sarstedt GmbH) containing 2mL of PreservCyt® Solution, then vortexed again for 30 seconds. HerSwab: each brush was snapped into an 8mL tube containing 2mL of PreservCyt, then vortexed for 30 seconds. The cobas Swab was vortexed for 30 seconds.[25] All samples were tested according to the manufacturer's instructions, except as noted for the sample preparation.[26] The cobas 4800 HPV test detects all 14 oncogenic HPV types, genotyping HPV16 and HPV18 individually and pooling the 12 other oncogenic HPV types as "other high-risk".[26] HPV results were not used for clinical management. All women were offered cytology testing, as per usual care, which was carried out in accordance with national guidelines and standard operating procedures (data not shown).

Data are reported as prevalences, with the open-ended questions reported qualitatively. The study was approved by the New Zealand Central Health and Disability Ethics Committee (14/CEN/211).

Results

Fifty-six women completed the questionnaire (see Table 1 for demographics), the majority of whom only used one self-sampling kit (87.5%; n=49); three used all three kits and four used two kits. HerSwab was used by 51 participants, Delphi Screener by eight, and the cobas Swab by seven.

Table 1: Characteristics of participants.

	Number (%)
Ethnicity	
Pacific	31 (55.4)
Māori	12 (21.4)
Asian	9 (16.1)
Other	4 (7.1)
Age[#]	39.5 (20-61)
Occupation^	
Housewife*	18 (32.7)
Healthcare worker[$]	13 (23.6)
Education[‡]	6 (10.9)
Other	18 (32.7)
Number of kits used by each woman	
1	49 (87.5)
2	4 (7.1)
3	3 (5.4)
Kits used	
HerSwab	51
Delphi Screener	8
cobas CT/NG Swab	7

[#]Median (range), date of birth was missing for two women; ^Data were missing for one woman. Percentages do not equal 100% due to rounding; *Includes home-maker, housework and mother; [$]Includes nurse, caregiver and community health worker; [‡]Includes teacher, home base teacher and home educator. CT/NG: *Chlamydia trachomatis/ Neisseria gonorrhoeae*.

Preferences and expectations before and after self-sampling

Before trying any devices, 78.0% (n=39/50) of women said that they would prefer to self-sample next time they were due for screening, and 22.0% (11/50) said that they would prefer a physician-collected sample (PCS; six women did not answer the question). After trying a device, fewer women (65.9%; n=29/44) preferred to self-sample next time, fewer women (7/44) preferred a PCS, and 8/44 expressed no preference (12 women did not answer the question after trying a device).

Table 2 shows the participants' responses to general questions before trying any of the devices. Only one woman said that she would not go for a follow-up test after a positive result; she said that this was because she would think that she was healthy and did not need further testing.

Table 2: Participant responses to questions prior to trying self-sampling devices.

	Age <40 years n (%)	**Age ≥40 years n (%)**	**Total**[#]
Receive kit through post	12 (54.5)	10 (45.5)	22
Collect kit from clinic*	13 (44.8)	16 (55.2)	29
Automatically sent kit when due*[$]	8 (50.0)	8 (50.0)	16
Written to or phoned before kit sent*[$]	16 (48.5)	17 (51.5)	33
Other	0	1 (100.0)	1
Would attend follow-up if result positive^	19 (45.2)	23 (54.8)	42
Would not attend follow-up if result positive	0	1 (100)	1

[#]Totals exclude women who did not answer the question; *plus one woman with missing age; [$]one woman answered that she preferred to be automatically sent the kit and that she preferred to be telephoned first, so she has been included in both categories; ^plus two women with missing age.

Table 3: Participant responses to questions about the device(s).

Question	Response											
	HerSwab				Delphi Screener				cobas CT/NG Swab			
	Positive* n (%)	Negative# n (%)	Neutral/ Other n (%)	No comment/ answer n	Positive* n (%)	Negative# n (%)	Neutral/ Other n (%)	No comment/ answer n	Positive* n (%)	Negative# n (%)	Neutral/ Other n (%)	No comment/ answer n
Before using												
General impression	28 (68.3)	7 (17.1)	6 (14.6)	10	4 (50.0)	4 (50.0)	0	0	4 (100)	0	0	3
Ease of using	43 (89.6)	5 (10.4)	N/A	3	5 (71.4)	2 (28.6)	N/A	1	7 (100)	0	N/A	0
Ease of following instructions	44 (89.8)	5 (10.2)	N/A	2	5 (71.4)	2 (28.6)	N/A	1	6 (85.7)	1 (14.3)	N/A	0
Amount of discomfort expected	26 (53.1)	23 (46.9)	N/A	2	2 (28.6)	5 (71.4)	N/A	1	6 (85.7)	1 (14.3)	N/A	0
After using												
Anything unclear in instructions^	7 (14.3)	42 (85.7)	N/A	2	0	7 (100)	N/A	1	1 (14.3)	6 (85.7)	N/A	0
Ease of using	36 (92.3)	3 (7.7)	N/A	12	6 (85.7)	1 (14.3)	N/A	1	6 (100)	0	N/A	1
Were the instructions helpful	40 (95.2)	2 (4.8)	N/A	9	6 (85.7)	1 (14.3)	N/A	1	6 (100)	0	N/A	1
Amount of discomfort experienced during last cytology test	18 (46.2)	21 (53.8)	N/A	12	6 (85.7)	1 (14.3)	N/A	1	5 (83.3)	1 (16.7)	N/A	1
Amount of discomfort experienced using device	27 (62.8)	16 (37.2)	N/A	8	6 (85.7)	1 (14.3)	N/A	1	5 (83.3)	1 (16.7)	N/A	1
Worry had not done test properly^	20 (47.6)	22 (52.4)	N/A	9	3 (42.9)	4 (57.1)	N/A	1	2 (33.3)	4 (66.7)	N/A	1
Using device against religious or cultural beliefs^	0	43 (100)	N/A	8	0	7 (100)	N/A	1	2 (33.3)	4 (66.7)	N/A	1

Percentages in table are out of the number of women who tried the device and answered the question. Since seven women used more than one kit the total number of participants included in the table is 66.
*Positive includes favourable, very easy/easy, none/very little, somewhat agree/agree, and yes; #Negative includes unfavourable, difficult/very difficult, some/a lot, somewhat disagree/disagree, and no; ^In this question a negative is a good answer. CT/NG: *Chlamydia trachomatis/Neisseria gonorrhoeae*.

Participants' impressions of specific devices

Before using any of the devices the women's impressions of the devices were mostly positive (Table 3). Before using HerSwab, 76.6% (n=36/47) of women said that they would prefer to use HerSwab next time they need to be screened, compared to 23.4% (11/47) who said that they would prefer to have a PCS (four women declined to answer). After using HerSwab, 63.4% (n=26/41) of women stated that they would prefer self-sampling, compared to 7/41 saying that they would prefer to have a PCS and 8/41 stating no preference (10 women declined to answer). Before using Delphi Screener, 4/6 women said that they would prefer to self-sample next time, 2/6 said that they would prefer to have a PCS, and two women declined to answer the question. After using Delphi Screener, 6/7 stated that they would prefer self-sampling, and 1/7 said that they would prefer to have a PCS (one woman declined to answer). Finally, before using the cobas Swab, all six women said that they would prefer to self-sample next time (one woman declined to answer). After trying the cobas Swab, all of the women who answered the question (n=6/7) stated that they would prefer self-sampling next time. Reasons for preferring to use a self-sampling device, a PCS, or for having no preference (captured by open questions, after trying a device) are given in Table 4.

As shown in Table 3, before using the device only 2/5 women who used Delphi Screener anticipated experiencing no or very little discomfort using the device, but after using it 6/8 said that they experienced no or very little discomfort.

The majority of the women said that there was nothing unclear in the instructions (Table 3). The only women who used HerSwab or the cobas Swab and thought

Table 4: Some of the participants' comments about the devices.

	Comments		
	HerSwab	**Delphi Screener**	**cobas CT/NG Swab**
Before using Favourable	"Small, colourful, appears easy" "Looks like it's easy to use, small, compact" "User-friendly"	"Awesome" "User-friendly" "Like a tampon"	"Easy" "Very easy" "Awesome"
Less favourable	"Ugh! The way it looks is off-putting" "Unsure/uncomfortable looking at this, but happy to have a go after this explained" "Hmmm!!! How does that work and will it collect what is needed?"	"Big" "Large and frightening"	N/A
After using For next screening test			
Prefer self-sample because…	Comfort and ease; being able to do it at home in own time; no appointment needed; convenience; no shame; privacy; less pain	"Easier"; "more comfortable"; "confidentially, privacy, and convenience"	"Easier"; "comfortable"; "privacy and convenience"; "rather do it myself"
Prefer cytology test because…	Self-sampling was painful; concern about not doing self-sampling correctly; cytology test would be done properly first time, is more thorough and more accurate	No comments given	N/A
No preference because…	"Will the swab indicate glandular cancers? I would like to alternate between self-testing and cervical smears" "Whichever one gives non-contaminated/ reliable result"	N/A	N/A
To return sample			
Prefer to use at home and mail to laboratory because…	Faster; more convenient; easier and saving time	No comments given	"Comfortable"
Prefer to use at home and take to clinic because…	Better hygiene; ease; tamper-proof	Sample won't get lost in mail; a lot easier, because sample can be dropped into clinic on way to an errand/work	"Flexibility"; "to make sure it gets to the clinic"
Prefer to use at the clinic because…	Ease; safety (including availability of help & sample being contamination-free); correctness of the procedure	Will not get contaminated	N/A
Have no preference because…	"This was a complete fail. The pink brush did not come out at all"	N/A	No comments given

Comments are either quotes (marked as such) or paraphrased for brevity. CT/NG: *Chlamydia trachomatis/Neisseria gonorrhoeae*.

that there was something unclear and who wrote a response, said that there were not enough instructions.

Some women said that they would worry that they had not done the test correctly: 47.6% (n=20/42) who used HerSwab, 3/7 who used Delphi Screener and 2/6 who used the cobas Swab (Table 3).

Preferences for where to self-sample

The majority of women who used HerSwab (38%, n=16/42) preferred to use it at the clinic, but only 1/7 who used Delphi Screener, and none who used the cobas Swab did so. The majority of women who used Delphi Screener (n=5/7) and who used the cobas Swab (4/6) said that they would prefer to use it at home and take the sample to the clinic, as did 29% (12/42) of women who used HerSwab. Twenty-four percent (n=10/42) of women who used HerSwab said that they would prefer to use the device at home and mail the sample to the laboratory in the future, as did 1/7 who used Delphi Screener, and 1/6 who used the cobas Swab. Ten percent (n=4/42) of women who used HerSwab said that they had no preference, while none who used Delphi Screener, and 1/6 who used the cobas Swab had no preference. Nine women who used HerSwab declined to answer the question, as did one who used Delphi Screener, and one who used the cobas Swab. Some of the (qualitative) reasons given for these preferences are given in Table 4.

Would the participants recommend using the self-sampling device to a friend?

The majority of the women would recommend using the device to a friend: 87.8% (n=36/41) who used HerSwab, 6/7 Delphi Screener and 6/7 the cobas Swab. However, 12.2% (n=5/41, 10 declined to answer) of women who used HerSwab, 1/7 (one declined to answer) Delphi Screener, and 1/7 the cobas Swab would not.

HPV testing

A total of 57 samples were received for HPV testing from 56 women. Of these, 22 samples had been stored for more than seven days at room temperature, exceeding the acceptable limits for testing, and were therefore discarded. The remaining 35 samples (one woman used two devices) gave unremarkable HPV results with one of these positive for HPV 'other' oncogenic type. Three (8.6%) of the samples were invalid/failed. Both of the samples from the woman who provided two (one from HerSwab and one from Delphi Screener) were negative.

HerSwab samples frequently returned "failed" results from the cobas HPV test, which resolved on removal of the sampling brush head from the test tube. There were additional handling problems with HerSwab during the pre-analytical phase, caused by sample loss through drying due to no lid on the device; cross contamination was also a potential issue. The Delphi Screener provided a macroscopic bolus of cells and the lack of a swab device in vitro meant that no issues were encountered when processing on the cobas® X480 instrument. There were no issues with the cobas Swab.

Discussion

This pilot study, which examined the acceptability of self-sampling in un- and under-screened Māori, Pacific and Asian women in New Zealand showed that, in general, the participants were positive about the self-sampling devices, which is in accordance with the hui (of 106 under-screened Māori women) findings of Adcock et al.[6] The participants found the devices easy to use, but several were worried that they had not taken the sample properly. The majority of the participants used only one self-sampling kit, and the nurses always presented the devices in the same order (HerSwab, Delphi Screener, cobas Swab), which explains why the HerSwab device was used most often. Indeed, the design of the HerSwab presented technical difficulties and contamination risks that could affect any HPV testing system; future users need to be aware of this. To the authors' knowledge this is the first study to show the use of Herswab and Delphi Screener with the cobas HPV test, albeit with a modification of the US Food and Drug Administration approved protocol.

Before trying any devices, 78% of the women (n=46/59) said that they would prefer to self-sample, rather than have a PCS, next time they were due for screening, showing that these women largely found the idea of self-sampling to be an acceptable alternative to a PCS. However, after they had tried using a device 'only' 70% (n=38/54) preferred that

option. Adcock et al[6] found that 61% of their survey participants (397 under-screened Māori women) would prefer to self-sample rather than have a PCS. In contrast to the current study, a study of 197 low-income, recently screened women in New York City, US showed an increase in preference for use of a self-screen (rather than a PCS).[24] The difference between the results of the current study and those of Jones et al[24] may be because the participants in the current study were un- and under-screened, rather than recently screened women.

The decrease in preference for self-sampling that was found in the current study was accompanied by a decrease in the preference for a PCS (22%, n=13/59 before trying a device, and 15%, n=8/54 afterwards) and an 'increase' in the number of women who expressed no preference after trying the device (n=8/54; all eight used HerSwab), an option that unfortunately was not available in the questionnaire before trying the device. Six women did not answer the question before trying a device, compared with 12 afterwards. So, it is likely that after trying a device, women were more inclined to state no preference or not answer the question rather than that they changed their mind about which test they would prefer in the future.

The women in the New York study experienced less discomfort taking a self-sample than they had expected,[24] and the majority of women in Canadian,[27] British[28] and Australian[7] studies found self-sampling comfortable. In contrast, of the women who only used one device in the current study (n=49/56), the majority (70%; 28/40) experienced the same amount of discomfort as they had expected, and nine (23%; 9/40) experienced less discomfort than they had expected. Nine women did not answer the question both before and after trying a device.

The study found that 42% (n=22/52, four women did not answer the question) of women would prefer to receive the self-sampling kit through the post, but most (58%; 30/52) would prefer to collect the kit from a clinic. Slightly more of the women who preferred to receive the kit through the post were aged <40 years (55%; n=12/22), whereas slightly more of the women who preferred to collect the kit from a clinic were aged ≥40 years (55%; 16/29). Similarly, Adcock et al[6] found that 64% of their survey participants would be happy to receive a kit through the post. The majority (67%; n=33/49) of the women said that they would prefer advance notice by mail or telephone before having a self-sampling kit sent to them next time they were due for screening. Reasonable postal delays will not affect the validity of the HPV self-sample test as recent research has shown that dry-brush self-samples stored at room temperature for up to 32 weeks were stable for both human genomic material and HPV.[29] Overall, age did not seem to have a large influence on women's preferences for how to receive the kit, but the small numbers meant that other possible explanatory factors (such as ethnicity) were not able to be examined. The ongoing national randomised controlled trial of the acceptability of self-sampling is further investigating these preferences.

A strength of this pilot study is that it included Māori and Pacific women who have persistently low screening coverage rates and a high burden of disease.[1,3,30] The limitations of the study include the small sample size, which limits the reliability and generalisability of the findings. The number of women who were told about the study and invited to participate was unfortunately not recorded due to the large workload of the PUCHS nurses. The participants also included women who were younger than the target age range, and who were not of the target ethnicities.

Conclusions

This is the first study of HPV self-sampling for cervical-cancer screening in New Zealand and the first to include Māori women. Although the sample size is small, the pilot study suggests that un- and under-screened New Zealand women generally find self-sampling acceptable and, with appropriate laboratory validation, all sample types will be feasible for use with the cobas HPV test.

Appendix

The following questions were used in the study questionnaire.

These questions were asked before any devices were used:

1. If you were going to use a self-sampling kit for cervical screening would you prefer to receive the kit?

   (Answer options: through the post; collect it from a clinic (such as your family doctor); other—please specify.)

2. If you were going to use a self-sampling kit would you prefer to be?

   (Answer options: 'automatically' sent the kit when you were due to be screened; be written to or phoned first; other—please specify.)

3. Would you go for a follow up test with the doctor (or specialist) if your self-sampling result was positive?

These questions were repeated three times in the questionnaire so that women could answer them for each device that they tried:

Please answer these questions before you try the [device name]

1. What was your impression of the [device name]?
2. Please indicate how easy or difficult you think it will be to use the [device name]?

   (Answer options: Very easy; Easy; Difficult; Very Difficult.)

3. Please indicate how easy or difficult you think it will be to follow the user instructions?

   (Answer options: Very easy; Easy; Difficult; Very Difficult.)

4. Please indicate the amount of discomfort you think you will experience using the [device name]?

   (Answer options: Very little; Some discomfort; No discomfort; Very much.)

5. Please indicate which method you would prefer the next time you need to be screened?

   (Answer options: Smear test health professional; Use [device name] myself.)

Please answer these questions after you have tried the [device name]

1. Was anything not clear on the instructions for using the [device name]?

   (Answer options: Yes; No (If No, please go to Q.x).)

2. What was not clear?
3. Which method would you choose the next time you need to be tested, self-sampling with the [device name] or having a health professional take a specimen during a smear test?

   (Answer options: Self-sampling; Smear test by a health professional; No preference.)

4. Why would you prefer this?
5. If you could use the [device name] which would you prefer?

   (Answer options: Use [device name] at home and mailing the specimen to clinic; Use [device name] at home and bring the specimen to clinic; Use the [device name] at the clinic; No preference.)

6. Why would you prefer this?
7. Please indicate how easy or difficult it was to use the [device name]?

   (Answer options: Very easy; Easy; Difficult; Very Difficult.)

8. Please indicate how easy or difficult it was to follow the user instructions?

   (Answer options: Very easy; Easy; Difficult; Very Difficult.)

9. Please indicate the amount of discomfort you experienced during your last smear test (please leave blank if you have never had a smear test)?

   (Answer options: Very little; Some discomfort; No discomfort; Very much.)

10. Please indicate the amount of discomfort you experienced using the [device name]?

    (Answer options: Very little; Some discomfort; No discomfort; Very much.)

11. Please indicate whether you would worry that you had not done the test properly?

    (Answer options: Disagree; Somewhat disagree; Somewhat agree; Agree.)

12. Please indicate whether using the [device name] would go against your religious or cultural beliefs?

    (Answer options: Disagree; Somewhat disagree; Somewhat agree; Agree.)

13. Which method would you prefer the next time you need to be screened?

    (Answer options: Smear test by health professional; Use [device name] myself; No preference.)

14. Would you recommend using the [device name] to a friend?

    (Answer options: Yes; No.)

15. Do you have any last comments on the [device name] or the smear test?

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Counting the costs of complications in colorectal surgery

Laila Sheikh, Rowan Croft, Christopher Harmston

ABSTRACT

AIM: New Zealand has a high incidence of colorectal cancer. Most patients are treated with resectional surgery. There is a significant rate of complication associated with treatment. Costs of surgical treatment and effect of complications have not been previously investigated in New Zealand. The aim of this study was to define treatment costs of complications in patients undergoing resectional surgery for colorectal cancer.

METHODS: Adult patients who underwent a resectional operation for colorectal adenocarcinoma at Northland DHB between January 2011 and December 2016 were identified. Actual costs and diagnoses-related group (DRG) costs were obtained. Demographic data and information on outcomes were identified using the hospital's results reporting system CONCERTO.

RESULTS: Three hundred and ninety patients were included. One hundred and seven patients suffered a complication. Median cost per patient was $17,090. In those with complications, median cost was $28,485 compared to $14,697 in those without. Cost of complications increased as complication grade increased. Additional cost in patients with complications was on average $20,683 per patient, equating to a total of $2.2 million in this cohort.

CONCLUSION: This study has defined the costs associated with colorectal cancer resection. Complications following colorectal surgery add significant costs. Significant investment in initiatives to reduce complications is justified.

Colorectal cancer is common with over 3,000 cases diagnosed per year in New Zealand.[1] This overall incidence is high by international standards, with women in particular having a higher incidence compared to any other country within the international screening network.[2] It is the second most common cancer in New Zealand, with only breast and prostate cancer having a higher incidence in women and men respectively. In the majority of patients with colorectal cancer, curative treatment is with resectional surgery.

The incidence of complications following colorectal cancer surgery is also high, with some studies quoting figures up to 50%.[3–5] Short-term consequences of these complications are obvious, with increased length of stay, intensive care admissions and possible mortality.[6] Studies also suggest poorer long-term outcomes associated with complications in terms of reduced overall 3–5-year survival and reduced disease-free survival.[3,5] Surgical complications are associated with increased costs,[7,8] but despite the high volume of colorectal cancer surgery this is poorly understood. A single study from the Netherlands examined the impact of complications on inpatient costs in patients undergoing resectional surgery for colorectal cancer. Their results showed a substantial increase in costs in patients with complications, particularly severe complications.[9]

In today's economic climate, understanding costs in an already stretched healthcare system is important. Accurate data on costs facilitates appropriate allocation of resources within hospitals. It can also guide the implementation and funding of quality improvement programmes that are potentially cost saving.[10] Studies have already shown how simple self-audit strategies can reduce complication rates and costs.[11–13]

The aim of this study was to define the costs associated with complications in resectional surgery for colorectal cancer.

Methods

All adult patients at Whangarei Hospital (Northland DHB) who underwent a major resectional operation for colorectal adenocarcinoma between 1 January 2011 and 31 December 2016 were identified using coding data. This was crossmatched with the colorectal cancer database to ensure accuracy. Patients who underwent palliative stoma formations/bypass procedures were excluded. Further information on the primary cohort was gathered from CONCERTO, the hospital electronic results reporting system. This included patient demographics, operative data and investigations. Data regarding complications was also gathered from CONCERTO by reviewing operation notes and discharge summaries for each patient. Complications were grouped based on the Clavien-Dindo classification.[14]

In-hospital costs were calculated from the day of admission for the initial operation/day of acute admission until day of discharge from the surgical ward. Both actual costs and DRG costs were calculated. Actual costs were calculated using in-house patient level costing, utilising CostPro software. New Zealand common costing standards were applied. DRG costs, based on DRG codes used nationally, were calculated using standard techniques.

Data was analysed using Microsoft excel. Standard statistical tools were used to present data. Comparisons between groups were made using t tests.

Health and Disability Ethics Committee opinion was sought via the HDEC scope of review process and ethical approval was deemed unnecessary.

Results

Basic demographics and outcomes

Three hundred and ninety patients underwent major resectional surgery for colorectal cancer and formed the primary cohort.

Median patient age was 71.2 years (range 31–99 years), with 57.9% males and 8.9% New Zealand Māori within the cohort. Further patient demographics and breakdown of the type of operation and mode of presentation are outlined in Tables 1 and 2.

Of the 390 patients, 107 patients had a complication (27.4%).

Table 1: Patient demographics and mode of presentation.

	Numbers (%)	Median age
Ethnicity		
NZ European	318 (81.5)	73
NZ Māori	35 (8.9)	64
Other European	33 (8.5)	71
Asian	3 (0.8)	62
Samoan	1 (0.3)	38
Gender		
Male	226 (57.9)	72
Female	164 (42.1)	72
Mode of presentation		
Acute	66 (16.9)	73
Elective	324 (83.1)	72
Curative intent		
Curative	357 (91.5)	72
Palliative	33 (8.5)	72

Table 2: Type of operation.

Type of operation	Numbers (%)
Right hemicolectomy	135 (34.6)
Left hemicolectomy	13 (3.3)
Sigmoid colectomy	15 (3.8)
Anterior resection	159 (40.8)
Hartmann's	17 (4.3)
Abdominoperineal resection	30 (7.7)
Other	21 (5.4)
Access	
Open	123 (31.5)
Laparoscopic	267 (68.5)
Acute vs elective	
Elective	323 (82.8)
Acute	67 (17.2)

Table 3: Summary of actual and DRG costs in patients with and without complications.

	COSTS					
	Actual costs (per patient)			DRG costs (per patient)		
	No complication	Complication	Difference	No complication	Complication	Difference
All	14,697	28,485	13,788 (p<0.001)	19,048	26,651	7,603 (p<0.001)
Elective	14,664	27,224	12,560 (p<0.001)	19,048	26,651	7,603 (p<0.001)
Acute	18,216	30,509	12,293 (p<0.001)	22,417	26,651	4,234 (p 0.004)

Costs

The median actual inpatient cost was $17,090 per patient and the median DRG inpatient cost was $19,785 per patient. Median actual costs and DRG costs were higher in all patients with complications compared to those without. Table 3 outlines the difference in costs between patients with and without complications overall and in acute and elective cases. Median actual costs for all elective cases was $16,246 compared to $23,148 for all acute cases (p 0.002).

In the group with complications, costs for each complication grade are outlined (Table 4).

Table 4: Cost of complications by grade.

Complication grade	N (%)	Actual cost	DRG cost
1	5 (4.7)	17,786	22,711
2	63 (58.9)	24,446	26,386
3a	2 (1.9)	37,009	26,793
3b	25 (23.4)	40,071	27,022
4	8 (7.5)	34,846	26,670
5	4 (3.7)	77,760	30,130

Discussion

This study has defined the costs associated with complications of resectional colorectal cancer surgery. Costs were significantly higher in those suffering complications, and costs increased as severity of complications increased. There was a significant discrepancy between actual and DRG costs in those patients suffering complications, which increased as complication severity increased.

Several studies have assessed the cost of colorectal surgery worldwide, including two studies in New Zealand. In common with costing of other conditions there is a wide variation between countries, with international studies showing costs of between $21,000 and $41,900 per patient.[8,9,15] In the New Zealand studies the costs were $27,000 and $18,100 per patient respectively, reassuringly similar to those seen in our study.[16,17] It is likely that the worldwide variation in costs occur due to different index costs in different healthcare economies. There are also methodological differences, especially with regard to inclusion criteria.[18] It would make sense, however, to expect that the impact of complications on costs would be similar across countries, despite these index differences.

In the few studies that have considered the effect of complications on the cost of colorectal surgery, two themes emerge. Firstly that the costs in patients with complications is over double that of patients without complications, and secondly that the cost of care increases as the severity of the complications increases.[9,19] These findings were mirrored in our study, where median cost increased by a factor of two when a complication occurred. There were also increasing costs with increasing Clavien–Dindo complication grade. Overall, costs increased as the complication grade worsened, except between grades 3b

and 4a. Grade 3b complications include those that require a return to theatre while grade 4a include those that result in organ dysfunction. Most 4a complications included patients with pulmonary emboli or myocardial infarctions. We suspect the higher costs with grade 3b complications reflect the costs associated with theatre use, while grade 4a complications did not necessarily require invasive intervention. Compared to patients without complications actuals costs went up by 1.2 times in patients with grade 1 complications and up to five times in patients with grade 5 complications. The average cost of a complication was $20,683 and a 20% reduction in all complications would lead to a saving of $4,100 per patient or $73,000 per year.

Previous Australiasian studies have also assessed the differences between actual costs and DRG costs, mainly in trauma patients.[20,21] These have shown consistently higher actual costs in the overall cohort, and higher individual costs, especially as injury severity increases. It appears from our data that in the majority of patients undergoing colorectal surgery the actual and DRG costs are similar. In those with complications, however, in all but the most minor group, the actual costs are higher, with an increasing discrepancy as complication severity increases.

The authors accept the limitations of this study. It is retrospective in nature and the numbers are relatively small. This did however allow accurate analysis of costs in all patients as well as a full notes review to obtain complication data. It is also likely that our population cohort, including complication rate, is similar to many hospitals in New Zealand. Only in-hospital costs were considered as these are most relevant to the decision-making around funding of quality improvement projects and budgeting within the hospital environment. It is possible that when all costs are included the magnitude of cost increase that occurs with a complication is lower.

Despite these limitations this remains the first study in New Zealand to consider the costs of complications in patients undergoing colorectal cancer resection. The main findings are in keeping with the international literature. It has also allowed a benchmark for use when considering quality improvement programmes. Prospective studies are needed to confirm the theoretical costs savings if complications can be reduced.

Competing interests:
Nil.

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Gestational weight gain in a multi-ethnic sample of pregnant women from Counties Manukau Health, Auckland, New Zealand

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ABSTRACT

AIM: High and low gestational weight gain (GWG) adversely affects perinatal outcomes, and impacts long-term maternal and child health. Our aim is to report i) GWG categories by 2009 Institute of Medicine guidelines in the multi-ethnic population in Counties Manukau Health, ii) demographic factors and iii) adverse perinatal outcomes associated with high and low GWG.

METHOD: Women with singleton pregnancy and weight recorded at ≤20 weeks and again in the third trimester comprised the study population. GWG categories (weight gain per week) were defined as low, normal or high. Maternal characteristics and pregnancy outcomes were compared between GWG categories.

RESULTS: Study population comprised 604 women: 39.7% Pacific, 19.9% Māori, 21.5% European. 70.5% were overweight or obese, and 65.1% lived in the highest deprivation decile areas. 70.7% had high, 16.1% had normal and 13.2% had low GWG. Pacific [OR 3.58 (95% CI 1.82, 7.03)] had increased odds of high GWG and Para 2/3^{+} had reduced odds of high GWG [OR 0.50 (95% CI 0.26, 0.99), OR 0.36 (95% CI 0.17, 0.74) respectively]. Low GWG was associated with increased SGA [OR 2.48 (95% CI 1.11, 6.44)] and with GDM [OR 2.74 (95%CI 1.06, 8.79)]. We demonstrated a linear association between GWG and birthweight with 126g (95% CI: 90g, 162g) increase per 250g increase in weekly GWG.

CONCLUSION: The majority of participants had high GWG, which is clinically relevant as this was associated with increased infant weight, with potential to perpetuate intergenerational obesity. The association between low GWG and GDM may reflect care in the GDM clinic.

High gestational weight gain (GWG) is associated with adverse pregnancy outcomes, including caesarean section, large for gestational age infants (LGA), gestational hypertension and gestational diabetes (GDM). International studies, performed predominantly in European and Asian women, report that one- to two-thirds gain excessive weight in pregnancy.[1–6] Long-term adverse outcomes associated with high GWG include obesity for the offspring and weight retention for the mother, perpetuating the inter-generational obesity cycle.[5,6] Low GWG, though less common, has been associated with pregnancy complications of spontaneous preterm birth and small for gestational age infants (SGA).[3,5]

Obesity during pregnancy has similar risks to high GWG, but abnormal GWG is an independent risk factor for pregnancy complications after adjusting for body mass index (BMI).[3,7–11] While obesity cannot be reversed during pregnancy, GWG is a modifiable risk factor. Importantly, dietary interventions can reduce pregnancy weight gain and improve pregnancy outcomes.[6,12]

There is only one previous study on pregnancy weight gain that included New Zealand women (SCOPE study).[13] In this

analysis from the SCOPE study, comprising healthy predominantly European nulliparous women, 14% of participants were from Auckland. In this study, 74% of participants had high, 17% had normal and 9% had low GWG. These results may not be generalisable to the multi-ethnic Counties Manukau setting.

The Counties Manukau Health (CMH) area in South Auckland, New Zealand serves a multi-ethnic community, where 52.4% of the maternity population lives in the most deprived deciles compared to 20% for the rest of New Zealand.[14,15] This community has very high rates of obesity with 41% of all women entering pregnancy with obesity (50% of Māori, 70% of Pacific, 26% of European and 7% of Asian/other)[14] and high rates of adverse pregnancy outcomes including stillbirth.[16] While an association has been found between high obesity rates and adverse outcomes in this community, there are no data on GWG. Such data are necessary to establish a baseline and to plan suitable interventions.

We aimed to: i) identify the proportion of women within CMH who gain weight within and outside the 2009 Institute of Medicine (IOM) Guideline ranges,[7] ii) assess demographic factors associated with GWG categories, and iii) assess adverse maternal and neonatal outcomes associated with low and high GWG.

Methods

Ethics

The Health and Disability Ethics (HDEC) NZ Online Form (nz.ethicsform.org) was completed to assess the need for full ethical review. The current study met the HDEC definition for observational research[17] and therefore did not require HDEC ethical review. Locality approval was obtained to conduct the study in Counties Manukau Health.

Study design and participants

This was a prospective observational study using data from consecutive women, booked for birth with CMH employed midwives from September 2014 to March 2016. The inclusion criteria were; a singleton pregnancy, first visit gestation ≤20 weeks confirmed by ultrasound, maternal weight recorded in hospital database at ≤20 weeks and in the third trimester. Exclusion criteria were multiple pregnancy, serious maternal medical conditions (type 1 or 2 diabetes, essential hypertension, anti-phospholipid syndrome, systemic lupus erythematosis, chronic renal disease). Data were extracted from the hospital database. Participants received antenatal care from their lead maternity care provider.

Weight and height measurements

All CMH midwifery clinics were provided with identical weighing scales (SECA 813) and stadiometers (SECA 206) to ensure standardisation during data collection. All weighing scales were calibrated by CMH clinical engineers before and during the study period. All CMH midwives were informed of the study and the use of the equipment. Women were weighed in light clothing without shoes at every antenatal clinic visit as per CMH guidelines. Height was measured in centimetres (to one decimal point) using the stadiometer with no shoes, head upright and heels flat against the wall at first visit. Weight was measured in kilograms and rounded to one decimal point. Gestation at each weight measurement was calculated based on estimated date of delivery according to dating ultrasound scan performed at ≤20 weeks' gestation.

Determining BMI and GWG

BMI was defined as weight in kg (in early pregnancy) by height at first visit in meters squared. GWG was defined as kg/week through the second and third trimesters. The 2009 IOM reference ranges for optimal GWG for maternal BMI group was used (underweight 0.44–0.58kg/week, normal weight 0.35–0.50kg/week, overweight 0.23–0.33kg/week and obese 0.17–0.27kg/week).[7] Using these ranges and the BMI category, we classified women as having low, normal or high GWG.[7]

As this was an observational study, large variation occurred in gestational age when first and later weights were measured and in the number of weight measurements. Statistical modelling was therefore used to adjust for the variation in the timing and number of the weight recordings. See specific details in statistical analysis.

Demographic characteristics and secondary maternal and infant outcomes

At the first antenatal visit demographic data were entered by the midwife into the hospital database including: age, home suburb (to generate New Zealand deprivation index—NZDep2013), parity, ethnicity, smoking status and estimated date of delivery[18] by ultrasound scan (≤20 weeks' dating scan).

Information about secondary maternal and neonatal outcomes were extracted from the hospital database. These included: gestational hypertension, pre-eclampsia, GDM, gestation at delivery, mode of delivery, infant birthweight, sex and birthweight centiles. Gestational hypertension was defined as systolic BP ≥140 or diastolic BP ≥90mmHg on at least two occasions six hours apart after 20 weeks' gestation but before onset of labour;[19] and pre-eclampsia as systolic BP ≥140 or diastolic BP ≥90mmHg on at least two occasions six hours apart (after 20 weeks but before labour) plus proteinuria defined as Protein Creatinine Ratio ≥30mg/mmol or other organ dysfunction.[19] GDM was defined as: fasting blood glucose ≥5.5mmol/L or two-hour ≥9.0mmol/L on 75g oral glucose tolerance test (OGTT) or if no OGTT as polycose ≥11.1mmol/L.[20] Customised birthweight centiles were calculated using maternal height, early pregnancy weight, parity, ethnicity as well as infant sex, birthweight and gestation at delivery using the New Zealand bulk calculator.[21] Large for gestational age was defined as birthweight >90th customised centile,[22] and small for gestational age as birthweight <10th customised centile.[22]

Statistical analysis

The sample size was calculated based on the reported counts of births in Counties Manukau by BMI category and ethnicity in 2012[14,16] to achieve an expected precision of the estimated proportion in each BMI category (normal, overweight and obese) while maintaining the expected overall distribution of main ethnic groups in the Counties Manukau population. Consecutive recruitment continued until the minimum required sample size for each ethnic group was met.

Statistical modelling for early-pregnancy weight and GWG was done using linear mixed models with individual women as random effects. This allowed modelling of how each woman gained weight across the pregnancy using all obtained weights in segments of linear weight gain (called spline models). We tested various spline models investigating different gestation points (knots) where women started gaining weight (gestation tested: 13–18 weeks) and if the weight gain rate changed in late gestation (gestation tested: 34–39 weeks). A model with knots at week 15 and 34 fitted the data best. This model identified that no significant weight gain occurred prior to 15 weeks, a linear weight gain was present between 15 and 34 weeks and a non-significant decrease in weekly weight gain occurred after 34 weeks. Using the best linear unbiased predictions (BLUPs, individualised estimates from the overall model for each individual's observations and trends) we obtained early pregnancy weight and GWG for each woman. Proportions of low and high GWG were estimated with 95% family-wide confidence intervals using Wilson's method.[23]

Multi-way multinomial logistic regression (baseline-category logit model) was used to assess which demographic factors (stepwise analysis, removal rule p-value>0.1 and addition rule p-value<0.1), including gender of infant, were associated with GWG categories. One-way analysis (Chi-squared test of independence or Fisher's exact in case of assumptions not met) was used to assess individual associations between GWG categories and maternal and neonatal outcomes. For those with a significant association (p-value <0.05) 'small sample size adjusted' odds ratios were calculated with normal weekly GWG as baseline and 95% family-wide confidence intervals. ANCOVA was used to assess if the non-categorical weekly GWG was associated with birthweight when age, BMI, smoking status, ethnicity, gender of infant, parity, deprivation status, gestation at delivery, gestational hypertension and GDM were considered. All assumptions were checked at every step in the statistical models.

Results

The study population comprised of 604 women, age ranging from 14 to 47 years.

Women of Pacific and Māori ethnicity made up 59.6% of the population (39.7% and 19.9% respectively). Multiparous women made up 66.4% of the population and 65.1 % of the population lived in the highest deprivation deciles 9 and 10. Demographics characteristics, maternal and neonatal outcomes are described in Table 1.

Table 1: Demographic characteristics and pregnancy outcomes for each IOM weekly gestational weight gain category.

Variable	N=604	Institute of Medicine (IOM) Guidelines Weight Category		
		Low (n=80)	Normal (n=97)	High (n=427)
Age (y)	28.4 (6.5)	29.0 (6.9)	29.3 (5.9)	28 (23, 33)
Height (m)	1.65 (0.07)	1.62 (1.59, 1.68)	1.63 (1.58, 169)	1.66 (0.06)
Early pregnancy weight (kg)	80.2 (64.4, 98.8)	81.8 (67.4, 109.9)	66.4 (56.0, 86.9)	82.8 (66.7, 99.7)
BMI (kg/m^2)	29.6 (24.2, 35.6)	30.2 (24.6, 38.3)	24.6 (22.1, 32.3)	30.1 (25.1, 35.8)
Ethnicity				
European	130 (21.5%)	14 (17.5%)	25 (25.8%)	91 (21.3%)
Asian	52 (8.6%)	6 (7.5%)	16 (16.5%)	30 (7.0%)
Indian	62 (10.3%)	8 (10.0%)	21 (21.6%)	33 (7.7%)
Māori	120 (19.9%)	26 (32.5%)	17 (17.5%)	77 (18.0%)
Pacific	240 (39.7%)	26 (32.5%)	18 (18.6%)	196 (45.9%)
Smokers	112 (18.8%) (n=596)	20 (25.3%)	17 (17.9%)	75 (17.8%)
Parity				
0	203 (33.6%)	15 (18.8%)	29 (29.9%)	159 (37.2%)
1	180 (29.8%)	26 (32.5%)	30 (30.9%)	124 (29.0%)
2	107 (17.7%)	12 (15.0%)	20 (20.6%)	75 (17.6%)
3+	114 (18.9%)	27 (33.8%)	18 (18.5%)	69 (16.2%)
Gestation at birth	39.3 (38.4, 40.1)	39.1 (38.3, 39.9)	39.1 (38.1, 39.9)	39.3 (38.6, 40.3)
Deprivation decile				
1–2	41 (6.8%)	5 (6.3%)	10 (10.3%)	26 (6.1%)
3–4	44 (7.3%)	2 (2.5%)	11 (11.3%)	31(7.3%)
5–6	0 (6.6%)	8 (10.0%)	6 (6.2%)	26 (6.1%)
7–8	86 (14.2%)	13 (16.3%)	21 (21.6%)	52 (12.3%)
9–10	393 (65.1%)	52 (65.0%)	49 (50.5%)	292 (68.4%)
Gender—Female	272 (45.0%)	37 (46.3%)	39 (40.2%)	196 (45.9%)
Gestational hypertension	28 (4.6%)	1 (1.3%)	4 (4.1%)	23 (5.4%)
Gestational diabetes	58 (9.9%) (n=585)	16 (20.8%)	7 (7.6%)	35 (8.4%)
Mode of delivery				
Vaginal	427 (70.7%)	62 (77.5%)	70 (72.2%)	295 (69.1%)
Elective caesarean	73 (12.1%)	11 (13.8%)	15 (15.5%)	47 (11.0%)
Emergency caesarean	104 (17.2%)	7 (8.8%)	12 (12.4%)	85 (19.9%)
Birthweight (g)	3,453 (558)	3,256 (477.3)	3,340 (2,950, 3,680)	3,527 (550.4)

Continuous data are mean (SD), median (25th–75th IQR) as appropriate.
Categorical data are count (%).

Table 2: Multinomial regression analysis of demographics associated with Institute of Medicine (IOM) Guidelines for Gestational Weight Gain (GWG) Category.

Variable	Level	Odds ratios (95% CI): normal GWG as referent	
		Low GWG	High GWG
Ethnicity	European	Referent	Referent
	Asian	0.66 (0.21; 2.08)	0.48 (0.22; 1.03)
	Indian	0.71 (0.25; 2.06)	0.37 (0.18; 0.76)*
	Māori	2.61 (1.05; 6.46)*	1.4 (0.69; 2.82)
	Pacific	2.43 (0.98; 6.02)	3.58 (1.82; 7.03)*
Parity	0	Referent	Referent
	1	1.72 (0.75; 3.95)	0.76 (0.42; 1.37)
	2	0.96 (0.36; 2.53)	0.50 (0.26; 0.99)*
	+3	1.77 (0.71; 4.45)	0.36 (0.17;0.74)*

Odds ratios (95%CI) are from a model which includes ethnicity and parity as explanatory variables.
*Confidence interval does not include 1.00.

Of the 604 women, 529 (87.6%) had weights recorded four times in the pregnancy, 47 (7.8%) had three and 28 (4.6%) had two weights recorded. First weight was recorded between 6.3 and 20.0 weeks of gestation (median 14.7 weeks) and the last weight was measured between 26.0 and 41.7 weeks of gestation (median 37.6). After modelling, the estimated early pregnancy BMI ranged from 14.8 to 55.3 (median 29.6) with 18 (3.0 %) participants being underweight, 160 (26.5%) normal weight, 135 (22.4%) overweight and 291 (48.2%) obese.

The estimated mean weekly GWG between 15 and 34 weeks' gestation was 0.51kg per week (95% confidence interval: 0.49, 0.53kg/week. According to the IOM GWG categories 13.2% (95% CI: 10.5, 16.6%) had low, 16.1% (95%CI: 13.3, 19.2%) had normal and 70.7% (95% CI: 66.4, 74.7%) had high GWG.

The multi-way multinomial regression analysis of demographic characteristics showed that only ethnicity (p<0.0001) and parity (p=0.0003) remained significantly associated with GWG categories. Māori women had higher odds of low GWG [OR 2.61, (95% CI: 1.05, 6.46)], Pacific women had increased odds of high GWG [OR 3.58, (95% CI: 1.82, 7.03)] and Indian women lower odds of high GWG [OR 0.37, (95% CI 0.18, 0.76)] than European. While women with one previous child did not differ from nulliparous women, those with two or more previous children had reduced odds for high GWG compared with nulliparous women (see Table 2). After adjustment for ethnicity and parity, age, smoking status, gender of the infant, deprivation category and BMI were no longer associated with GWG categories (p-values >0.10).

In the one-way analyses low GWG was associated with gestational diabetes (p-value=0.0028) and SGA infants (p-value 0.0007), (see Table 3). The effect of increased SGA in women with low GWG persisted in the sensitivity analysis after excluding GDM. The GWG categories were marginally associated with mode of delivery (p-value 0.0700) and early gestation at delivery <37/40 (p-value 0.0515).

In ANCOVA analysis, non-categorised weekly GWG remained associated (p<0.0001) with birthweight when adjusted for maternal age, BMI, smoking status, ethnicity, infant sex, parity, deprivation status, gestation at delivery, gestational hypertension and GDM. The birthweight increased by 126g (95% CI: 90–162) for each 250g increase in weekly GWG.

Discussion

This is the first study to report GWG in a multi-ethnic population comprising of a large proportion of Māori and Pacific women with high rates of overweight and obesity in early pregnancy. The majority of participants (70.7%) had high weekly GWG, similar to the 74.3% reported in the previous study of predominantly white New Zealand nulliparous women.[13] Our rate of high GWG

Table 3: Results of one-way analysis looking at Institute of Medicine (IOM) Guidelines for Gestational Weight Gain (GWG) Categories association with pregnancy outcomes where p-value<0.05.

Variable	Level	IOM weekly GWG category			Odds ratio (95% CI)	
		Normal	Low	High	Low vs Normal	High vs Normal
Gestational diabetes	No	85	61	381	Referent	Referent
	Yes	7	16	35	2.74 (1.06; 8.79)*	0.97 (0.41; 2.72)
Size for gestational age	AGA	77	54	315	Referent	Referent
	SGA	12	23	55	2.48 (1.11; 6.44)*	1.03 (0.51; 2.33)
	LGA	8	3	57	0.47 (0.13; 2.57)	1.54 (0.70; 3.97)

Counts and small-sample size adjusted odds ratios with Bonferroni correction confidence interval to keep 95% confidence for each variable.
Normal GWG is referent group.
*Confidence interval does not include 1.00

is in-keeping with other studies showing that overweight and obese women have elevated risk of high GWG.[7,13,24] In our study 13.2% had low GWG, lower than the 23% reported in a recent systematic review where the included trials were conducted in the US, Europe and Asia.[3]

Consistent with previous reports,[25,26] we found ethnicity to be significantly associated with GWG. We found that when compared with European, Pacific women had higher odds of high GWG (OR 3.58 (95% CI 1.82, 7.03), Indian women had lower odds of high GWG (OR 0.37 (95%CI 0.18, 0.76) and Māori had higher odds of low GWG (OR 2.61 (95% CI 1.05, 6.46). The explanation for these findings requires further investigation but the elevated odds of high GWG in Pacific is important information for maternity care providers as high GWG is associated with short- and long-term health complications in women and their children.[1–6]

In our population; women who were para 2, 3 or more had reduced odds of high GWG compared with nulliparous women. A recent systematic review and meta-analysis, reported that the relationship between parity and GWG categories was inconsistent, with studies showing both positive and negative associations, suggesting that this relationship may vary by geographic location.[27]

Consistent with a recent systematic review,[3] we found increased odds for SGA infants [OR 2.48, (95%CI 1.06, 8.79)] in women with low GWG. Gaining an optimal amount of weight is a strategy with potential to reduce the prevalence of SGA. Consistent with findings from a Chinese study,[28] we found that low total GWG was associated with increased odds for GDM [OR 2.74 (95% CI 1.06, 8.79)]. We, and the Chinese authors, speculate that this association may reflect care in the GDM service where women are encouraged to limit weight gain after GDM diagnosis. Other publications have reported that high GWG in early pregnancy and prior to testing for GDM are associated with increased GDM.[2,29] We were not able to investigate the relationship with early GWG and GDM in our study.

We found a borderline association between mode of delivery (p-value 0.0700) and GWG categories. The increasing percentage of emergency caesarean section across GWG categories and decreasing percentage of vaginal births from low to high GWG categories, although not statistically significant in our study, is consistent with findings in the systematic review.[3]

Of concern, we also demonstrated a linear relationship between increasing GWG and increasing birthweight, which could contribute to the elevated risk of childhood obesity in the Counties Manukau community.[30] This finding is consistent with another study[31] that also reported that GWG had a linear association with birthweight, and the more frequently reported association of low GWG with SGA and high GWG with LGA infants.[3]

The strengths of this study include the prospective design allowing the use of standardised weighing scales and stadiometer to measure height and weight. The observa-

tional design allowed data from all women attending the clinic to be incorporated in the study, with the distribution of ethnicity and deprivation decile in our study being comparable to that for this area.[14] While the observational study design increased the variation in the number of weights measured and the gestation at measurement, we used statistical modelling to minimise any potential bias caused by this variation. The consistency of our findings with other studies suggests that bias is likely to have been minimised in our study.

The study provides the first data on GWG in Pacific and Māori women who are over-represented in adverse pregnancy outcome statistics in New Zealand. A limitation is that we were underpowered to investigate the relationship between GWG and less common adverse pregnancy outcomes.

Multiple studies of dietary and/or physical activity interventions have been undertaken to try to limit excessive gestational weight gain. Recent meta-analyses have shown modest reductions in gestational weight gain with dietary and/or physical activity interventions in pregnancy, however the large majority of participants in these meta-analyses were European.[6,12] The Healthy Mums and Babies (HUMBA) Study, a randomised trial of a culturally tailored dietary intervention provided by community health workers, was recently completed in the Counties Manukau DHB among a multiethnic population with obesity.[32] Pregnant women who received the dietary intervention had 1.8kg lower total GWG compared with those who received routine dietary advice. Ongoing follow-up will determine whether this modest reduction in pregnancy weight gain impacts on longer-term health in the mothers and babies.[33]

Conclusion

The majority of women in this multiethnic high deprivation sample gained an excessive amount of weight during pregnancy. Pregnancy weight gain was positively associated with birthweight and may contribute to the high rates of childhood obesity in this community. The demographic factors associated with abnormal GWG provide information about where resources aimed to optimise GWG could be directed.

Competing interests:
Nil.

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Sun protection policies and practices in New Zealand primary schools

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ABSTRACT

AIM: To assess sun protection policies and practices in New Zealand primary schools.

METHODS: Principals at 1,243 schools (62% of eligible primary schools) completed a survey about school: 1) provision of personal and environmental sun protection, 2) sun protection practices.

RESULTS: Virtually all schools (94%) had a sun protection policy/procedure about which their community was informed (96%). Nearly three-quarters (72%) allowed only sun-protective hats, 28% allowed caps. Almost all schools either enforced or encouraged student hat wearing outdoors. Three-quarters of schools encouraged students to wear broad-spectrum sunscreen of at least SPF30 and most (93%) provided sunscreen at least some of the time. Three-quarters of schools (74%) had at least sufficient shade for passive activities like eating lunch.

CONCLUSIONS: A substantial improvement in sun protection in primary school settings was observed since a previous survey, but sun protection remains inadequate in many schools and vulnerable students throughout New Zealand deserve equitable protection. Skin cancer is New Zealand's most common cancer, but also highly preventable, yet primary prevention in school settings is not resourced from public funds. Appropriate school sun protection policies and practices can potentially reduce students' exposure to excessive UVR and ultimately reduce skin cancer risk.

In New Zealand, skin cancer is by far the most common cancer type[1] with nearly 500 deaths annually.[2] New Zealand also has the highest incidence rate for cutaneous malignant melanoma, the most deadly of the skin cancers.[3] The burden on the public health system is considerable.[1] Yet, we know the main potentially modifiable cause of skin cancer, and that the risk of developing it can be mitigated by reducing exposure to ultraviolet radiation (UVR).[4] Exposure to excessive UVR during childhood is associated with an increased risk of skin cancers later in life.[5] Reducing sun exposure and encouraging sun protective behaviour while at school can potentially mitigate lifetime skin cancer risk. Schools can play an important role in educating about risk and protective practices as well as implementing policies which will help to protect students and staff from UVR damage.[6]

The New Zealand Cancer Society SunSmart Accreditation Programme (SSAP) is available free to schools that enrol and comply with 12 sun protection criteria recommended by the World Health Organization and is based on scientific evidence of effective strategies for skin cancer prevention.[7] The US-based Community Preventive Services Task Force has concluded that there is strong evidence of effectiveness of this type of primary school-based intervention.[8] The SSAP encourages schools to provide a sun protective environment and implement curriculum and policies designed to encourage students and staff to develop positive sun safety behaviours. There is no public funding for the provision of shade or other sun protective resources in schools. However, the Board of Trustees is required "to provide a safe physical and emotional environment for students; and comply in

full with any legislation currently in force or that may be developed to ensure the safety of students and employees".[9]

The purpose of this paper is to report the findings from a nationwide survey of primary school principals (from both SunSmart accredited and non-accredited schools) on their schools' sun protection policies and practices.

Methods

The Ministry of Education's Website[10] was used to identify every school delivering education in English to primary age students. Information available included: school name, website, name of principal, contact details, type of school (eg, full primary), location (eg, rural), gender of students (eg, co-educational) and socioeconomic decile rating (a school with a decile rating of 1 receives more Government funding than a school with a decile 10), as well as the proportion of students in each of the five New Zealand Census major ethnic groups attending the school.

In the first instance, the survey was promoted to principals using the Ministry of Education fortnightly email distribution network. Then, each principal was invited to participate in an electronic survey on their school's sun protection policies and practices. A personalised invitation letter, including a URL link and password, information sheet and letter of support from the Cancer Society was posted (15 April 2017). Schools for which the survey had not been completed were sent a reminder email (10 May), followed by a reminder telephone call (starting 16 May) and final email reminder (3 June). School principals were encouraged to complete the survey themselves, but were able to nominate another person at the school to do it on their behalf. Data collection was closed off on 31 July 2017. As a token of appreciation for participation, there were six random draws for one-litre containers of sunscreen. Feedback summarising the survey findings was emailed to respondents in November 2017.

Questionnaire

The survey instrument was developed collaboratively with Cancer Society staff. Most of the questions were based on items in previous surveys.[11] The survey instrument was piloted, with one school principal and several Cancer Society health promotion staff. The questions included each of the 12 sun protection measures that form part of SSAP. In order to reduce possible response bias, response categories were randomly ordered where this was practical. The questionnaire was delivered electronically online, using Lime survey software.[12]

Data analysis

Most of the survey instrument consisted of fixed response questions. In some instances, there was an 'other' option for respondents who felt that the response categories provided did not adequately capture the situation of their school or their point of view. The responses to open-ended questions were collated into common 'themes' and reported numerically. Data collation and statistical analysis was conducted using SPSS.[13]

Ethics

Ethical approval was obtained from the University of Otago ethics committee (D17/045) and Māori consultation undertaken with the Ngāi Tahu Research Consultation Committee.

Results

Of the 2,013 schools invited, 62% (n=1,243) participated, which represents 322,272 students or 62% of the total primary school population. The schools that responded to the survey represent 'all schools' well in terms of school socioeconomic decile rating, type, size and geographic region (Cancer Society Division). Schools that were SunSmart accredited and/or had a higher decile rating were slightly over-represented in the final cohort (42% nationwide compared with 45% of respondent schools). The average time taken to complete the survey was 13 minutes.

The majority of respondents (76%) were senior managers at the school, followed by administrative (16%) or teaching staff (8%). Half of the schools responding (50%) were full primary, 39% were contributing, 6% were composite and the remaining 5% were intermediate schools.

More than 90% of respondents reported that their school had either a sun protection policy (57%) or procedure (37%). Of the remaining schools, most respondents were either unsure whether or not there was a

sun protection policy/procedure in place, or reported that sun protection was included in another policy (usually Health and Safety). For virtually all schools the policy/procedure was implemented in Terms 1 and 4. A small proportion of schools also implemented the policy or procedure in Terms 2 and 3 (9% and 8% respectively). Approximately half of these schools were in the upper half of the North Island where ultraviolet index (UVI) levels are above 3 (the level at which sun protection is recommended) for a longer period of time.

For schools with a policy, most informed staff (99%), parents/caregivers (96%) and students (96%) about the sun protection policy or procedure. Over 90% of respondents reported that their school reviewed the sun protection policy/procedure at least triennially.

Respondents were asked which types of hats students were permitted to wear—the most commonly reported were broad-brimmed (78%) or bucket hats (73%). In total, 72% allowed **only** appropriate sun-protective hats to be worn. Some schools noted that resourcing for specific types of hats could be-challenging for low decile schools. Nearly one-third of schools (28%) allowed non sun-protective caps to be worn. In some schools, particular types of sun protective hat were mandated as part of the school uniform.

With the exception of one school, all schools either enforced (90%) or encouraged (10%) students to wear a hat when outdoors. For those schools that enforced sun-protective hats, the consequences of not wearing a hat were that: children had to play in the shade (88%), wear a school 'spare-hat' (40%) or play indoors (14%). Overall, over 74% of respondents reported that most students (at least 70%) wore a sun-protective hat during all outdoor activity.

Two-thirds of respondents (68%) reported that their school had a school uniform, and in most cases this was compulsory. For the purposes of this project, a sun-protective uniform was designated to be one that included a collar and sleeves to, at least, mid upper arm (eg, polo shirt). Overall, in 76% of schools, students were wearing/encouraged to wear clothing that was sun-protective. In terms of clothing worn during sports or outdoor events, nearly two-thirds of schools (61%) reported that they did not have a PE uniform. During athletic sports, nearly two-thirds of schools (63%) encouraged the use of sun protective clothing.

Three quarters (75%) of respondents reported that their school encouraged students to use sunscreen. Most schools (93%) provided students with sunscreen at least some of the time and nearly half of schools encourage parents to provide sunscreen (45%). For schools that provided sunscreen, 82% provided it for school outings, 71% had it available in most classrooms, and 60% had it available at other points around the school. During athletic sports, most schools (86%) had sunscreen available for student use. Contrary to Cancer Society recommendations, over half of schools (59%) were encouraging parents to apply sunscreen to children before they leave home for school.

The majority of schools had sufficient shade for passive activities like eating lunch (60%), but fewer had sufficient shade for active pursuits (eg, playground) (14%). In total, 43% of respondents reported that their school had plans to increase shade in the next 12 months (17%) to five years (26%). About one-fifth of schools (21%) were not planning to increase shade because of funding constraints, and 10% because it was not considered to be a priority area. About one-quarter of schools (22%) said they had no plans to increase shade as they already had a sufficient amount. A few schools noted concerns regarding resourcing the provision of shade and the experience of environmental conditions or weather events and the issue of ongoing maintenance and repair.

Less than one-third of respondents (28%) reported that their school attempted to minimise time spent outdoors between 10am and 4pm. The most common strategies for minimising time in the sun were to eat lunch in shady areas (86%) and to hold assemblies either indoors or before 10am (82%).

The behaviour most encouraged for staff was the use of a sun protective hat, which the majority of schools either required (58%) or recommended (36%). Other sun protection behaviours (such as sun protective clothing or use of sunscreen) tended to be recommended rather than required.

As part of the curriculum for all year groups every year, 41% of respondents reported that staff at their school taught about when sun protection is needed and why. Of the remaining schools, most (31%) taught sun protection once or twice during a child's primary school education.

Two-thirds of schools (66%) always included sun protection in their Risk Management Systems for Education outside the classroom (EOTC) activities. A further 32% reported that sun protection was considered in these situations, but not formalised. Only 20 (3%) respondents said that sun protection was not considered.

In total, 92% of schools had school swimming. Of these schools, 62% conducted swimming at an outdoor venue (mostly (83%) on site). Only a small proportion of schools with outdoor swimming (19%) displayed SunSmart posters or boards to remind people of the need for SunSmart behaviours.

All the schools held athletic sports, generally in the summer months. For non-competing students, most schools encouraged students to use sun protective hats and shade (86%). While competing, most schools encouraged students to use sun protective hats (89%) and most encouraged sunscreen use (86%). Only one-third of venues had plenty of shade available for students.

Most schools implemented sun protection practices in Term 1 and Term 4 rather than relying on the level of UVR on a particular day. A small percentage of schools were incorrectly using temperature/sunny day (16% each) to determine when sun protection was needed.

Discussion

This nationwide survey of all New Zealand primary school principals shows that there has been a substantial improvement in sun protection in a primary school setting over time.[14] Since 2009 a number of key sun protection items have improved, including having a sun protection policy/practice (58% in 2009 compared to 94% in 2017), required use of a sun protective hat (74% compared to 88%), and encouragement of students to wear sun protective clothing (42% compared to 75%).[14] Despite this improvement, sun protection remains inadequate in many schools and all vulnerable students throughout New Zealand deserve to receive equitable protection.

Having a school policy in place is critical, as it informs staff, Board of Trustee members and parents entering the school of the importance of the expectations of the school community regarding sun protection. In Australia, schools with a sun protection policy report better sun protective practices than those without.[15] Almost all New Zealand schools (94%) reported having a sun protection policy/procedure. This is similar to the 91% reported in Queensland.[16] As sun protection procedural guidelines incorporated into health and safety policies are counted as meeting accreditation criteria, they were likewise counted as complying with the policy criterion. In this context, it is worth noting that many schools are now using SchoolDocs, a commercial organisation that provides modifiable documents to schools, to help develop and manage all of their policy documentation. In line with Education Review Office (ERO) requirements, most schools review their documents at least triennially and notify their community of the sun protection policy. In Australia, recently introduced Education Department rules now require a sun protection policy in all public schools.[17] However, having a policy does not necessarily mean that the policy is comprehensive.[18]

Most schools enforced (90%) hat wearing, with the consequences of not having a hat being to 'play in the shade' (88%) or wear a school 'spare' hat (40%). Nearly three-quarters (72%) of schools allowed only sun protective hats. Unfortunately, the remaining schools allowed caps to be worn, and these do not adequately protect much of the face or neck, which are common areas for skin cancers to develop.[19] The ultraviolet protective factor of sun protective hats is double that of caps.[20] A number of reasons were provided to explain why schools were not complying with the recommended criteria. First, there was a view that any hat was better than no hat. Second, principals reported that students didn't like to wear fully sun protective hats and found caps more acceptable. Third, the provision of sun protective hats was financially challenging, particularly for families

of students attending low decile schools. A particular concern was that some schools required students in Years 1 to 6 to wear a sun protective hat, but then permitted a cap to be worn in Years 7 and 8. Unfortunately, this was likely to be viewed by students as a 'badge of honour' for having reached the senior school and, therefore, become an aspirational goal for junior students. On a positive note, three-quarters of respondents reported that, when they observed students, at least 75% would be wearing a sun protective hat in the playground during any of the break periods or during sports events or outings. However, it is important to remember that these are self-reported results. In Queensland, an observation study of hat use in primary schools found only about half of students were wearing hats of any description.[21] Similarly in a small observational study of New Zealand school children, only 21.3% were wearing sun protective hats.[22]

When used as recommended, and in conjunction with other means of sun protection, sunscreen can be an important tool in reducing exposure of the skin to UVR and the development of skin cancers.[23,24] Three-quarters of schools reported that they encouraged students to use broad-spectrum SP30+ sunscreen. Almost all schools (93%) provided students with sunscreen—at least some of time. This was largely for school outings (82%) or in individual classrooms (71%). Unfortunately, and contrary to Cancer Society recommendations, over half of schools (59%) encouraged parents to apply sunscreen to children before they leave home. This can be an opportunity, before the UVI reaches 3, for relatively safe endogenous vitamin D production, particularly if students are walking to school. There is also a risk that students will not reapply sunscreen to protect themselves around the middle of the day when the risk of sun damage is greatest.

Shade, either built or from natural sources such as trees, can provide substantial sun protection benefits and reduce UVR exposure,[25] not only for current but also future student cohorts. Environmental shade provision means that an individual may not need to make a choice about whether or not they use personal sun protection strategies. It can, however, be costly and financially challenging for schools to provide. Unfortunately, with the exception of new buildings, the Ministry of Education does not provide any funding for the provision of shade in schools, although it does fall under their remit of providing a safe and healthy environment for students and staff.[26] Only 14% of schools had sufficient shade for both passive pursuits and active activities. Almost all schools (94%) required their students either to eat lunch in a shady area (86%) or indoors (20%).

The wearing of sun protective clothing can provide a physical barrier that substantially reduces the amount of UVR reaching the skin. School uniforms, when they meet sun protective guidelines and are worn correctly, provide an excellent opportunity to reduce excessive UVR while at school. The use of uniforms can mean that all students are similarly protected without each family or individual needing to make decisions about sun protective clothing practices. Over two-thirds of schools had a school uniform which was, largely, sun protective. Most commonly this included a collared polo shirt with mid-arm length sleeves or a collared shirt. Without specific testing, it can be difficult to reliably assess the extent to which a school uniform is sun protective, since even small alterations, such as the length of a sleeve, can potentially affect subsequent skin cancer risk, as can the colour and weave of the fabric.[27] Based on reports of school uniform sleeve length and collar, at 75% of schools, overall, students were either wearing a sun protective uniform or were encouraged to wear sun protective clothing. In Australia, school uniforms for primary students are usually compulsory.[27]

Parental role modelling has been demonstrated as an important factor for reducing sunburn in children.[28] Likewise, teachers can encourage and reinforce appropriate sun protective behaviours in students. Most schools either required or recommended that staff should role model appropriate sun protective behaviours. One school noted the difficulties of dealing with all-day events and getting parents to also role model appropriate behaviour. For staff, it is possible that health and safety employment requirements could be used to achieve compliance.

Teachers can be exposed to high levels of ambient UVR during lunch time breaks and outdoor events.[29]

Less than one-third of schools were reported as rescheduling events outside the 10am to 4pm period when the UVI mostly exceeds 3 during Terms 1 and 4. This criterion may be impractical on a day-to-day basis, as it incorporates much of the school day and essential classroom activities, such as reading and writing, which are often scheduled for that first hour at school when students tend to be most alert and receptive. However, in the case of events such as swimming sports, it may be possible to schedule outdoor activities to later in the day or in the evening. This may have added benefit because it can allow working parents to attend. Rescheduling of outdoor events outside peak UVR is also not a standard practice in Queensland primary schools where, between 4.9% and 22% of schools included this in their sun protection policy. Similarly in the US, 15% of all schools reschedule activities outside times of peak UVR.[30]

Nearly two-thirds of schools did not have a PE uniform, so that the clothing worn during PE was not prescribed and sun protection could not be ensured. Protection is particularly important during all day events as students can be exposed to high UV levels for extended periods. Of the 92% of schools that had school swimming, 62% held this at an outdoor pool—a potentially particularly risky environment, given UVR reflection off water, a lack of shade and the wearing of clothing that may not be sun protective. Although some schools were reported to require the wearing of rash tops or provision of shade sails, we did not specifically ask about these. Almost all schools held an athletics sports day, generally in summer months when children can be exposed to high levels of UVR for extended periods, making sun protection critical. Also, sports clothing may provide less protection than ordinary daily clothing. The wearing of a sun protective hat while competing in many sports may be impractical. In high UVR contexts, when it may impractical to use clothing and hats for protection from the sun, the correct application and re-application of adequate amounts of sunscreen, the provision of shade or timing of the event is critical in reducing student exposure to excessive UVR. Nearly two-thirds (66%) of schools always included sun protection in their Risk Management Systems for EOTC activities. The remaining schools reported either that it was considered but not formalised (32%), or not considered at all (3%).

It is important not only that students should be instructed in the need to use sun protection, but also educated about the reasons why it is necessary. In this way they would be protected during the period of their lives while they are at school, and develop knowledge that would serve to help them protect themselves throughout life. It is particularly relevant that students understand about New Zealand's geographical position and why such high UVI levels can be experienced. There are opportunities to link this into the science curriculum, and some of these opportunities are covered in the curriculum resources developed by the Cancer Society in collaboration with educationalists familiar with the requirements of the New Zealand primary and intermediate school curriculum. Less than half of schools (41%) of schools reported they taught sun protection as part of the curriculum every year, but nearly three-quarters of schools (72%) reported that they taught it at least once during the primary school years. Many schools commented that although sun protection was not taught formally every year, it was covered regularly in assemblies or before outdoor events. Sun protection is only one of other equally important health and safety topics (such as Water Safety and Fire Safety) vying for space in the classroom. It is worth noting that in Australia, SunSmart resources are now available in an interactive format,[31] which is likely to be attractive to both staff and students.

There are some potential limitations of this study. First, the findings are based entirely on respondents' self-reports because we were unable to carry out direct observation in order to verify the selected survey responses about sun protection practices at participating schools. It could be expected that this method may inflate positive results, and other comparisons between self-report and observation tend to

support that conclusion,[32] so actual levels of protection in schools, overall, may be lower than reported.

Secondly, the response rate of 62%, although relatively high for such a survey, may have produced responses that are not representative of the national population of all schools attended by primary age students. However, the likelihood that this occurred is reduced, as a comparison between responding schools and all schools found no significant differences according to their socioeconomic characteristics recorded in the Ministry of Education database.

Conclusions

A substantial improvement in sun protection in primary school settings was observed since a previous survey, but sun protection remains inadequate in many schools and vulnerable students throughout New Zealand deserve equitable protection. Skin cancer is New Zealand's most common cancer, but also highly preventable, yet primary prevention in school settings is not resourced from public funds. Appropriate school sun protection policies and practices can potentially reduce students' exposure to excessive UVR and ultimately reduce skin cancer risk.

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Inclusion of a molecular marker of bladder cancer in a clinical pathway for investigation of haematuria may reduce the need for cystoscopy

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ABSTRACT

AIM: To examine prospectively the impact of adding a urinary biomarker of bladder cancer (Cxbladder Triage™, CxbT) to a clinical pathway for investigating haematuria.

METHODS: The clinical outcome of 571 patients with haematuria who presented to their general practitioner was reviewed. Outcome measurements included the findings of laboratory tests, imaging, cystoscopies, histology and specialist assessments. The data were used to model a theoretical clinical pathway that involved initial screening using CxbT in combination with imaging, and only test positive patients being referred for specialist assessment and cystoscopy.

RESULTS: All patients underwent cystoscopy and 44 transitional cell carcinomas were diagnosed in the study cohort, with two low-risk cancers missed by CxbT, one of which was also not detected by imaging. When combined, imaging and CxbT had a sensitivity of 97.7% and negative predictive value of 99.8%.

CONCLUSIONS: In our series, all significant bladder cancers were diagnosed by imaging and CxbT before cystoscopy was undertaken. The high negative predictive value of this clinical pathway would allow approximately one-third of patients with haematuria to be managed without cystoscopy.

The causes of asymptomatic haematuria are numerous. As such the investigating algorithm for haematuria is composed of a number of tests. Approximately 600 patients are accepted each year to the Canterbury District Health Board (DHB) Urology Department for evaluation of haematuria. All referrals are accepted if they have laboratory confirmation of haematuria and the investigations completed.

One of the most common important causes of haematuria is bladder cancer. While a number of these are detected on imaging, the 'gold standard' for diagnosing bladder cancer is cystoscopy.[1] While generally well-tolerated by patients, flexible cystoscopy is uncomfortable and may have adverse post-procedural consequences.[2,3] Anecdotally, it is the test in the haematuria algorithm least cherished by patients and also necessitates patients seeing a specialist urologist. If it were safe not to undertake cystoscopy in a group of patients presenting with haematuria, then their work-up could potentially be completed by clinicians other than a urologist, such as a general practitioner (GP).

The need to improve risk stratification of patients who may require cystoscopy and imaging was emphasised in a recent review of guidelines for assessing microhaematuria.[4] Numerous biomarkers have been identified in urine or blood samples that

have the potential to detect and monitor bladder cancers.[5–9] Current trends have moved towards measuring the expression of microRNAs (miRNAs), small non-coding RNAs that regulate genes involved in cancer development, progression and metastasis.[10–12] While incorporating multiparametric assays of miRNAs in algorithms may improve diagnostic accuracy suitable for clinical application,[13] there remain concerns regarding the ability of these assays to detect low-grade tumours and their relatively high rate of false positive results.[6,14,15] To date, no biomarker or combination of biomarkers has sufficient validation to serve as a reliable alternative to cystoscopy for detecting bladder malignancies.

Cxbladder Triage™ (CxbT) measures the expression of five urinary miRNA biomarkers (CDC2, MDK, IGFBP5, HOXA-13 and CXCR2) using the reverse transcriptase quantitative polymerase chain reaction (RT-qPCR) method.[16,17] The expression levels when combined with four phenotypic factors (age, sex, smoking status and haematuria frequency) are used to calculate a segregation index that identifies patients with a low risk of having an invasive transitional cell carcinoma (TCC).[17–19] Using a previously validated cut-off value of <4.0,[17] the segregation index has been reported to have a sensitivity of 96% and a negative predictive value (NPV) of 97%, with the potential to reduce the number of flexible cystoscopies in patients investigated for haematuria by approximately 40%.[20,21] Red blood cells (<10^5 cells/ml of urine) and haemolysis (ie, visible haematuria) have no effect on the assay, although a marked inflammatory response is known to interfere with the measurements [Personal communication, Pacific Edge Ltd, Dunedin New Zealand].

Prior to April 2016, GPs investigated patients with haematuria according to a clinical pathway on a local clinical guidance website https://www.healthpathwayscommunity.org/Home.aspx. In that pathway, all patients received MSU urinalysis, culture and microscopy, urine cytology, imaging (ultrasound of the renal tract or computed tomography [CT-IVU]), cystoscopy and specialist opinion. Microhaematuria was investigated using ultrasound and macrohaematuria by CT-IVU, except in patients aged <40 years or >85 years who underwent ultrasound regardless of the type of haematuria. This stratification of patients was based on prior local assessment of 2,436 patients treated at a haematuria clinic.

From April 2016 onwards the CxbT test was added to the laboratory assessment section of the clinical pathway. All patients referred by their GP for public or private urological assessment of haematuria from this time until May 2017 were included in a review of the addition of CxbT. Investigations were otherwise identical to those used before the addition of CxbT. The data were then used to design and evaluate a theoretical pathway that would have the potential to safely reduce the number of patients requiring a cystoscopy.

This paper summarises our review and evaluation of adding CxbT to the laboratory testing section of a clinical pathway used to investigate patients with haematuria.

Patients and methods

Study design

The work was carried out in the Canterbury region of New Zealand. The addition of CxbT to the routine investigation of haematuria was carried out following consensus between local clinicians. No other change to clinical practice was made and there was no randomisation or control group.The Health and Disability Ethics Committee, Ministry of Health, New Zealand advised that the review did not require ethical approval, as it constituted monitoring and improvement of usual patient care carried out by the Canterbury DHB.

The prevalence of bladder cancer in patients with microhaematuria has been reported to be 2–4%[22] and in those with macrohaematuria between 8–14%.[18,23] Based on these findings and assuming a 10% prevalence of bladder cancer, inclusion of at least 500 patients in the review would provide sufficient statistical power to allow precise estimates of both the sensitivity and negative predictive value (NPV) for CxbT alone and in combination with the clinical pathway. The exact 95% confidence interval (CI) for sensitivity would be 83.5–98.7%, and for 98% NPV the exact 95% CI would be 93.8–99.3%. The review was therefore carried out over a 13-month period to obtain the required number of patients.

Patients

The clinical outcomes of 571 patients investigated for haematuria by their GP were reviewed. Four hundred and seventy-eight patients were referred for urological assessment, 73 were managed solely by their GP and did not proceed to cystoscopy, while 20 were excluded from the final analysis, 10 because of sampling or assay problems with CxbT (high levels of inflammatory markers n=4, inadequate sample volume n=4, expired sample tube n=1 and excessive blood in sample n=1), and 10 for other reasons (non-attendance at urologist appointment n=6, and incomplete clinical data n=4).

Collection of the urine samples for the Cxbladder Triage™ assay

A single mid-stream urine sample for the CxbT assay was collected from each patient, preferably from the second void of the day. A 4.5ml aliquot of this sample was transferred immediately to a stabilisation liquid via vacuum-driven aspiration, followed by storage at 4°C until assayed as described previously.[18]

Data collection

Data was collected in a non-blinded manner and included clinical and demographic characteristics of the patients and the findings of laboratory tests, imaging, cystoscopies, histology and specialist assessment. A cystoscopy and histology were required for diagnosis of bladder cancer. Patients not referred for specialist urological assessment (n=73) were followed-up by review of their medical records for at least two years to ensure that no bladder malignancy had been missed.

Statistical analysis

The diagnostic accuracy of CxbT was evaluated by calculation of sensitivity, specificity, NPV and likelihood ratio. Continuous data in the referred and non-referred patients were compared using Welch's unpaired t test and the distribution of categorical data in the two groups compared using Chi square and Fisher's exact tests where appropriate. A p value ≤0.05 was considered statistically significant.

Design and evaluation of theoretical pathway

Patients were only included in the analysis and subsequent modeling of a theoretical pathway if they had been referred to a urologist. A pathway was developed that did not include cytology in the laboratory tests, and only referred patients for secondary urological assessment and cystoscopy if the CxbT index or imaging was positive. The sensitivity, specificity and NPV of this theoretical pathway to detect bladder cancer using a CxbT segregation index cut-off value of <4.0[17] was calculated as the test alone, and within the context of the pathway.

Results

The clinical and demographic characteristics, results of the laboratory and imaging investigations and diagnoses of the 478 patients referred for urological assessment and the 73 patients managed solely by their GP are summarised in Table 1. All the patients lived in the funded area of the Canterbury District Health Board, and were predominantly middle-aged or older, with two-thirds being male. Approximately 50% of the referred patients were classified as having an increased risk for bladder cancer because of their smoking history (n=230) or having previously received radiation therapy of the pelvis (n=8). In comparison, only 26% of the non-referred patients were at increased risk, solely because of their smoking history. The proportion of patients with macrohaematuria was significantly higher in the referred patients than in those who were not referred (70% vs 44%). The mean CxbT score in the two groups was not significantly different, although the results indicated 69% of the referred patients required further investigation compared to 33% of the non-referred patients.

Detection of bladder cancers

The number of bladder cancers detected by the clinical pathway with imaging and CxbT, CxbT alone, or urine cytology alone in the referred patients is shown in Table 2. Forty-four patients were diagnosed with a TCC, with two of these lesions being missed by CxbT, giving the test a sensitivity of 95.5% (95% CI 84.5–99.4) and NPV of 98.6% (95%CI 95.3–99.8%). The high proportion of false positive tests however resulted in a low specificity of 34.3% (29.9–39.0). Expressed as likelihood ratios, for a positive test CxbT had a ratio of 1.45, indicating the test result was moderately associated with bladder cancer, and for a negative test, a ratio of 0.07, indicating the result was strongly associated with absence of disease.

Table 1: Clinical and demographic characteristics, diagnosis, and results of laboratory tests of the 478 referred patients and 73 non-referred patients.

Parameter	Referred patients n=478	Non-referred patients n=73	P value
Gender			0.002[a]
Male	332 (69%)	37 (51%)	
Female	146 (31%)	36 (49%)	
Age (yr)			0.003[b]
Mean (±SD)	64.0 (14.4)	57 (18.8)	
Median (range)	66.0 (18–95)	57 (24–91)	
Type of haematuria			<0.001[a]
Macrohaematuria	334 (70%)	32 (44%)	
Microhaematuria	144 (30%)	41 (56%)	
Smoking status			0.001[c]
Current smoker	58 (12%)	7 (10%)	
Previous smoker	172 (36%)	12 (16%)	
Never smoked	248 (52%)	54 (74%)	
Previous history			
Bladder cancer	0 -	0 -	
Radiation therapy of pelvis	8 (1.6%)	0 -	
Anticoagulation therapy	11 (2.3%)	0 -	
Cxbladder Triage™			0.08[b]
Mean score (±SD)	4.53 (1.15)	3.82 (0.68)	
Range	1.87–10.00	2.20–5.45	
Result indicates:			
No further investigation required	150 (31%)	49 (67%)	
Further investigation required	328 (69%)	24 (33%)	
Urine cytology			<0.001[c]
Normal	392 (82%)	71 (97%)	
Indeterminant	55 (11.8%)	0 -	
Abnormal	30 (6%)	0 -	
Not tested	1 (0.2%)	2 (3%)	

[a]Fisher's exact test.
[b]Welch's unpaired t test.
[c]Chi square test.

The first of the missed lesions was a papillary pTaG1 tumour smaller than 1cm, which was seen on ultrasound. The second missed lesion was 2mm in size and papillary in appearance, although no histology was obtained as the specimen was destroyed in the resection process. The operating surgeon judged the appearance to be likely either a pTaG1 tumour or a papilloma. When combined with imaging, assessment only missed the 2mm papillary lesion, giving the pathway a sensitivity of 97.7% (95% CI 88.0–99.9) and NPV of 99.8% (95% CI 98.7–99.9). Six patients with a positive CxbT and bladder cancer had negative urine cytology and imaging results.

For data stratified according to haematuria type the diagnostic accuracy of CxbT was; macrohaematuria, sensitivity 95.1% (95% CI 83.5–99.4), specificity 32.8% (95% CI 27.4–38.5) and NPV of 98.0% (95%CI 92.8–99.8%); microhaematuria, sensitivity 100.0%% (95% CI 29.2–100.0), specificity 42.6% (95% CI 34.3–51.5) and NPV of 100.0% (95%CI 94.0–100.0%).

In comparison, urine cytology only detected 22 of the 44 TCCs giving a sensitivity of 50% (95% CI 26.3–56.8), while the positive predictive value was also low at 72% (95% CI 53.3–90.2). In nine of the 22 cases with negative urine cytology, imaging also failed to detect the bladder lesion, although in eight of these cases CxbT indicated referral to a urologist was warranted. Further, none of the one abnormal or eight atypical cytology reports with a CxbT index <4.0 had a malignancy.

Of the 73 non-referred patients, none subsequently presented with bladder cancer, and the GPs of all these patients were reminded to check appropriate care had been provided.

Causes of haematuria

The causes of the haematuria are outlined in Table 3, along with the likelihood of being CxbT positive and the percentage of each cause of haematuria that would have been detected by the modified pathway.

Development of the theoretical pathway

The findings were used to construct a new clinical pathway that involved a GP requesting MSU urinalysis, culture and sensitivity and CxbT as the initial laboratory screening tests for bladder cancer in combination with appropriate imaging based on the age and type of haematuria of the patient. In this pathway, urine cytology would only be requested in patients with a CxbT >4.0, who were referred for specialist assessment and cystoscopy.

Figure 1 shows the flow of patients if they had gone through the theoretical clinical pathway. In 60 (42%) of patients with microscopic haematuria and 91 (27%) with macroscopic haematuria the Cxbladder Triage and imaging results indicated no further urological assessment or a cystoscopy was required (total 151, 32% of patients). No invasive or high grade TCC would have been missed by the new pathway.

Discussion

Urinary biomarkers of bladder cancer are not currently recommended in the laboratory investigation of haematuria because of their low specificity and limited accuracy in low-stage and low-grade tumours.[15,24] The review described in this paper was novel as it collected prospective data following the inclusion of CxbT in a haematuria assessment algorithm, with the patients included solely on the basis that their GP had requested a CxbT test. This approach was observation of usual care and provided real-time data on clinical utilisation of the test and would potentially minimise selection bias. The data were then used to inform further development of the haematuria clinical pathway. The pathway developed leveraged the high NPV of the CxbT segregation index to identify patients who do not require a primary care urinary cytological evaluation or a secondary care appointment and cystoscopy.

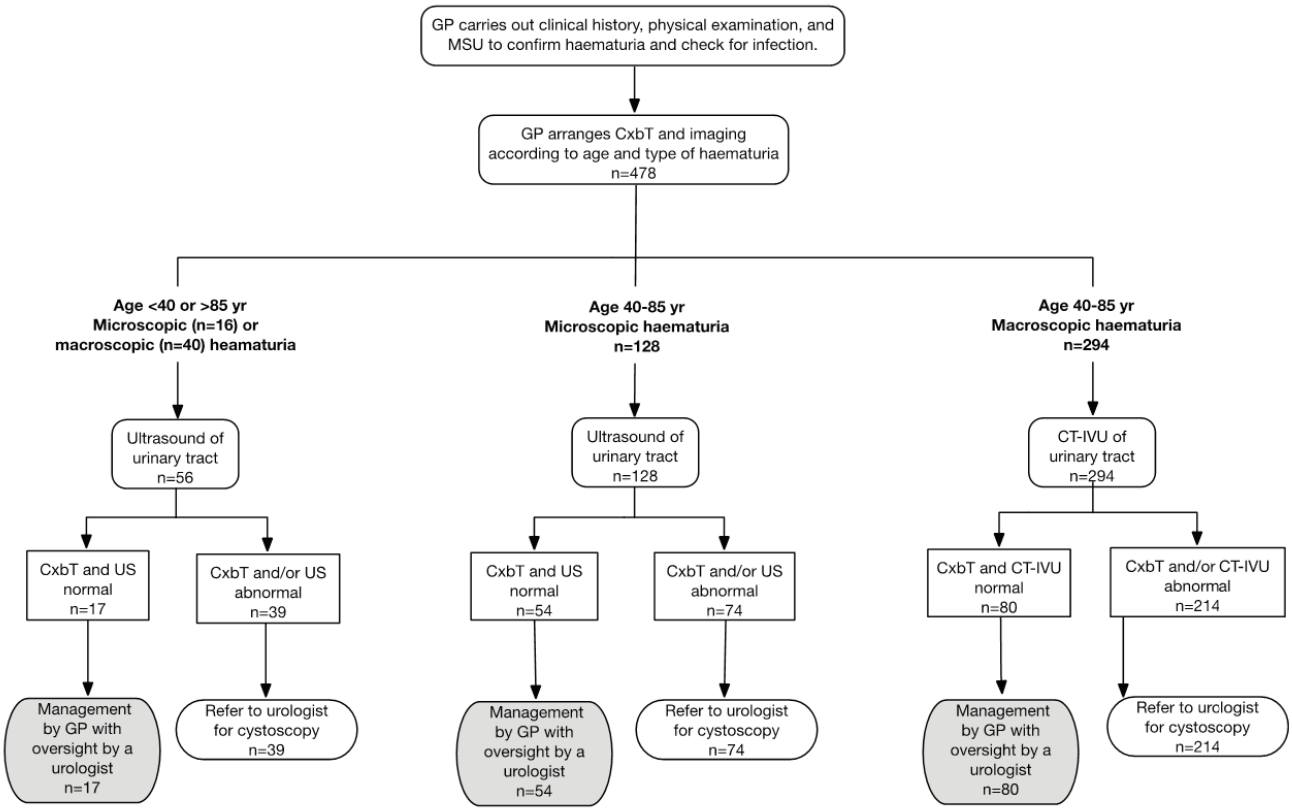
Table 2: The number of bladder cancers detected in the 478 referred patients with haematuria by the model pathway with imaging and Cxbladder Triage™, Cxbladder Triage™ alone, and urine cytology alone. The bottom panel shows the stage and grading of the cancers grouped according to the type of haematuria.

	Bladder cancer (n=44)	
	Yes	**No**
Pathway with imaging		
Abnormal result	43	-
Normal result	1	434
Cxbladder Triage™		
Abnormal result	42	285
Normal result	2	149
Urine cytology		
Abnormal result	18	6
Normal result	26	428
	Haematuria	
Stage and grading	**Macro**	**Micro**
CIS	1	-
pT1G3	5	1
pT1G3;CIS	3	-
pT2G3	7	-
pT2G3;CIS	3	-
pTa	1	-
pTaG1	12	-
pTaG3	6	1
pTaG3;CIS	1	-
pTiG3;CIS	-	1
pTx	2	-

Table 3: Causes of haematuria in the review cohort.

	Referred patients (n=478)			**Non-referred patients** (n=73)		
	n	**CxbT positive** n (%)	**Detected by pathway** n (%)	n	**CxbT positive** n (%)	**Detected by pathway** n (%)
Malignant lesions						
Bladder cancer	44	42 (95%)	43 (98%)	-	-	-
Prostate cancer	3	3 (100%)	3 (100%)	-	-	-
Kidney cancer	6	4 (67%)	6 (100%)	-	-	-
Benign lesions						
Bladder	4	3 (75%)	4 (100%)	-	-	-
Renal	2	1 (50%)	2 (100%)	1	1 (100%)	1 (100%)
Inflammatory						
UTI	18	7 (39%)	7 (39%)	5	3 (60%)	5 (100%)
Radiation cystitis	9	7 (78%)	7 (78%)	-	-	-
Other	9	7 (78%)	7 (78%)	1	1 (100%)	1 (100%)
Stones						
Upper tract	36	15 (42%)	36 (100%)	1	1 (100%)	1 (100%)
Bladder	10	10 (100%)	10 (100%)	1	1 (100%)	1 (100%)
Other causes						
Vascular prostate	87	60 (69%)	60 (69%)	-	-	-
Anticoagulation	10	6 (60%)	6 (60%)	-	-	-
Post-TURP	8	7 (88%)	7 (88%)	2	2 (100%)	2 (100%)
Urethral stricture	5	5 (100%)	5 (100%)	-	-	-
Renal disease	2	1 (50%)	2 (100%)	-	-	-
Gynaecological origin	-	-	-	1	1 (100%)	1 (100%)
Red blood cell issue	-	-	-	1	-	1 (100%)
No cause identified	225	137 (61%)	Not applicable	60	16 (27%)	Not applicable

Figure 1: Flow of patients through the hypothetical clinical pathway for investigation of patients with haematuria.



The risk of avoiding a cystoscopy in the evaluation of haematuria is principally the risk of missing a significant bladder cancer. Our results showed a false negative CxbT result was obtained in only two of 44 patients diagnosed with bladder cancer, with both being low-grade superficial urothelial lesions. The parameters of diagnostic accuracy we measured for CxbT are similar to those reported previously,[16–18] with a sensitivity of 95% and NPV >98%.

In our theoretical pathway, CxbT is not used in isolation, but as part of an algorithm. The performance of this pathway would have missed a single very low-risk bladder lesion. In other words, 150 cystoscopies in CxbT negative patients were performed to detect a single very low-risk lesion. This is consistent with published studies of other Cxbladder tumour markers where a negative test excludes invasive and high-grade cancers.[17–20] The risk of missing a significant cancer from the adoption of the theoretical pathway appears very low and clinically acceptable. Similar results and the ability to predict patients with a high risk of bladder cancer have been reported for other urinary markers such as immunocytology[8] and methylation products combined with standard urine cytology.[9] However, further large prospective cohort studies are necessary to prove the true clinical value of inclusion of these biomarkers in investigative pathways.

There can be other lower urinary tract causes of asymptomatic haematuria. These are highlighted in Table 2. While the numbers were small in this study, no malignancies, bladder stones or benign lesions of the bladder were missed by the clinical pathway. Two cases thought to have had an inflammatory cause (one with normal cystoscopy and vulval inflammation, and the other with asymptomatic trigonal squamous metaplasia), were not detected. The risk of missing other significant lower tract pathology also appears to be negligible.

The model pathway we constructed and evaluated involves CxbT being the sole urine test to screen for bladder cancers in patients with confirmed haematuria, with urine cytology only being requested for patients referred for specialist urological assessment. It is consistent with several reviews that concluded urine cytology has insufficient sensitivity to rule out malignancy or exclude patients with haematuria from further investigations. [25,26] The continued use of urinary cytology in those CxbT positive patients presenting for secondary care and cystoscopy reflects local unit practice of doing upper tract endoscopy where there is positive cytology and no lower tract cause found.

The majority of patients treated in secondary care within the New Zealand health system are seen though publicly funded DHBs, with access to services tightly managed to capacity using strict criteria and careful review of referrals. The secondary care system is supported by a robust and competent primary care sector through GPs. As such, in our health system the avoidance of cystoscopy in the haematuria algorithm would allow the assessment of haematuria in patients with a negative CxbT to be undertaken in primary care with oversight of specialist urologists.

The theoretical pathway has the potential to save considerable amounts of these resources without severely compromising clinical safety. Although we acknowledge this pathway differs from current international guidelines,[27] it is pragmatic in our setting and is the best utilisation of resources in the financially capped New Zealand public health system. Our review showed approximately one-third of patients can be assessed without the need for a cystoscopy, and in our health system, we judge that these patients can remain in primary care without being referred to secondary care for specialist review. In our unit this would free up an estimated 200 patient consultations a year and allow management of conditions that might not otherwise reach the thresholds for referral. Importantly, the patient with haematuria would also safely avoid the social disruption and discomfort of a secondary care visit for cystoscopy.

The cost of seeing all patients with haematuria in secondary care, even if not performing a cystoscopy, will vary by health system. It is anticipated that, in the future, new-generation multiparametric assays will have greater specificity and potentially cost less, thereby improving further the financial benefits of using these assays in the investigation of haematuria.

A third of patients will be CxbT negative and therefore not need cystoscopies. While there may be other savings with less urine

cytology tests and freed-up urologist time, the relevant workforce will be used in other areas of pathological and clinical endeavour, thus our assumption that the saving of a third of the price for cystoscopies should be around the cost neutral price for the CxbT test. This is simplistic, but there will clearly be more productivity in other areas from cytologists and urologists, allowing a rationed health system to dig deeper into diseases in the community.

Conclusions

This study adds to the increasing evidence that urinary mRNA biomarkers have a place in the assessment of haematuria. When clinicians are provided with CxbT results in combination with imaging they are able to reliably identify patients in whom cystoscopy can be avoided with negligible risk. In our health system we judge that these CxbT-negative patients can also be assessed in primary care without the need for secondary care referral.

This new haematuria assessment algorithm was adopted into the Canterbury Community HealthPathways in February 2018 and continuous audit has been carried out over the last year to ensure patient safety. Data on approximately 890 patients managed using the new pathway will be published when follow-up is complete. The new pathway should be applicable in any health system with effective general practice or primary care and the ability to inform GPs of locally recommended assessment and management of haematuria. Health systems with less constrained urological specialist services might continue to choose to recommend specialist referral for investigation of all patients with haematuria.

Competing interests:
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The New Zealand *Government Inquiry Into Mental Health And Addiction*'s recommendations on substance use: some reflections from the science perspective

Benedikt Fischer, Sally Casswell

ABSTRACT

The New Zealand Government Inquiry Into Mental Health And Addiction recently tabled its final report, including a substantial set of recommendations. Four of these recommendations focused specifically on interventions and policy for psychoactive substance use (including alcohol and drugs). Based on longstanding involvement in science on alcohol- and other drugs-related health and policy, and similar commission efforts, the authors briefly examine and provide comments on these recommendations from a scientific evidence perspective. In sum, the Inquiry's recommendations provide a good and sensible basis towards improved substance use-related health and reduced harms in New Zealand. Concrete design and implementation of these reforms require thoughtful consideration of key evidence, details and experiences elsewhere, as well as a concerted strive for policy coherence, in order to be successful.

New Zealand's Government Inquiry into Mental Health and Addiction recently presented its Final Report, containing a total of 40 recommendations.[1] These include a subset of four recommendations (#s 26–29; see Appendix) devoted to substance use-related intervention systems and policy. We briefly comment on these recommendations, primarily from a science-and-policy interface perspective on substance use and health, and active participation in similar system or policy review efforts, in diverse international settings.

We begin our observations by lauding the Inquiry for actively considering and including substance use issues, and related specific recommendations in its primary scope on mental health. While the biological disease concepts of mental and substance use disorders are well-recognised to be fundamentally connected, many systems continue to view, and practically organise and treat, these phenomena as separate entities (or 'solitudes').[2,3] Such artificial and counterproductive separation can be driven by organisational agendas of resource or 'turf' protection. However, scientific data clearly suggests the opposite, as substance use and mental health disorders are strongly associated and commonly co-occur ('dual diagnosis') especially in those individuals with severe problems.[4,5] Therefore, generally improved integration and care of these realms is key for system development and outcome progress.[6]

We also applaud the Inquiry's focus on upstream intervention in relation to alcohol, the most widely used drug in New Zealand, estimated to result in upwards of $7 billion costs per annum.[7] The Inquiry draws on previous well-evidenced recommendations from the NZ Law Commission, 2010[8] and subsequent reports on the need to restrict marketing[9] and increase excise

tax.[10] Marketing for alcohol is ubiquitous, including on social media, and alcohol has become more affordable since the Law Commission report—in 2017 it cost less than three minutes to earn enough to buy a drink of the cheapest alcohol.[11] These recommendations for policy reform, not yet addressed adequately by government, represent the 'best buys' (most cost effective) of alcohol control as delineated by the World Health Organization.[12] Taking steps to shape the alcohol environment by cutting back on oversupply, aggressive marketing and extreme affordability are examples of the 'proportionate universality' this government recommends: employing the tools which will have most impact while also providing services for those with complex needs. According to the Inquiry report they heard a strong appetite for strengthening alcohol reforms, particularly around decreasing the exposure of young people to alcohol advertising and promotions. They believe the case for change has been made and action on alcohol reform is required, and state the main impediment to stronger alcohol reform is a lack of political will.

The report makes two recommendations towards the reform of current criminal control provisions of personal drug use, specifically with replacement by non-criminal penalties, interventions or treatment, and for these alternatives to be supported by a "full range of treatment and detox services". These recommendations are overall important and well-advised; their meaningful implementation, however, requires thoughtful consideration of various challenges and potential pitfalls. Crucially, as available information shows, New Zealand urgently requires substantial expansion of evidence-based treatment availability for problematic substance use and related disorders.[13,14] This includes both the need for diversification of available treatment modalities for different kinds of substance use disorders (eg, psychostimulants), yet also resource expansions to improve basic treatment service access. Such is especially required for rural/remote communities. Given the disproportionate experience of problematic substance use among Māori and the imperative of Te Tiriti o Waitangi, an expansion of culturally sensitive and appropriate services is an urgent need. Progress on this front is primarily a matter of committed governmental resource provision and delivery.

Sensible replacement of criminal sanctions for personal drug use is a more complex challenge for several reasons, most of which have differentially played out in related experiences of other systems. An essential challenge for meaningful reform is that criminal sanctions of personal drug use are *a priori* determined by current provisions in the drug control law, ie, New Zealand's *Misuse of Drugs Act*.[15] Thus, fundamental and sustained corrections to the status quo of undesired criminalisation of personal use requires change to the law, as otherwise the outcomes are likely both ambivalent and inconsistent. To illustrate: While multiple policy systems have implemented a variety of 'de facto'-type adjustments to the criminalisation of personal drug use, many of these have resulted in extensive, if often unintended adverse effects. These include the undue provision of 'discretion' to criminal justice authorities—mainly but not limited to police—in applying non-criminal over criminal sanctions, with primarily disadvantaged (eg, street-involved or poor, racialised) populations disproportionately subjected to the latter.[16,17] Similarly in Australia, experiments with 'civil expiation notice' schemes for personal cannabis use offenses led to substantial 'net-widening' effects. This meant that law enforcement suddenly enforced more cannabis possession offences under the CENs based on much more simplified procedures, however with the consequence of more people ending up entangled in the criminal justice system, many due to fine defaulting.[18]

It is furthermore important to recognise that many people involved with substance use who end up in the tentacles of the criminal justice system do not categorically require, or will not benefit from, 'treatment'. This can render (commonly well-intended) alternatives like mandatory treatment orders or similar diversion options devised to replace criminal punishment a double-edged sword.[19,20] Hence, such alternatives ought to be devised based on solid case-by-case assessments, which require relevant knowledge and training for those making relevant decisions. Meanwhile, 'therapeutic justice'-based interventions like 'drug treatment courts'

continue to be sociopolitically popular and promoted even though rigorous empirical assessments concerning—especially sustained—impacts and benefits are highly limited, and outcome data are equivocal or inconclusive at best.[21–25] Such rigorous evaluative data should form the pre-requisite basis for decisions on future programme support or expansions. Moreover, 'therapeutic justice' practices in many ways may result in different, rather than fewer, forms of 'punishment' for participating offenders.[19,26,27] Finally, it is essential to recognise that the 'criminalisation' of many individuals with substance use problems does not occur directly through substance use offenses, but rather related deviant behaviors (eg, violence, property/acquisition crime).[28,29] Consequentially, it is in these areas where corresponding knowledge, analysis and appropriate complementary interventions need to be developed and applied by criminal justice authorities. Meanwhile, the above considerations largely neglect the fundamental fact that a large extent of substance use problems in the population are driven by key social determinants (eg, poverty, lack of housing). Systemically addressing these dynamics naturally requires a primary focus on preventive, systemic 'upstream' measures rather than mostly individual adjustments to 'downstream' interventions.[30–32]

In focusing on decriminalising personal use of drugs, the Inquiry is silent on the essential issues of drug supply, which from the alcohol experience are well-established to be among the key drivers of problematic use and use-related harms.[33] Among the determinants of substance use problems are commercial determinants, very clear in the case of the alcohol transnational producers and retailers who oppose effective policies, but also a factor in the supply and normalisation of use of other drugs. The situation in New Zealand is about to be potentially further complicated by the availability of medicinal cannabis and a referendum on recreational cannabis. Any consideration of decriminalisation of personal use requires a careful consideration of supply issues.

A further recommendation calls for improved cross-sectoral leadership and coordination regarding alcohol and drug policy development in New Zealand. The relevance and timing of this directive is acute, both in the context of a general need for more policy coherence and better integrated psychoactive substance policy within a public health framework as well as major impending policy decisions in New Zealand. As just one preeminent example, possible cannabis control reform towards legalisation and related regulations for use and supply will require careful and sensible harmonisation with respective alcohol control provisions. While possible joint use and related adverse outcomes of alcohol and cannabis should be avoided as far as possible, both substances should be controlled according to their own specific, evidence-based properties relevant for health and social harms while maintaining policy coherence in the overall approach for psychoactive substance control in New Zealand.[34,35] Similarly, possible liberalisation of cannabis control ought to consider and be integrated with relevant priorities in the tobacco control realm. There, as just one example, active efforts to protect tobacco users—and others/non-users—from smoking or related harm exposure should be extended (and not be undermined) when regulating potentially legal cannabis use.[36,37]

In sum, the New Zealand Inquiry has tabled important recommendations to improve health- and justice-oriented substance use interventions and policy in New Zealand. In order to tangibly capitalise on these well-advised directives, it is now essential that primary stakeholders hold the government accountable towards active and comprehensive implementation and delivery. Unfortunately, extra-governmental entities like the Inquiry—especially on marginalized topics like mental health and addictions—commonly receive extensive political or symbolic attention when they occur; however, required action or delivery on recommended system or policy change often lags or experiences neglect. The material health and social burden of mental health and substance use (eg, as partly expressed in the volume of related morbidity, mortality and economic costs) in New Zealand—as in other wealthy jurisdictions—is way too high for the Inquiry's important recommendations to be neglected.

Appendix

New Zealand Inquiry on Mental Health and Addictions—RECOMMENDATIONS on alcohol and drugs[1]

26. Take a stricter regulatory approach to the sale and supply of alcohol, informed by the recommendations from the 2010 Law Commission review, the 2014 Ministerial Forum on Alcohol Advertising and Sponsorship and the 2014 Ministry of Justice report on alcohol pricing.
27. Replace criminal sanctions for the possession for personal use of controlled drugs with civil responses (for example, a fine, a referral to a drug awareness session run by a public health body or a referral to a drug treatment programme).
28. Support the replacement of criminal sanctions for the possession for personal use of controlled drugs with a full range of treatment and detox services.
29. Establish clear cross-sector leadership and coordination within central government for policy in relation to alcohol and other drugs.

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Rare cause of chronic bowel obstruction in the setting of malrotation and omental agenesis

Paul VB Fagan, Sam Dickson, Nigel Henderson, Karl Kodeda

We present an unusual case of chronic obstruction due to internal herniation and the first documented case due to congenital agenesis of the gastrocolic and gastrohepatic ligaments in the context of malrotation.

Case report

A 61-year-old female presents with abdominal pain and intractable vomiting for one day's duration on a background of several admissions over the past five years with repeated vomiting attributed to gastroenteritis. This was believed to be a paraduodenal hernia after discussion at our radiology meeting. On further questioning, she had previously had episodes similar to this and recurrent episodes of bloating and vague colicky abdominal pain for more than five years' duration, including several presentations to the emergency department with intractable vomiting. Her symptoms settled rapidly after decompression and she was discharged home for semi-elective surgery the following week.

Loops of the centrally located jejunum were herniating under the stomach via the congenital absence of the gastrocolic ligament and out onto the anterior aspect of the stomach via the congenital defect in the lesser omentum (see Figure 2). The herniated bowel was reduced and the defects closed with 2-0 PDS sutures to prevent recurrence, the small bowel mesentery was widened in a fashion similar to a Ladd's procedure and an appendicectomy was performed to avoid diagnostic confusion in the future.

Figure 1: Diagram of the case: sagittal representation of normal anatomy vs omental agenesis and herniation.

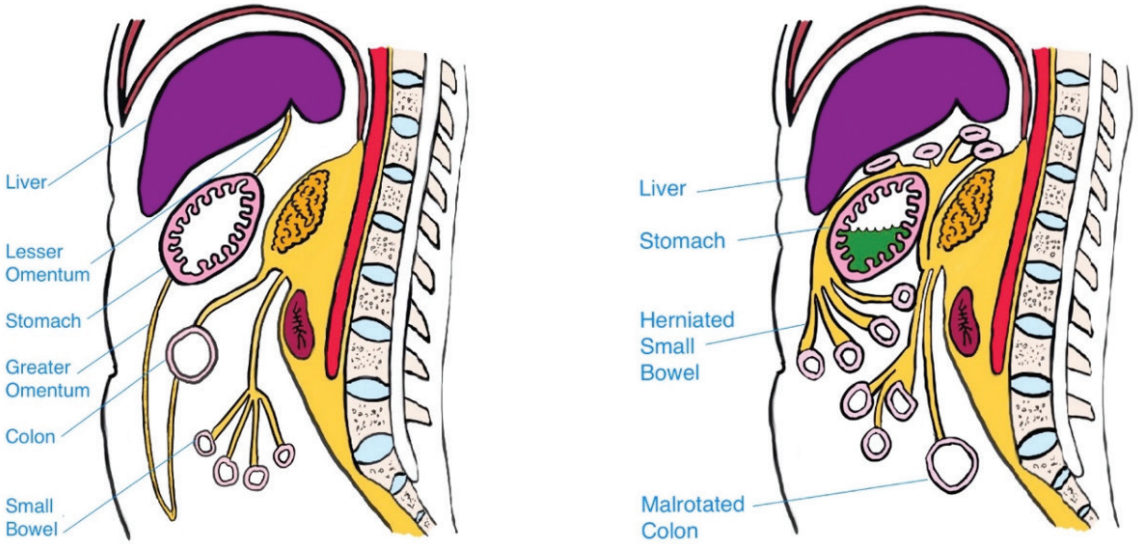

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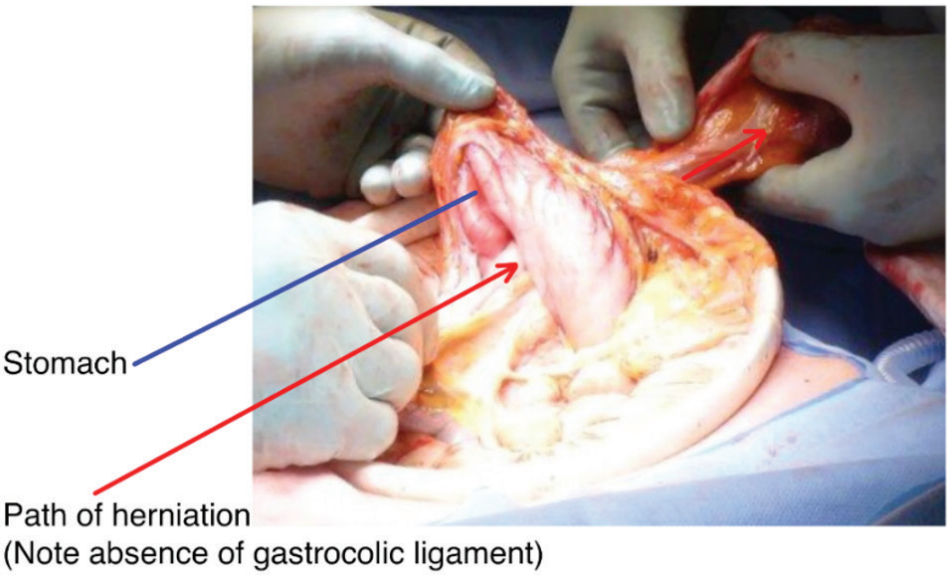
Figure 2: Loop of small bowel herniating behind the stomach and lacking any normal gastrocolic attachments of the omentum.

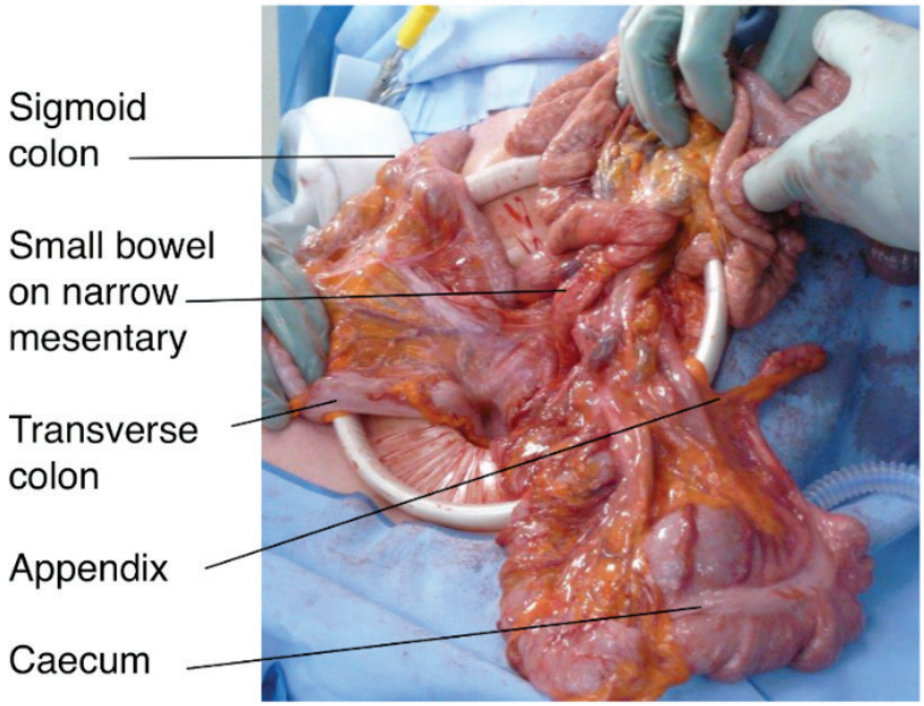


The bowel was noted to be partially malrotated with the duodenum crossing the midline (see Figure 3), with the sigmoid colon on the right side, the appendix in the left upper quadrant on an extremely mobile cecum and the small bowel sitting centrally on a narrow mesentery.

Discussion

Congenital obstruction attributable to malrotation is not as rare as previously thought and can present in any time from infancy to adulthood.[1] As with this case, the presentation in adults is often indolent with a long lead time between first symptoms to diagnosis.[1] Congenital malrotation due to defects in the normal omental attachments is very rare with only a dozen cases stretching back over the past 50 years.[2–10] This is the first published case to occur due to malrotation and congenital absence of the gastrocolic and gastrohepatic ligaments. A high index of suspicion is required for diagnosing obstruction secondary to malrotation, and patients often wait many years to final diagnosis. Additional imaging with x-ray or CT imaging should be considered before attributing recurrent gastrointestinal symptoms to more benign conditions such as gastroenteritis.

Figure 3: Intraoperative photo showing malrotation (with the appendix in the right upper quadrant).



Competing interests:
Nil.

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More than ticking a box: barriers to CPR form completion

Katherine Bloomfield, Terry Zhang, Martin J Connolly

The district health board (DHB) within which we work is often at the forefront of electronic innovation, with the latest development being electronic resuscitation/ceiling of care decision forms now visible on a patient's individual electronic daily record. Development of this tool is designed to make the resuscitation status more accessible and easier for clinicians to view previous decisions when patients are readmitted. Our previous publication in this journal illustrated our concern about completion of CPR forms, in particular the lack of discussion around decision making with patients and/or whanau.[1] While a move to electronic documentation is an excellent one, in its current form it does not ensure appropriate discussions are held. Although such discussions are sensitive and can be challenging to all involved, there is an ethical need to address these decisions with our patients.

We reviewed 52 older adults across two rehabilitation wards at Waitemata DHB (WDHB) following introduction of electronic resuscitation documentation. Forty-two (81%) had forms completed. This is an improvement from our last review (63–68%).[1] However, only 20 (38%) documented any communication with patient/whanau about the decision reached. Fifteen patients were documented as 'For CPR', with eight (53%) of these decisions discussed with patients. It is possible that wider discussions around ceiling of care were occurring but not documented on this form.

We have explored potential barriers to completion of CPR documents with an online questionnaire of clinicians in December 2016/January 2017. WDHB senior medical officers (SMOs) and registered medical officers (RMOs) were contacted via DHB email on two occasions over a two-month period. A link to the questionnaire was also advertised on two occasions through the Waitemata Weekly e-news. Fifty-one doctors participated in the questionnaire (26 SMOs, 25 RMOs), with the majority representing general medicine (14, 27%), older adult medicine (10, 20%), emergency medicine (8, 16%) and sub-specialty medicine (7, 14%). While 24 (47%) thought they had received adequate training to equip them for these discussions, 16 (31%) had never received training or education on initiating these discussions, and only eight (16%) thought documentation was done well or very well. The most common barriers to discussions with patients included patient's cognitive function (39, 76%), language/cultural differences (33, 65%), lack of time (30, 59%), patient lack of understanding of CPR (30, 59%), doctor's level of comfort in discussion (29, 57%), lack of appropriate training (29, 57%) and doctor-patient discordance (27, 53%). Only four doctors (8%) reported they would not wish to take part in formal education if this was available. Decision-making guidance and a framework for discussion were the most common aspects of further education requested by those taking part. Uptake of this questionnaire was low (26/435 SMOs, 6%; 25/343 RMOs, 7%). This is likely in part related to the time of year the study was carried out, which included the holiday period and both house officer and registrar changeover. It is also possible that some clinicians would have seen this questionnaire as not directly relevant to their practice, for example those working in the community only.

Although patients often have limited understanding of CPR and overestimate the benefits, there is evidence that they wish to be involved in these important decisions.[2–4] Without such discussions, there is the risk of frail older patients receiving non beneficial (and unwanted) CPR. Heyland et al[5] studied advance care planning practices, including

resuscitation, in acutely hospitalised older adults. Only ~12% wished for life-prolonging care including resuscitation, yet in only 30% was there agreement between patient preference and hospital record documentation, highlighting inadequate communication. Commentary around this study was that this represents significant medical error in the goal of patient-centred care.[6]

An attractive framework to these decisions and discussions is provided in a publication by Barbara Hayes.[7] She argues that initially the clinician should consider whether the patient would survive CPR: either no or possibly yes. Addressing this question first will then assist in further placing patients into one of four clinical categories with specific discussion goals in each. In the first category, that of the dying patient, discussion should centre on preparation for death. The second group are those medically unwell but not imminently dying, who would not survive CPR attempts. In this group discussion is around good and bad ways to die, rather than life and death choices and a recommendation to withhold CPR is made. Further comment is made by Hayes that where the patient or family disagrees with this decision, further judgement is required particularly in the knowledge that there can be harm due to damaged trust by refusing to provide CPR. Therefore in these two categories discussed, clinicians enter the conversation with 'recommendations' around CPR decisions. The third category of patient includes those where it is not clear whether they would survive CPR attempt, but expectations would be that outcomes from this would be poor. In discussions with these patients, dialogue is around such uncertainty and the possibilities of poor outcomes. Patients' viewpoints and ethical views are important in exploring and following in this group. The final category includes those with moderate chance of survival, where the clinician's approach is ideally in exploring these potential outcomes with the patient within the context of the patient's values. A further useful tool includes an online video produced by the Department of Health, Government of Western Australia, which illustrates a CPR discussion.[8]

We believe there needs to be a coordinated and continued education package to RMOs, and that SMOs role model these important skills at the bedside. Within our DHB, we are working to improve these areas through RMO teaching sessions based on the resources mentioned above, updated to address these important communication aspects. We suggest other DHBs reflect on their practices in this regard. Many DHBs may in fact already be addressing these very issues, in which case we recommend the sharing of these ideas and successful projects.

Barriers to cardiopulmonary resuscitation (CPR) form completion

Online survey questions

This study is designed to identify potential barriers which prevent doctors from initiating effective CPR-related discussions with patients in hospitals and completing CPR forms. We are interested in exploring your experiences in this area and invite you to complete this short survey.

Demographics and clinical experience:

1. Male/female.
2. Level of training. Options: house officer/registrar/consultant.
3. Current specialty. Options: general medicine/older persons' health/general surgery/orthopaedics/emergency medicine/sub-specialty medicine/intensive care medicine/other.
4. Years practicing medicine. Options: less than one year/1–2y/3–5y/6–10y/over 10y.
5. On average how many times do you complete CPR documents? Options: never/less than one per month/less than one per week/1–5 per week/6–10 per week/over 10 per week.
6. What role do you think your area of clinical practice plays in discussion of resuscitation decision making with patients? (free text box).

Current practice:

7. How often (approximately) do you discuss resuscitation decisions with patients when completing CPR forms? Options: 0%/less than 10%/10–30%/30–50%/over 50%.
8. In the last year, when you have discussed resuscitation decisions with patients, how difficult have you found it? Options: Likert-type scale 1–5 (1=easy, to 5=extremely difficult).
9. When you have not engaged in discussion with patients, briefly list all the potential reasons preventing you from doing so? (free text box).
10. Other than the patient, do you think it is appropriate to involve family member in the discussion of the decision making process? Yes/no/maybe (with free text to further explain answer).
11. Briefly state the approach you would take during discussion of CPR with patients (free text box).
12. How important do you think it is to discuss resuscitation decisions with competent patients? Options: Likert-type scale 1–5 (1=not important, to 5=extremely important).
13. What other factors would help you decide to initiate discussion about resuscitation? Options: Colleague's opinion/results of investigations/progress of disease/frailty/age/co-morbidities/other (with free text box).
14. When did you receive the most recent training or updates in initiating resuscitation discussions? Options: At medical school/house officer teaching sessions/registrar teaching sessions/medical conferences/other/never.
15. Are you aware of any guidelines (eg, 'Advance CPR decision making in the hospital setting' that could be helpful to make resuscitation decisions? Options: yes/no (plus free text to comment on answer).
16. Generally, how well do you think resuscitation decisions have been documented? Likert-type scale 1–5 (1=extremely poor, to 5=extremely well).

Issues and barriers regarding patient involvement in CPR decision making:

17. Do you think for your level of training, you are suitable for initiating discussions relating to CPR decision making? Options: Yes/no/unsure.
18. Please choose who you think would be most suitable to initiate the discussion. Options: house officer/registrar/consultant/general practitioner/other.
19. Is there ever a time a resuscitation decision should be made without discussion with patient/legal guardian? Options: yes/no/maybe (plus free text box to comment on answer).
20. In your opinion, what barriers are there to discussing resuscitation decisions with patients? Options: patient's lack of understanding of CPR process and outcome/ patient's mental or cognitive function/doctor's level of comfort in discussing options and medical status with patients/rapport with patient or short duration of care/ lack of appropriate training/lack of time and busyness of job/the ward is an inappropriate setting or place to discuss with patients/the emergency department is an inappropriate setting or place to discuss with patients/lack of knowledge of ethical and legal issues related to CPR discussion/ fear that 'do not resuscitate' will result in withholding other treatments/uncertainty about patient's prognosis/to avoid difficult conversations by indicating 'full CPR' by default/patient language or cultural differences/doctor-patient discordance in decision/patients not willing to have resuscitation discussions/patient expectations.

Training and support:

21. How adequate do you believe your training has been to equip you in these types of discussions? Options: excellent/good/fair/poor.
22. Do you believe you have enough guidance from other colleagues, WDHB and national sources in initiating these discussions? Options: yes/no/ unsure.

23. What kind of guidance would you find useful/potentially useful in future practice to help facilitate discussions? Options: help from other colleagues/local guidelines/ national guidelines/training tutorials within the hospital/training from other sources/ none required/other (free text).
24. If there were formal education sessions in this area would you be keen to participate? Options: yes/no/maybe.
25. In regard to the previous question, choose the areas you would like the tutorials to be focused on. Options: approach initiating the conversation/framework used for discussion/decision-making guidance/technical analysis and judgement about patient illness, response to CPR/ who to initiate conversations with/cultural factors/other (free text box).
26. In your opinion, what else needs to change to improve completion of CPR forms? (free text box).

Competing interests:
Nil.

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Code of Rights and bowel screening

Brian Cox, Phil Bagshaw, Ainslie Talbot, Mary Jane Sneyd

As a provider of health services, the National Bowel Screening Programme (NBSP) is subject to the Code of Health and Disability Consumers' Rights (COR).[1] There are several aspects of the Code that need to be considered.

The COR states "Every consumer has the right to the information that a reasonable consumer, in that consumer's circumstances, would expect to receive" including the results of tests (Right 6.1(f)). This raises questions of what information a 'reasonable' consumer, undergoing a faecal immunochemical test (FIT), would expect to receive. The NBSP currently interprets the result of the test and tells the participant whether they are "positive" or "negative" based on a cut-off value of 200ng of haemoglobin (Hb) per ml of buffer. The Ministry of Health has stated "They will not be informed of the numerical result of their test".[2] Neither is the participant told that the real result is a numerical measurement of the concentration of Hb from blood in the stool.

If a participant seeks the actual result of the test, the programme is required to provide it.[3] However, to do this the participant would need to doubt the report received and know that the quantitative measurement of blood in the stool was available. Most people are likely to assume that a 'negative' test means that there is no evidence of bleeding in the stool, but it does not. The use of the term "negative" is misleading, because it only means the result is not sufficiently high for referral to publicly funded colonoscopy and not, as the participant is likely to assume, that no blood was present.

The COR also states "Every consumer has the right to have services provided in a manner that minimises the potential harm to, and optimises the quality of life of, that consumer" (Right 4.4). The Waitemata pilot study, using a threshold of 75ng/ml to define a positive test, found 17% of the cancers detected occurred in participants with a test result of 75–199ng/ml.[4] In Australia, a country with lower bowel cancer incidence, the cut-off used for a recommendation for colonoscopy is 100ng/ml. Setting a low threshold for referral means more colonoscopies are performed, while a higher FIT threshold reduces the colonoscopy demand, as only higher-risk individuals are referred, but increases the chance of missing significant disease. The National Screening Advisory Committee observed that, internationally, "bowel screening programmes set the FIT cut-off values to align with their resources and circumstances".[5] However, programmes in New Zealand must comply with our law, in particular the New Zealand COR.[1] While it is accepted that there are multiple factors that inform where a threshold is set, there is a big difference between reporting a screening result as "negative" and more accurately reporting the result as a number that is below the threshold for referral.

Clause 3 of the Code ensures that a provider will not be in breach of the Code if they have taken "reasonable actions in the circumstances (which includes resource constraints) to give effect to the rights, and comply with the duties, in this Code".[1] A letter indicating the NBSP interpretation of the test is provided to participants already, so providing the real numerical FIT result to give effect to the Code requires no additional resources. A reason for adopting a cut-off of 200ng/ml is to avoid overloading the DHB colonoscopy services. This is an appropriate ethical consideration for the NBSP but lawful reporting of the result is necessary.

To be clear, our concern is not with the NBSP's choice of cut-off, rather it is with the reporting of results as either 'positive' or 'negative' and the withholding of information that could decrease the informed choices of some participants. For example, a participant in the current NBSP with a test

result of 185ng/ml will receive a report from the programme that their test was negative. We suggest that, to comply with the COR, the numerical result should be provided with explanation of why colonoscopy is, or is not, recommended by the NBSP. The participant can then discuss the result with their general practitioner, as occurs for other cancer screening tests. This information would also be useful for the general practitioner, if for example, the participant has a family history of bowel cancer or resides in an area with high incidence, such as the lower South Island. However, because only the NBSP interpretation of the test result is routinely provided, the decision not to provide the numerical result (ie, the laboratory result) reduces the rights of a participant to make autonomous decisions about their health.

Competing interests:
Nil.

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Denis Astley Harding

11 June 1935–7 March 2019

MBChB (1959), DLO (1963), FRCS (1966)

Denis Harding was born in Dargaville, the third and youngest son of highly decorated and twice-wounded Brigadier Ralph Harding. Denis spent his childhood on the family farm at Tagiteroa, fished for enungas in the local creek and attended the tiny Kirikopene School (sometimes riding the nine miles to school on horseback). He enjoyed every sport available.

In 1949 he followed his oldest brother Hal as a pupil of MAGS and border in the school house. Hal had been head prefect, boxing champion, captain of the first 15 and dux. In the lower 6th form (year 12) Denis was a school prefect and house prefect, he was in the 1st cricket 11, the 1st rugby 15 and in the school boxing team. In his final year (6A, ie, year 13) he was head prefect of the school and head prefect of the school house, he was in the school boxing team (and awarded the prize for most scientific boxer), he was in the first 15 and he was captain of the 1st cricket 11, which won the intersecondary school championship. He was the school's "victor ludorum".

Denis then studied medicine at Otago University and boarded at Knox College where he became president. Denis earned his Otago University blues playing rugby for Otago University and his University of New Zealand blues playing rugby against the provinces in a team made up of the best players from all the universities. He was selected for All-Black trials.

At university he met physical education student Adrienne McKenzie and they married during the first of Denis's two years as a house surgeon at Waikato Hospital. In 1963 and 1964 Denis worked at the Alfred Hospital in Melbourne where he developed his commitment to a career as an ear, nose and throat surgeon and studied for a diploma in laryngology and otology at the Victorian eye and ear clinic. The older two sons Geoff and James were born in Melbourne. The family then moved to

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Oxford where Denis had landed a prestigious ENT training post at the Radcliffe Infirmary.

After two years in Oxford and Denis having obtained his English Fellowship, the Harding family returned to Auckland in 1967 and two younger sons Peter and Cameron were born soon after.

Denis spent the rest of his professional career in private practice and as a part-time surgeon at Greenlane Hospital. From the moment he arrived home he played a major role in tutoring younger colleagues and then increasingly so as advanced training in New Zealand was introduced. He spear-headed the expansion of surgical treatments for patients with head and neck cancer, studied snoring, he was a clinical lecturer at the school of medicine, he was a president of the NZ Society of Otolaryngology—Head and Neck Surgery, a board member of the Deafness Research Foundation and a member of the management board of the Hearing House. Denis and Adrienne were very popular attendees at meetings of ENT surgeons throughout the world both because of Denis's laid-back professional input and because of their easy-going friendliness. Many doors were opened for younger colleagues because of them.

Denis and Adrienne were exemplary parents balancing their own passion for sport, especially golf, with supporting their four full-on sons and their high-level achievements in a wide variety of sports. Denis related as a respected mate not only with his sons, but also with his sons' friends. The family home in Rahiri Road Mt Eden was a second home to many young men.

At age 49 Denis had the perfect wife, family and life until 8 February 1985, when he got news that his oldest son Geoff had been killed in an accident while painting an old lady's roof as a PhD student-volunteer. Denis's and Adrienne's devastation was overwhelming and left a deficit they never truly bridged, though they coped. With the support of their family and their numerous friends they had many further happy times.

When Denis retired, many of his colleagues felt left behind, but that was typical Denis. He lived each chapter in his life to the full but when that chapter was over, he valued the memories without reliving them, focusing on the next chapter. It applied to school years, varsity years and each stage of his career.

Retirement meant more travel for Denis and Adrienne, often together, but frequently apart. Adrienne would return home with stories from the Silk Road, the ancient trade route through Asia, while Denis would return with stories of a particularly difficult dog leg 4 at Hope Island and espousing the virtues of the steak and chips at the Mooloolaba RSL. Golf, a few beers and banter with his mates was the perfect holiday for Denis.

Tragedy hit again for Denis in 2008 when Adrienne lost a short but well-fought battle with cancer. Denis was magnificent in his care for her during that time. At her funeral he delivered an eloquent, loving, broken-hearted eulogy which was unforgettable.

Subsequent depression and loneliness finally came to an end when he began a friendship with Julia McDowell and her welcoming family. Marriage followed but then Denis developed cancer and Julia became a full-time carer and nurse as remission was followed by relapse. He retained his sense of humour until he finally drifted into a coma and died peacefully late on 7 March 2019.

Denis Harding was a talented and innovative ENT surgeon, a dedicated teacher, an outstanding sportsman, a natural leader, a warm and supportive friend, a real family man and a great bloke. Family, friends and colleagues have all benefitted from his influence and shall continue to do so.

He is survived by his wife Julie, by three sons, their wives and his eight grandchildren.

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Association of fried food consumption with all-cause, cardiovascular and cancer mortality

The objective of this study was to examine the prospective association of total and individual fried food consumption with all-cause and cause-specific mortality in women in the US.

Data was obtained from the Woman's Health Initiative conducted in 40 clinical centres in the US. Over 100,000 postmenopausal women aged 50–79 were enrolled and followed for over 20 years.

Frequent consumption of fried foods, especially fried chicken and fried fish/shellfish, was associated with a higher risk of all-cause and cardiovascular mortality in women in the US.

No association with cancer mortality was discovered.

***BMJ* 2019; 364:5420**

Chlorhexidine versus routine bathing to prevent multidrug-resistant organisms and all-cause bloodstream infections in general medical and surgical units

Universal skin and nasal decolonisation reduces multidrug-resistant pathogens and bloodstream infections in intensive care units. The effect of universal decolonisation on pathogens and infections in non-critical care units is unknown.

This trial involved patients in 194 non-critical care units in 53 hospitals in the US. The hospitals were randomised to either routine care or daily chlorhexidine bathing for all patients plus mupirocin for known MRSA carriers.

The researchers report that decolonisation with universal chlorhexidine bathing and targeted mupirocin for MRSA carriers did not significantly reduce multidrug-resistant organisms in non-critical care patients.

***Lancet* 2019; 393:1205–15**

A randomised trial of e-cigarettes versus nicotine-replacement therapy

E-cigarettes are commonly used in attempts to stop smoking, but evidence is limited regarding their effectiveness as compared with that of nicotine products approved as smoking-cessation treatments.

In this trial 886 participants were randomised to either e-cigarettes or nicotine-replacements of their choice. The latter included patch, gum, lozenge, nasal spray, inhalator, mouth spray, mouth strip and microtabs. Both groups received weekly behavioural support for at least four weeks during the three-month trial. The one-year abstinence rate was 18% in the e-cigarette group and 9.9% in the nicotine-replacement group.

The conclusion reached was that e-cigarettes were more effective for smoking cessation than nicotine-replacement therapy, when both products were accompanied by behavioural support.

An editorial commentary on this paper suggests that research on the health consequences of long-term e-cigarette use is needed.

N Engl J Med 2019; 380:629–37 and NEJM 2019; 380:678–9

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1497-21-june-2019/7921

Free Medical and Dental Treatment

June 1919

Patient under gas in a Dentist's surgery. Ref: 1/1-010329-G. Alexander Turnbull Library, Wellington, New Zealand. / records/22742526

Free dental and medical treatment for all scholars, irrespective of class, was advocated in a resolution passed by the Mount Albert School Committee, and recently referred by the Education Board to the Director of Education. A reply was received at a recent meeting of the board, stating that the present school medical staff would be quite inadequate to give medical treatment, in addition to carrying out medical inspection, and that after repeated advertisements it had been found impossible to secure more than one additional medical inspector for the present. The question of free medical treatment, or treatment for a small charge, could only be dealt with when a sufficient staff was procurable. With regard to dental treatment, authority had been obtained for the appointment of eight school dentists, and for procuring the necessary equipment, but it had been impossible to secure more than two suitable dentists until those who had been on military service had returned. It was hoped these would be available in a few months. A resolution was passed expressing appreciation of what had been done by the Department.

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2019/vol-132-no-1497-21-june-2019/7922

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