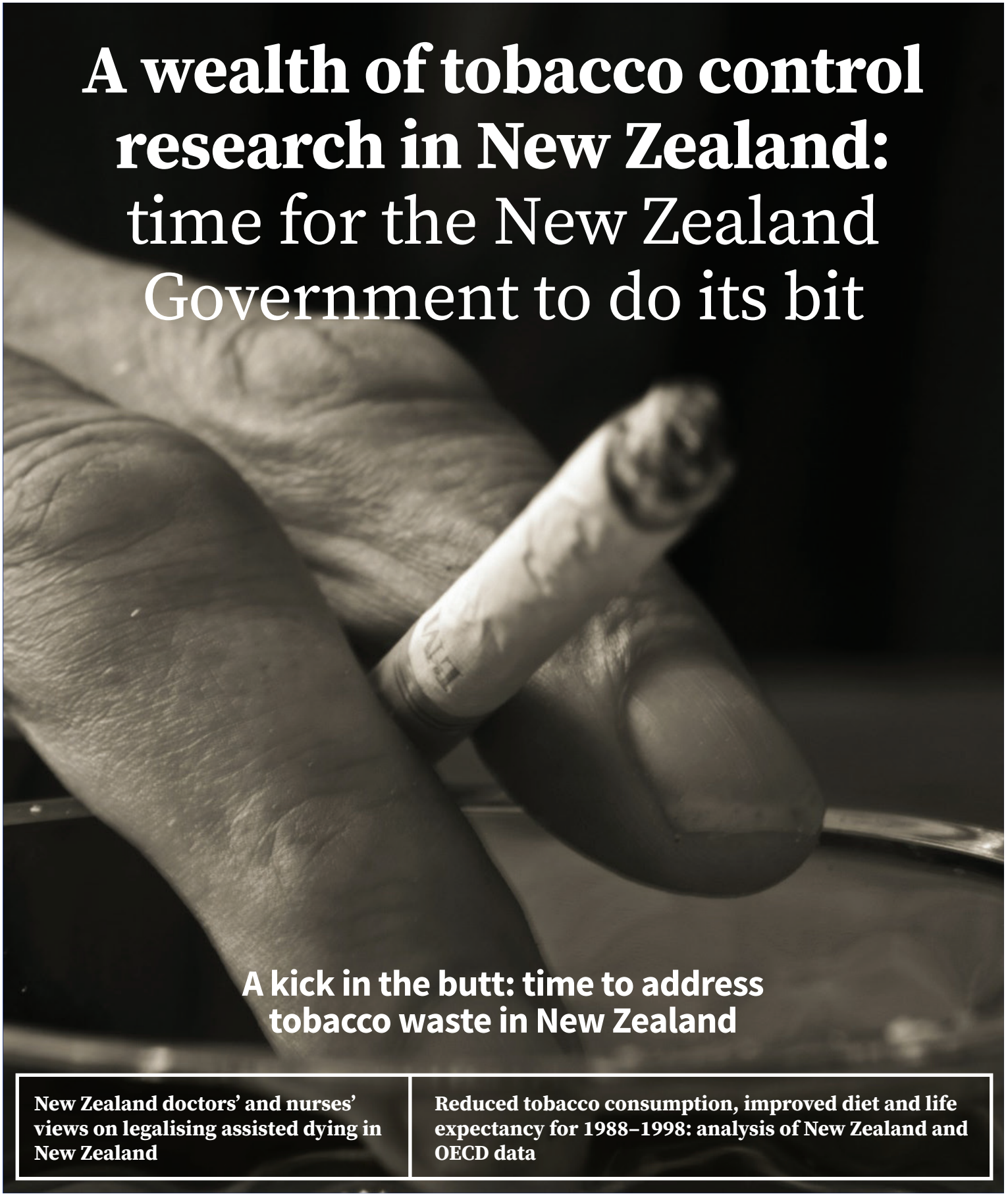
The
New Zealand
Medical Journal
Journal of the New Zealand Medical Association
Vol 130 | No 1456 | 2 June 2017

A wealth of tobacco control research in New Zealand: time for the New Zealand Government to do its bit



A kick in the butt: time to address tobacco waste in New Zealand

New Zealand doctors' and nurses' views on legalising assisted dying in New Zealand

Reduced tobacco consumption, improved diet and life expectancy for 1988–1998: analysis of New Zealand and OECD data

The New Zealand
Medical Journal
Publication Information
published by the New Zealand Medical Association

To contribute to the *NZMJ*, first read:
www.nzma.org.nz/journal/contribute

Other enquiries to:
NZMA
PO Box 156
The Terrace
Wellington 6140
Phone: (04) 472 4741

To subscribe to the *NZMJ*, email
julie@nzma.org.nz

Subscription to the *New Zealand Medical Journal* is free and automatic to NZMA members.

Private subscription is available to institutions, to people who are not medical practitioners, and to medical practitioners who live outside New Zealand. Subscription rates are below.

All access to the *NZMJ* is by login and password, but IP access is available to some subscribers.

Read our Conditions of access for subscribers for further information
www.nzma.org.nz/journal/subscribe/conditions-of-access

If you are a member or a subscriber and have not yet received your login and password, or wish to receive email alerts, please email: julie@nzma.org.nz

The NZMA also publishes the *NZMJ Digest*. This online magazine is sent out to members and subscribers 10 times a year and contains selected material from the *NZMJ*, along with all obituaries, summaries of all articles, and other NZMA and health sector news and information.

Subscription rates for 2017

New Zealand subscription rates		Overseas subscription rates	
Individuals*	$306	Individual	$426
Institutions	$530	Institutions	$571
Individual article	$25	Individual article	$25

*NZ individual subscribers must not be doctors (access is via NZMA Membership)
New Zealand rates include GST. No GST is included in international rates.
Note, subscription for part of a year is available at pro rata rates.
Please email julie@nzma.org.nz for more information.
Individual articles are available for purchase by emailing nzmj@nzma.org.nz

New Zealand doctors' and nurses' views on legalising assisted dying in New Zealand

Pam Oliver, Michael Wilson, Phillipa Malpas

This study explored the views of New Zealand doctors and nurses on legalising assisted dying (AD), including level of support or opposition for legalisation, willingness to engage in legal AD services, what factors might deter generally willing doctors and nurses from providing AD services and what professional supports were perceived as essential or desirable to enable willing engagement in AD service provision. While a majority of doctors in the sample still opposed legalising AD in New Zealand, a majority of nurses supported legalisation and were willing to participate in AD services. Both doctors and nurses supporting legal AD identified authorised guidelines, accountability processes, professional mentoring and a range of other professional supports as essential to safe practitioner engagement, and overwhelmingly saw it as the responsibility of the medical and nursing professional bodies to ensure the provision of robust professional supports for safe AD services.

New Zealand tobacco control experts' views towards policies to reduce tobacco availability

Lindsay Robertson, Louise Marsh, Janet Hoek, Rob McGee

We undertook a qualitative research study, which involved in-depth interviews with 25 smokefree experts throughout New Zealand, to explore their views about the importance of reducing tobacco retail supply, on different policy options, and barriers to policy adoption. In the long-term, participants envisaged tobacco only being available at a small number of specialised outlets, either pharmacies or adult-only/R18 stores. To achieve that long-term scenario, participants suggested a sinking-lid policy on licences or a zoning approach could be adopted to gradually reduce outlet density. Policies banning sales at only certain types of outlet were not considered feasible.

Perspectives of key stakeholders and smokers on a very low nicotine content cigarette-only policy: qualitative study

Trish Fraser, Anette Kira

Very low-nicotine cigarettes are cigarettes that are not addictive. If they were the only cigarettes on the market they could help smokers to quit and young people taking up smoking would not become addicted. However, the cigarettes have very little appeal to smokers, who would generally only be interested in them if they were wanting to quit. Most policy makers, politicians and participants with a commercial interest in cigarettes did not believe any government would be interested in reducing nicotine levels significantly in all cigarettes. Most of the participants thought very low-nicotine cigarettes should be available for sale at a much cheaper price, and policy makers and health people in particular thought alternative nicotine products should also be available to help smokers make the switch from high-nicotine cigarettes.

Reduced tobacco consumption, improved diet and life expectancy for 1988–1998: analysis of New Zealand and OECD data

Murray Laugesen, Randolph C Grace

New Zealanders are living much longer due to giving up tobacco smoking in the 1985–1995 period. Diet had an improving effect. In 1988, men were living 3.6 years more than 10 years before, and women 2.8 years more. That is equal to three months gain in life per person over these 10 years. Most of the effect has benefited men. Tobacco consumption per adult fell by 41% in these 10 years. To do that, the price of cigarettes went up 230%, and we started eating more vegetables and fruit and a variety of polyunsaturated fats.

The combination of bed sharing and maternal smoking leads to a greatly increased risk of sudden unexpected death in infancy: the New Zealand SUDI Nationwide Case Control Study

Edwin A Mitchell, John MD Thompson, Jane Zuccollo, Melanie MacFarlane, Barry Taylor, Dawn Elder, Alistair W Stewart, Teuila Percival, Nick Baker, Gabrielle McDonald, Beverley Lawton, Martin Schlaud, Peter Fleming

This study has shown that many of the risk factors that were identified in the original New Zealand Cot Death Study (1987–1989) are still relevant today. The combination of maternal smoking in pregnancy and bed sharing is extremely hazardous for infants. Furthermore, our findings indicate that the SUDI prevention messages are still applicable today and should be reinforced. SUDI mortality could be reduced to just 7 p.a. in New Zealand (approximately one in 10,000 live births).

A kick in the butt: time to address tobacco waste in New Zealand

Scott Metcalfe, Peter Murray, Carsten Schousboe

Tobacco consumption remains a major public health issue in New Zealand. It also generates a lot of waste. Cigarette butts are commonly seen on our streets and are an environmental hazard. Seeing this waste in our outdoor spaces is a visible reminder of tobacco use. Action to reduce this waste may reduce this hazard and support a smokefree Aotearoa New Zealand.

A comparison of the use of interpreters in New Zealand and the US

Ben Gray, Eric J Hardt

This paper compares the provision of interpreters in health care settings in New Zealand and the US. The US has a much stronger right to an interpreter being provided than New Zealand has. It is hard to know how big a problem there is in New Zealand because the census question does not count how many people have limited English proficiency and thus might need an interpreter. Interpreter use in both the US and New Zealand is still not provided in anywhere near all the circumstances when it is needed.

ISSN 1175-8716

A wealth of tobacco control research in New Zealand: time for the New Zealand Government to do its bit

Frederieke Sanne van der Deen, Nick Wilson

Similarly to countries like Canada, Iceland and Norway, New Zealand has made significant progress in reducing smoking prevalence since the 1980s.[1] In this issue of the *Journal*,[2] Laugesen and Grace show how major shifts in risky health behaviours, such as tobacco smoking, but also saturated fat consumption, are likely to have positively contributed towards increased life expectancy in most Organisation for Economic Cooperation and Development (OECD) countries, but particularly so for males in New Zealand. Out of 22 OECD countries included in their analysis, New Zealand showed the largest decline in per adult tobacco consumption among males (41%), as well as the largest increase in their life expectancy (3.2 years), with the latter two strongly associated. Yet, while New Zealand has come a long way in curbing the tobacco epidemic, in part likely due to measures such as tobacco tax, health warnings, mass media campaigns and the Smoke-free Environments Act, research suggests that a continuation of current policies is unlikely to achieve the Government-supported Smokefree goal for 2025.[3] In addition, unacceptably large ethnic inequalities in smoking prevalence remain. Adequate progress will most likely require 'something bold, something new' to accelerate progress in reducing the prevalence of tobacco smoking, or what is often defined as the 'tobacco endgame'.[4] An increasing number of tobacco endgame strategies have been proposed in recent years.[5]

With an emerging body of research suggesting that easy access to tobacco retail outlets may facilitate smoking uptake in youth, increase smoking and reduce (the success of) smoking cessation in adults, one proposed endgame measure is restricting the tobacco retail environment.[6] Specific measures include restricting outlets within a certain distance of locations frequented by children and youth, restricting sales to certain outlet types only, or a sinking lid on the number of tobacco retail licences over time. While jurisdictions overseas are making progress in putting measures in place to restrict the tobacco retail environment,[7] there is still little (if any) progress in New Zealand on this front. Documenting the views of tobacco control experts on what retail policy options may contribute towards achieving the 2025 goal, could help re-direct and guide advocacy efforts in this area. As such, Robertson and colleagues in this issue of the *Journal*[8] explored the views of 25 tobacco control experts in New Zealand on tobacco retail outlet restrictions. Implementing a tobacco retail outlet licensing scheme that would regulate who can sell tobacco was seen as a crucial short-term step towards New Zealand's Smokefree goal by the vast majority of experts. It was, however, also envisaged that tighter restrictions on who can hold a tobacco retail licence would be needed as 2025 approached, such as restricting tobacco sales to pharmacies or adult-only ('R18') outlets (eg, liquor stores). While modelling studies suggest that tobacco retail outlet restrictions are likely to accelerate progress towards New Zealand's Smokefree 2025 goal, and result in population health gains and cost-savings to the health system, additional measures are most likely required if the goal is to be achieved.[9–11]

Another category of endgame measures proposes more strict regulations on the design and contents of tobacco products. One particular proposal involves a reduction in the level of nicotine in tobacco products,

ultimately aiming to reduce the likelihood of new smokers becoming addicted to tobacco and making it easier for smokers to quit.[12] There is emerging evidence for such a strategy from clinical trials that have found that the consumption of very low nicotine cigarettes (VLNCs) reduces smoker's dependence on tobacco and their daily tobacco consumption.[13] In addition, there is some evidence that smokers who used VLNCs were more likely to start thinking about quitting, as well as actually making a quit attempt. A modelling study furthermore suggests that such a strategy may result in substantive population health gains, even if this measure would result in the rise of a black market of high nicotine products or result in over-compensatory smoking behaviours (increased intensity of smoking to boost nicotine intake).[14] It is therefore perhaps not surprising that this strategy has received support from a number of public health experts to form the backbone of New Zealand's tobacco endgame strategy.[13] Yet, little has been known about New Zealand key stakeholders' or smokers' perspectives of a nicotine reduction strategy, which may be an important indicator of political acceptability of implementing such a measure.

The qualitative study by Fraser and Kira in this issue of the *Journal*[15] helps address this knowledge gap. They report results of 17 semi-structured interviews with key stakeholders on VLNCs, as well as focus groups with 21 smokers who were given the opportunity to use VLNCs. Findings of the stakeholder interviews suggest that there was not much support for a population-level measure that would involve a reduction in the level of nicotine in cigarettes. Lack of real-life evidence, potential to still cause harm to health and political difficulty to implement such a measure were mentioned as reasons. While initially being interested in VLNCs, after using them, smokers mentioned they did not like the taste and smell of these products. They also voiced concerns about the hazardous components that would remain in cigarettes. Yet, some stakeholders and smokers did believe there was a place for VLNCs in the market, alongside high-nicotine cigarettes, and saw potential in smokers taking up these products if they would be offered at lower prices than high-nicotine tobacco cigarettes. Yet, the effectiveness of such a strategy where both products co-exist is potentially more questionable now that the Government has recently decided to make retail access to nicotine-containing electronic cigarettes (e-cigarettes) legal in New Zealand. While there are still many uncertainties about the long-term health impacts of e-cigarettes, there is increasing consensus that the latter products are less harmful to health if smokers make the full transition from smoking to using e-cigarettes (vaping).[16] VLNCs, in comparison, would apart from a lower level of nicotine, still contain all the hazardous components that regular tobacco cigarettes have.

Other major tobacco endgame measures that have been proposed in recent years include a sinking lid on the supply of tobacco, major tax increases and a tobacco-free generation (TFG).[5] The first strategy would involve annual reductions in import quotas of tobacco, resulting in reduced commercial availability of tobacco products each year until a final year wherein sales become illegal.[17] Such a strategy, if implemented carefully and monitored closely, may have a relatively high likelihood of achieving the Smokefree 2025 goal, and would result in substantial health gains and cost-savings to the health system in the next two to three decades.[11] The legal availability of nicotine-containing e-cigarettes would furthermore offer a potential alternative nicotine source for smokers that would find it difficult to quit smoking. Yet, it seems desirable for the New Zealand Government to restrict the sale of the latter products to pharmacies or specialist vape stores where smokers can be supported with professional tobacco cessation advice (and ideally nicotine cessation advice eventually also). Further increases in tobacco tax (beyond the increases scheduled to 2020) are also likely to accelerate progress towards the Smokefree 2025 goal, but may still not be sufficient.[11] Another proposed strategy, the TFG strategy, would entirely prevent future generations from taking up smoking. The TFG strategy could achieve fast reductions in future smoking prevalence if effectively enforced, particularly so for Māori who have nearly double the smoking rate among young people compared to non-Māori.[11]

Achieving the Smokefree 2025 goal would result in substantive population health gains and cost-savings to the New Zealand health system, and would reduce the ethnic gap in tobacco-related health inequalities.[11,18] Yet, benefits of achieving this goal may span much wider. Reduced tobacco use would also decrease tobacco waste, an important problem considered in this issue of the *Journal* by Metcalfe and colleagues.[19] Their proposed approaches are well worthy of further consideration for two reasons. Firstly, if New Zealand (unfortunately) avoids bold initiatives and ends up taking a slower and more incremental approach to ending the tobacco epidemic, then it will need a wide range of other initiatives, including making smokers and the tobacco industry deal with the tobacco waste problem more appropriately. Secondly, for dealing with tobacco waste from international visitors who continue to smoke in coming decades (ie, once New Zealand has achieved its Smokefree goal for its own population).

Tobacco endgame measures will enhance New Zealand's likelihood of achieving the Smokefree 2025 goal, but New Zealand policy-makers undoubtedly give consideration to other factors such as political and public acceptability and feasibility. Nevertheless, it appears unethical to us for a government that stated its commitment to a Smokefree 2025 goal (and which specifically stipulated that it would reduce both *smoking prevalence* and the *availability of tobacco* to minimal levels by 2025), to not seriously consider further substantial advances in tobacco control and the implementation of major endgame measures.

Competing interests:
Nil.

Author information:
Frederieke Sanne van der Deen, Public Health, University of Otago, Wellington; Nick Wilson, Public Health, University of Otago, Wellington.

Corresponding author:
Frederieke Sanne van der Deen, Public Health, University of Otago, Wellington.
frederieke.vanderdeen@otago.ac.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7257

REFERENCES:

1. Ng M, Freeman MK, Fleming TD, et al. Smoking prevalence and cigarette consumption in 187 countries, 1980–2012. JAMA 2014; 311:183–92.
2. Laugesen M, Grace RC. Reduced tobacco consumption, improved diet, and life expectancy for 1988–1998: analysis of New Zealand and OECD data. N Z Med J 2017; 130(1456):46–51.
3. van der Deen FS, Ikeda T, Cobiac L, Wilson N, Blakely T. Projecting future smoking prevalence to 2025 and beyond in New Zealand using smoking prevalence data from the 2013 census. N Z Med J 2014; 127(1406):71–9.
4. Warner KE. An endgame for tobacco? Tob Control 2013; 22:i3–5.
5. McDaniel PA, Smith EA, Malone RE. The tobacco endgame: a qualitative review and synthesis. Tob Control 2016; 25:594–604.
6. Henriksen L. The retail environment for tobacco: a barometer of progress towards the endgame. Tob Control 2015; 24:e1–2.
7. Robertson L, Marsh L, Edwards R, Hoek J, van der Deen FS, McGee R. Regulating tobacco retail in New Zealand: what can we learn from overseas? N Z Med J 2016; 129(1432):74–9.
8. Robertson L, Marsh L, Hoek J, McGee R. New Zealand tobacco control experts' views towards policies to reduce tobacco availability. N Z Med J 2017; 130(1456):27–35.
9. Pearson AL, Cleghorn CL, van der Deen FS, et al. Tobacco retail outlet restrictions: health and

cost impacts from multi-state life-table modelling in a national population. Tob Control (E-publication 22 September 2016).

10. Pearson AL, van der Deen FS, Wilson N, Cobiac L, Blakely T. Theoretical impacts of a range of major tobacco retail outlet reduction interventions: modelling results in a country with a smoke-free nation goal. Tob Control 2015; 24:e32–8.
11. van der Deen FS, Wilson N, Cleghorn CL, et al. Impact of five tobacco endgame strategies on future smoking prevalence, population health, and health system costs: two modelling studies to inform the tobacco endgame. Tob Control 2017; In Press.
12. Benowitz NL, Henningfield JE. Reducing the nicotine content to make cigarettes less addicitive. Tob Control 2013; 22:i14–7.
13. Donny EC, Walker N, Hatsukami D, Bullen C. Reducing the nicotine content of combusted tobacco products sold in New Zealand. Tob Control 2017; 26:e37.
14. Tengs TO, Ahmad S, Savage JM, Moore R, Gage E. The AMA proposal to mandate nicotine reduction in cigarettes: a simulation of the population health impacts. Prev Med 2005; 40:170–80.
15. Fraser T, Kira A. Perpectives of key stakeholders and smokers on a very low nicotine content cigarette-only policy: qualitative study. N Z Med J 2017; 130(1456)36–45.
16. Shahab L, Goniewicz ML, Blount BC, et al. Nicotine, carcinogen, and toxin exposure in long-term e-cigarette and nicotine replacement therapy users: a cross-sectional study. Ann Intern Med 2017; 166:390–400.
17. Wilson N, Thomson GW, Edwards R, Blakely T. Potential advantages and disadvantages of an endgame strategy: a 'sinking lid' on tobacco supply. Tob Control 2013; 22:i18–21.
18. Blakely T, Carter K, Wilson N, et al. If nobody smoked tobacco in New Zealand from 2020 onwards, what effect would this have on ethnic inequalities in life expectancy? N Z Med J 2010; 123(1320):26–36.
19. Metcalfe S, Murray P, Schousboe C. A kick in the butt: time to address tobacco waste in New Zealand. N Z Med J 2017; 130(1456)65–69.

New Zealand doctors' and nurses' views on legalising assisted dying in New Zealand

Pam Oliver, Michael Wilson, Phillipa Malpas

ABSTRACT

BACKGROUND: Assisted dying (AD) has been legalised by statute or court decisions in at least 15 jurisdictions internationally. Nonetheless, only three medical professional bodies (and none in nursing) across those jurisdictions have proactively developed authorised policy, practice standards, guidelines or protocols, or other professional supports for health practitioners who may legally participate in AD services, and the majority internationally remain formally opposed to AD. There is a perceived likelihood that AD may be legalised in New Zealand soon.

AIM: This study explored the views of doctors and nurses as to support for or opposition to legalising AD, including reasons for those views, what might deter generally willing doctors and nurses from providing AD services and what professional supports were perceived as essential or desirable to enable willing engagement in AD service provision.

RESULTS: While only 37% of doctors supported legalising AD in New Zealand, 67% of nurses were supportive. Of those respondents who were willing in principle to provide AD services, large majorities identified a range of practical and ethical professional supports as essential to safe practitioner engagement. Those respondents overwhelmingly saw the provision of most of those supports as the responsibility of the medical and nursing professional bodies.

CONCLUSION: There is a substantial cohort of doctors and nurses in New Zealand who support legalising AD, potentially sufficient for reasonable seeker access to AD services once legalised. However, many doctors in particular still oppose AD, and international research shows that the main barrier to access to legal AD is a lack of capacity and capability among health professionals, due in large part to several related factors, in particular: a lack of either accredited training and education for the AD provider tasks and roles; inadequate immunities within the legislation to protect participating professionals; and most importantly, a lack of practice standards and guidelines authorised by the relevant medical and nursing professional bodies. The challenge is for such protections to be available well in advance of legalisation, so that health practitioners are not at risk ethically or otherwise in early participation.

In the past two decades, more than a dozen jurisdictions internationally have legalised assisted dying (AD) with varying regulatory regimes.[1–3] Where jurisdictions internationally have legalised AD, the intent of the legislation—to ease intolerable suffering through proactive medical intervention to hasten death—has been frustrated by a range of factors, some foreseen and others unforeseen.[4] Major access barriers can occur not only for people seeking AD ('seekers') but also for doctors and other health practitioners who wish to provide legal AD services.[4–6] Barriers identified widely for doctors wishing to provide AD services include difficulties with the interpretation of legal requirements,[7] but are also often attributed by doctors to the absence of authorised guidelines, protocols and training for safe provision of AD services, resulting in doctors' fearing professional stigma or censure, the potential for making professional errors, and/or collegial or employer pressure to not engage in providing AD.[4]

Surveys and polls over the past 20 years have demonstrated strong and increasing public support for legalising AD in New Zealand.[8–12] In studies over the past decade,

small percentages of New Zealand doctors have acknowledged providing patients with a drug that had been "prescribed, supplied or administered explicitly for the purpose of hastening the patient's death", and nurses were identified as having assisted in hastening patients' deaths in this way.[13,14] The New Zealand Nurses Organisation (NZNO), in its 2016 submission to the Health Select Committee on Assisted Dying, noted that "… some form of euthanasia may be legal in Aotearoa New Zealand in the near future [which will] have serious implications for nurses who are involved in caring for people that are dying … [and thus] require consideration and input from professional nursing associations, regulatory bodies and national nursing organisations" into the development of the legislation.[15] However, most of New Zealand's professional medical and nursing bodies have until now consistently either opposed AD or declined to take a stand, and none of them appears as yet to have actively considered its potential role in providing practice standards or guidelines for its members in the anticipation of AD being legalised. The vocal opposition to legalising AD, in particular from faith-based organisations, has been endorsed by some palliative medicine and palliative care professional bodies.[16–19]

Given a perceived likelihood that AD may be legalised in New Zealand, the present research canvassed the following questions:

- What are New Zealand doctors' and nurses' views of legalising AD in New Zealand?
- What end-of-life practices, including AD, occur currently in doctors' and nurses' practice?
- In what circumstances might doctors and nurses be willing to engage in legal AD?
- What would deter doctors and nurses from engaging in legal AD?
- How might barriers to health practitioner participation be mitigated?

Method

Data collection

In October/November 2015, an invitation was disseminated through the electronic newsletters and some websites of key New Zealand medical and nursing professional bodies (including Australasian bodies) for New Zealand-registered doctors and nurses to take part in an online survey. The survey was anonymous and was approved by the University of Auckland Human Participants Ethics Committee (UAHPEC Reference: 015470) prior to dissemination. The survey questions and structure were developed from a review of the literature on doctors' and nurses' attitudes towards AD internationally and the development of professional supports for doctors and nurses participating in legal AD in North America and Europe. A mixed-method survey approach employed quantitative and qualitative data collection. Rating scales and other closed-ended response options were augmented by several open-ended questions for respondents to voice independent views. Rating questions had response options that allowed for the full range of views, from 'strongly agree' to 'strongly disagree', with options to indicate uncertainty or omit the question if preferred, eg, 'not applicable', 'don't know', 'not sure', 'prefer not to answer'. The survey was piloted with five doctors and five nurses working in a variety of specialities. It took from 15 to 30 minutes to complete depending on respondent contribution to the open-ended questions. Quantitative data analysis focussed on response frequency and percentage counts with cross-tabulation of selected variables of interest. Qualitative data were analysed using thematic analysis.[20] Multiple quotes have been included to represent the diversity of viewpoints.

Respondent attributes

Of the total 969 survey respondents, 197 did not complete the demographic questions. This article reports on the 772 responses identifiable as those of a doctor (n=298) or nurse (n=474). (Accordingly these data differ in some respects from those discussed in our *report* 'Attitudes of New Zealand doctors and nurses towards legalising assisted dying - Report to New Zealand medical and nursing associations', disseminated to medical and nursing associations earlier in 2016). Most respondents were highly experienced practitioners, and many had significant experience in end-of-life (EOL) care (see Table 1). The age, sex and ethnic distribution was closely representative of the medicine

Table 1: Percent frequency of respondent characteristics by nurse (n=474) and doctor (n=298).

	Age				Gender		
	<30	30–45	46–60	>60	F	M	T/I
Doctor	2	36	49	14	49.5	50.2	0.3
Nurse	11	22	51	17	93.5	6.5	.

	Ethnicity*					
	NZ European/Pakeha	Māori	Pasifika	Indian	Chinese	Other Asian
Doctor	82	3	1	2	4	18
Nurse	87	4	1	0.4	1.1	10

	FTE years professional experience					FTE years EOL care experience					
	1–5	6–10	11–20	21–40	>40	1–5	6–10	11–20	21–40	>40	None
Doctor	3	8	33	49	7	20	8	16	17	1	38
Nurse	16	10	25	37	13	38	16	14	7	1	25

	Location of practice				Religious affiliation				
	City (pop >250,000)	Provincial city	Town	Rural	None	Christian	Jewish	Hindu	Other
Doctor	55	31	6	8	43	53	.	0.7	3
Nurse	49	30	15	6	47	47	0.4	0.2	6

*Respondents could select as many as applied.

and nursing professions generally in New Zealand.[21,22] Doctors responding were predominantly members of the Royal New Zealand College of General Practitioners (RNZCGP) (40%) and New Zealand Medical Association (NZMA) (20%). Almost all nurses (98%) were members of the New Zealand Nursing Organisation (NZNO), with 21% also members of other professional nursing bodies. Respondents could select more than one professional membership, thus percentages exceed 100%. Just over half of respondents (55%) identified a religious affiliation, predominantly Christian, while the remainder indicated no religious affiliation.

Results

Doctors' and nurses' support for and opposition to legalising AD

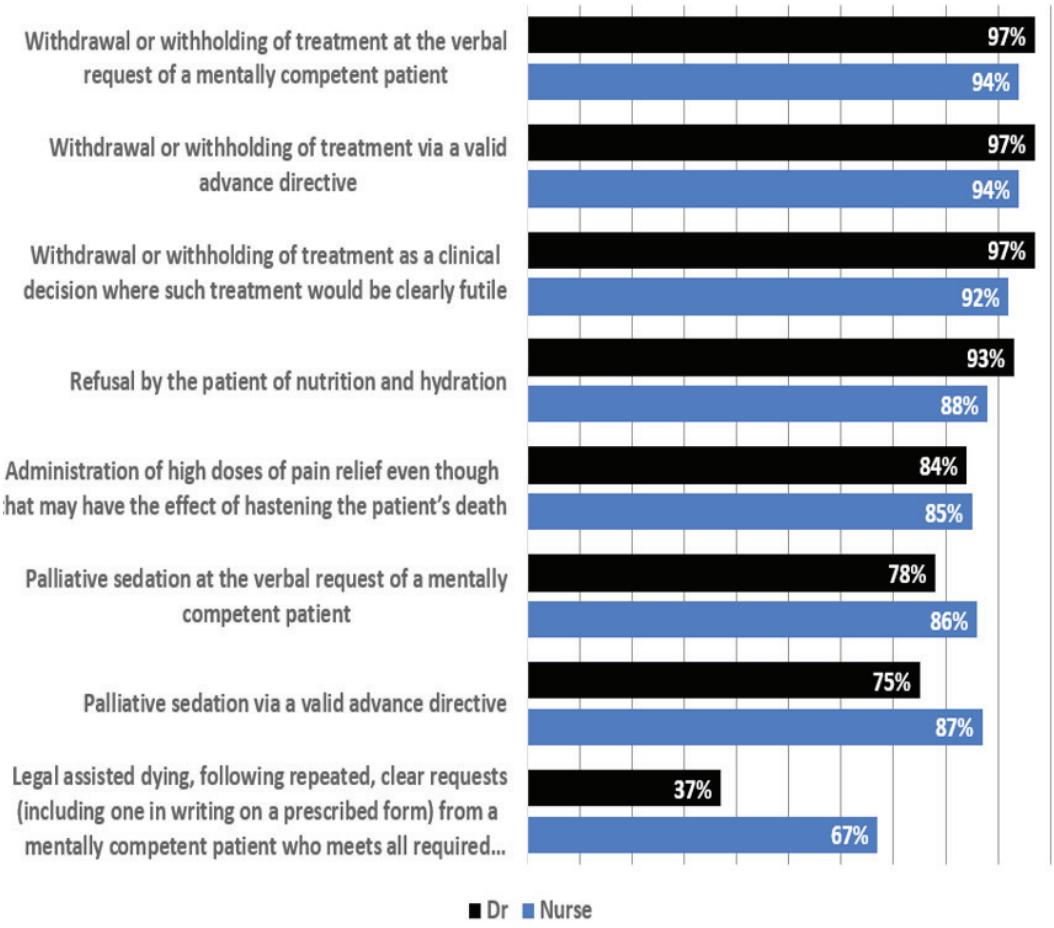
As shown in Figure 1, 37% of doctors and 67% of nurses responding "strongly" or "mostly" agreed—on a 5-point scale from 'strongly agree' to 'strongly disagree' or 'not sure'—that AD should be legalised in New Zealand, assuming provision of appropriate guidelines and protocols. In contrast, 58% of doctors and 29% of nurses "strongly" or "mostly" disagreed with legalising AD. That is, respondents tended to hold clear, and polarised, views on the topic, with only 4–5% of doctors and nurses answering "Not sure".

These findings reflect both recent New Zealand studies[8,23] and research in other countries prior to AD legislation being introduced, where somewhere between 30–40% of doctors have supported legalisation.[24–26] While no previous international research has measured nurses' support for or willingness to participate in AD prior to legalisation, the greater support from nurses than doctors is consistent with research elsewhere.[27–29]

Reasons for supporting legal AD

The most common reasons for supporting legal AD were respondents' views about (in order of frequency): people's right to autonomous decision-making at the end of their life, irrespective of health practitioners' beliefs (33% of all respondents to this question), philosophical beliefs about personal dignity and a perceived right for people to avoid unnecessary pain and suffering at end of life (23%); respondents' professional or personal experiences of witnessing severe suffering at end of life (11%); a perceived failure of some health practitioners to acknowledge medical

Figure 1: Agree with various end-of-life medical care options % "strongly" or "mostly" agree by doctor (n=298), nurse (n=475).



futility, resulting in avoidable suffering through prolonging people's lives, without their permission or against their wishes (9%). Percentages may total more than 100% collectively because respondents could give multiple reasons. Respondents' comments are provided verbatim with the original spelling, grammar and punctuation. This is accepted good practice in reporting qualitative data. Typical comments were: .

As a nurse I have lost count of the number of very elderly patients who, faced with a lingering end of life, have said they wished they could hasten the process rather than drag it out in a manner which they felt compromised their dignity and comfort. ... the medical profession has lost sight of the fact that people have a natural lifespan and try to keep some patients alive at no benefit to those patients (those that request cessation of treatment etc and the doctors ignore their wishes). [Nurse]

Everyone has a right to self-determination. I do not believe that the medicalised healthcare system should be able to over ride this right. People should be able to live and die on their own terms, according to their own personal and cultural values. Currently, without legalised euthanasia, people have to relinquish control of the last period of their life to whichever health care provider is providing their care. In my experience this often results in a death that is not defined by the person or their family as 'good'. We should all be entitled to a 'good' death. [Nurse]

Due to the many undignified and frankly awful deaths I have seen over the past several years working in various hospitals. A lot of what we [health practitioners] do is cruel at times (despite best intentions) and can cause a lot of pain for very little benefit (if any). [Doctor]

Collectively, these reasons indicate that respondents' support for legal AD closely reflected the key principles of medical ethics—beneficence, non-maleficence and in particular, patient autonomy as the recognised priority ethical principle in health care[30]—together with a perception by many respondents that the medical profession currently does not always sufficiently respect patient autonomy when it comes to death and dying.

'Clearly medically futile' treatment is offered/ordered/carried out far too often.

Advanced Directives are ignored/dismissed by Doctors too often. [Nurse]

Although I complied with the resus attempt at the time I was upset that a patient who'd decided & had marked on his file Not For Resus did have an [unsuccessful] resus attempt made on him. [Nurse]

Reasons for opposing legal AD

The most common reasons for respondents opposing AD were (in order of frequency): a belief that undertaking AD functions was not a proper role for health practitioners (10% of all respondents to this question); a belief that vulnerable people will be pressured to end their lives prematurely (10%); belief in the adequacy of good palliative care (9%); moral/ethical (non-religious) objections to legal AD (9%); slippery slope arguments; that legalising AD will result in doctors and nurses providing non-voluntary euthanasia (NVE) or families coercing dying people (7%); and a belief that there is important spiritual value in suffering (7%). The following comments illustrate these reasons:

I don't believe legally assisted dying is necessary, as patients should be able to receive high quality palliative care which includes withdrawal from treatment and high doses of sedation and analgesia to assist in a comfortable, humane death. [Nurse]

Have cared for dying people in a variety of organisations and situations and feel that GOOD palliative care will enhance the quality of their (and their families) lives and death. This has been proven and supported by research. It is society's attitude toward death that needs to change; death is a normal part of life and needs to be approached as this. Healthcare professionals enter the profession to care for people NOT to end their lives. [Nurse]

We are born, live and die, to take away the process (transitions of birth and dying) is to rob humanity of growing in courage and spiritual potential that can only birth with raw pain and the emotions that go with it. [Nurse]

These concerns highlight the equivocality and confusion of many health practitioners in relation to respecting patient autonomy when their own moralities may not entirely align with those of patients on this matter.

Deciding about legalising AD

While a majority of respondents were either "strongly" opposed or "strongly" supportive of legal AD, 21% of doctors and 19% of nurses voiced some level of ambivalence, identifying difficulties in thinking through the pros and cons of legalising AD, often because of lack of information. Only around a quarter of doctors (29%) and nurses (27%) had ever read detailed material or attended an information session on how AD laws are implemented overseas, while less than 10% of doctors and only 4% of nurses rated themselves as "well informed" on the legal safeguards for patients and doctors in jurisdictions where AD is already legal.

I have not taken the time to read all of the relevant information so am relatively ill informed. I think choices around end of life are very personal. I'm hugely anxious about the potential for abuse, but I'm also hugely anxious about inflicting suffering on those for whom existence is miserable. When I worked in intensive care, part of my job was telling people when further intervention was futile. I found that a) doctors in general are very bad at this and b) people were often very relieved to have what they already thought out in the open and would often have stopped treatment earlier had they felt they had the choice. I believe strongly that dignity and comfort are the least we can give the dying. Sometimes that means letting them choose the time and manner of their deaths. [Doctor]

I have spent the whole of my professional career to date trying to save lives and alleviate suffering; helping someone to end their life is a complete reversal of this mindset. Any decision on whether to be involved would require a great deal of discussion and soul-searching. I am not sure, at the moment, under what circumstances I would be prepared to help someone to die. It would very much depend on the individual circumstances. [Doctor]

Ambivalence was also apparent, more so among doctors than nurses, in relation to the acceptability of other, already legal end-of-life (EOL) interventions involving palliative sedation or the administration of high doses of pain relief where doing so had a potential to hasten death (see Figure 1). On

the one hand, the high levels of respondent support for administering "high doses of pain relief, even though that may have the effect of hastening the patient's death" indicate that the 'doctrine of double effect' is accepted practice among the majority of EOL care practitioners in New Zealand, as is the case in many overseas countries.[31]

Patients deemed to be competent under my care in their last hours/days of a terminal illness, who request not to receive nutrition and medical interventions that would prolong their death have my support and respect and I have no scruples about administering sufficient pain relief to maintain their level of comfort even if that would result in hastening death. [Nurse]

Usually when we withdraw treatment it is clear to families that the patient is not going to recover, the patient may no longer be able to communicate even. For those with more protracted conditions, assisted dying may give them dignity they will otherwise forgo - there's little dignity in long term bedsores and nappies. Or advanced dementia. [Doctor]

However, between one sixth and one quarter of doctors and nurses variously did not support other currently legal EOL interventions, in particular palliative sedation. This response pattern suggests that health practitioners struggle with the ethics, or personal emotional impacts, of supporting patients' EOL treatment choices where those involve actively administering medication, rather than withholding it, even where the outcome is likely to be the same, the patient has requested it and administering medication may well result in significantly less physical and/or emotional distress for the patient and family.

In what medical circumstances should AD be legal?

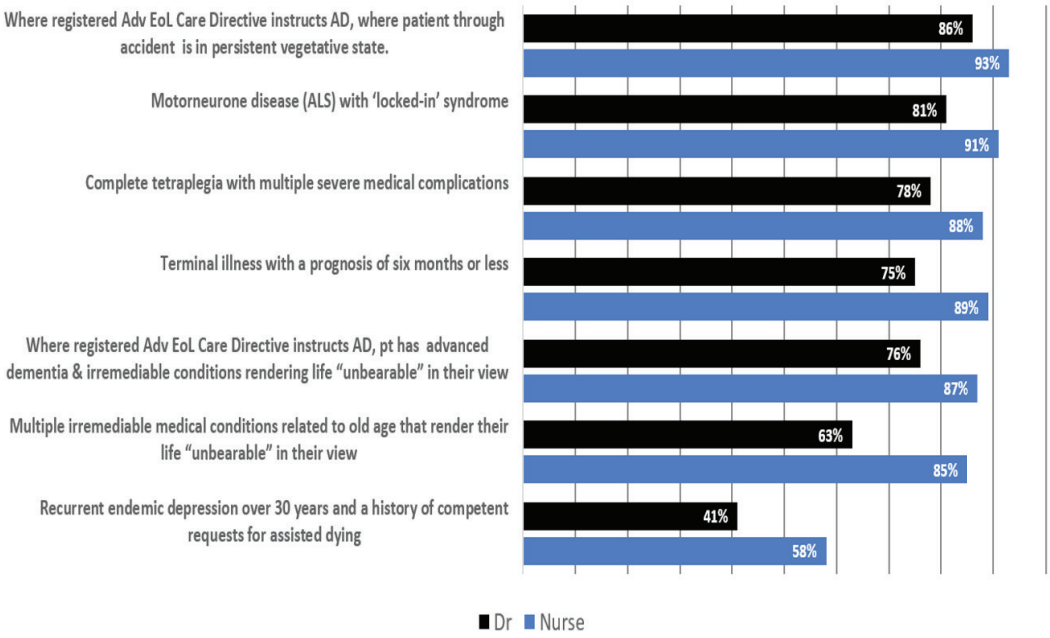
The data discussed in the remainder of this article represent the views of a sub-sample in the study—those respondents who had answered "strongly agree", "mostly agree", "mostly disagree" or "not sure" to the initial survey question on whether respondents agreed with legalising AD. Respondents who "strongly" disagreed with legal AD did not complete the remaining questions in the survey, as those were not relevant to opposers.

As Figure 2 illustrates, among the sub-sample there was a high level of support from both doctors and nurses for the availability of legal AD for seekers with a wide range of medical conditions. However, support for AD was greatest where the medical condition most clearly indicated either imminent death or a clear absence of quality of life—conditions such as a terminal illness, profoundly disabling conditions such as motorneurone disease, or being in a persistent vegetative state—that is, in patient contexts where there are arguably fewer ethical dilemmas and the health practitioner does not have to make value judgments or challenge their own belief systems. In contrast, support for legal AD was lowest where the medical decision-making was more ethically complex and open to value judgments, for example, where the person had multiple irremediable age-related comorbidities that made their life unbearable, in their view, or where the person had dementia but had made a clear advance directive while mentally competent instructing AD in certain circumstances which they considered intolerable. In these contexts, where health practitioners would need to make judgments and decisions about concepts such as mental competence, depressive states or the 'unbearability' of living, respondents voiced that decision-making as problematic, as it is for many doctors where AD has been legalised.[32, 33]

While this may be relatively straightforward in a younger person with no neurological or pyschiatric illness, this starts to become very difficult with any concerns about mood or cognitive deficit. It would be an assessment of competence with the highest stake and high potential to challenge (eg from famly members) as it is not an exact science. There is no single 'test' to do to answer the question. [Doctor]

In contrast, doctors' support for AD for people with multiple age-related medical conditions increased from 63% to 76% where there was a legal advance directive in place validating the person's pre-considered wishes, so that the doctor was not required to make a judgment for a seeker whose competence was in any doubt. Respondents' comments commonly reflected their concerns about making value judgments on

Figure 2: Agree with the availability of AD for various circumstances % "strongly" or "mostly" agree by doctor (n=155), nurse (n=356).



behalf of patients, highlighting the subjectivity of clinical judgment, and the need to make clinical decisions in a broader social/cultural/psychological context and only after substantial discussion with patients.

There also needs to be realistic, culturally appropriate, discussions with patients and their families about desirable thresholds of care in acute illness. The GP would seem to be the best resource for this, but these discussions take time to organise and conduct, and there will be a paperwork burden. Adequate funding would need to be provided. A number of elderly patients with multiple comorbidities come in to ED with "Resus" forms filled out requesting CPR, but I have yet to meet a single one who would actually want this when I talk to them about it. [Doctor]

I have experienced clients with a mental illness (Major Depression and Self Harm) become life focused when given a terminal illness diagnosis, this is why I have answered unsure on question lll [AD requested by a competent person with chronic depression]. [Doctor]

The boundaries for some decisions for assisted dying in the cases of mental health I believe should not be treated the same as palliative. Many people experiencing depression or dementia will repeatedly state that they want to die. I believe this would be dangerous to give the option of assisted dying as there will be some that will recover from their depression. [Doctor]

Unsurprisingly, many doctors also voiced the same concerns about the challenges in validating advance directives instructing AD, which remains an issue even where that is available by statute in The Netherlands.[34] However, it was apparent that many respondents had been thinking through how to manage such challenges.

The difficulty I think is in the wording [advance directive]. How to interpret clearly what is unbearable for a patient based on an advanced directive written years before. [Doctor]

Re dementia and end of life care directive. My concerns would be that the directive would need to have some clear statement that at the time of writing the person was competent to give the directive. How would you know this still is the persons wishes? [Doctor]

Figure 2 also shows that nurses were consistently and substantially more supportive of legal AD across the range of medical circumstances, remarkably so for AD to be permitted on the basis of aging-related co-morbidities and recurrent endemic depression, as has been found in overseas research.[27]

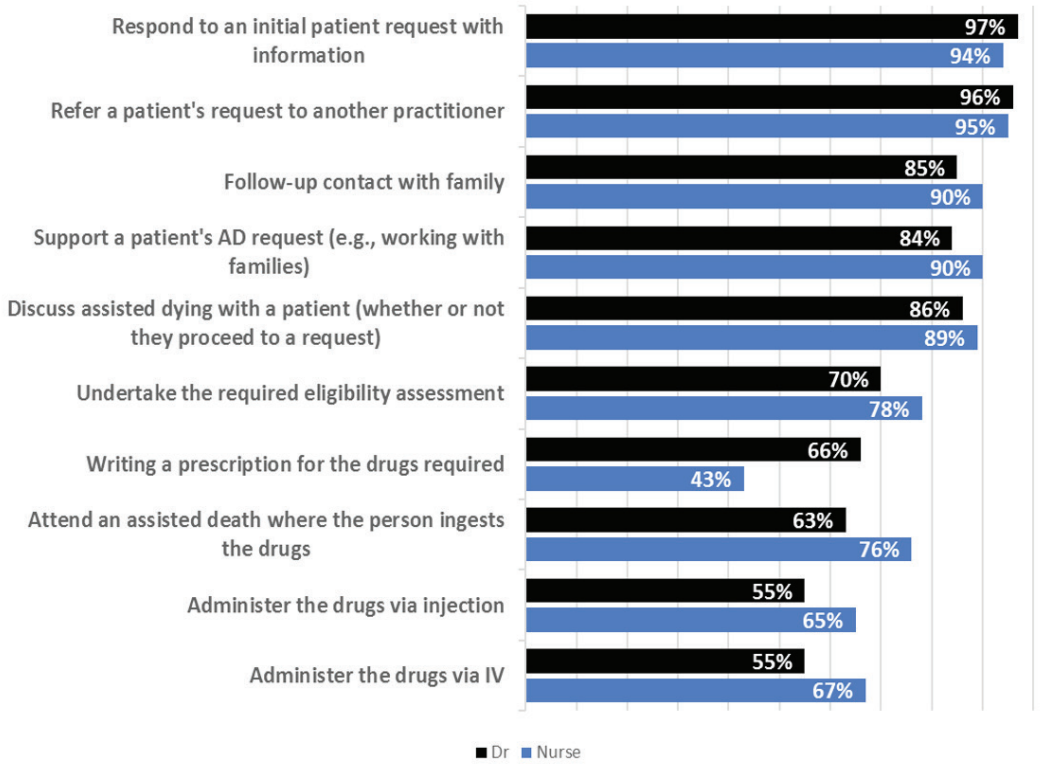
In what circumstances might doctors and nurses be willing to engage in legal AD?

The willingness of both doctors and nurses in the sub-sample to engage in AD tasks and roles, while generally high (see Figure 3), was greatest for the tasks that involve less 'agency' in relation to actively providing the means for a hastened death. These results reflect an international finding that doctors are more reluctant to administer the means of death than to counsel or provide other legal prerequisites such as a diagnostic report, especially in the absence of guidelines authorised by the profession.[4,35] In contrast to the AD access issues identified in jurisdictions where AD is already legal, where ignoring of such requests and non-referral to a willing practitioner are major barriers,[4] the great majority of doctors and nurses in this sub-sample were willing to discuss AD with seekers, provide them with information and refer them to another practitioner if needed. Two thirds or more of these doctors were willing to undertake prerequisite diagnostic and eligibility assessments (70%) and write a prescription for a lethal dose (66%) where a patient had met the eligibility requirements, and over half were willing to administer AD via either injection or intravenous line. Nurses' willingness to engage in providing AD was high for all tasks except writing the prescription; moreover, a majority of nurses' qualitative responses demonstrated that many more would be willing to prescribe, if so authorised by law, than the 43% who responded 'yes' to the rating question.

I have answered the question regarding prescribing and administering as a 'not willing' only due to my RN status. [Nurse]

I see this responsibility as more within the scope of nursing than medicine/psychiatry. Nurses are all about skilled caring, rather than focusing on curing. [Nurse]

Figure 3: Willing to participate in activities of legal AD service provision % "very" or "probably" willing by doctor (n=155), nurse (n=356).



NZMJ 2 June 2017, Vol 130 No 1456
ISSN 1175-8716
www.nzma.org.nz/journal

This finding supports nurses' willingness internationally to be involved, and to have been involved, in providing AD services.[36,37] A number of jurisdictions with legal AD have considered extending AD functions to nurse practitioners,[38] nurses in fact commonly administer AD in some of those jurisdictions,[36,37] and nurses' participation is considered normal and essential in The Netherlands.[39] Nurse participation in several AD tasks is authorised under the new Canadian federal legislation in acknowledgement of the gaps in medical services in many geographic locations.[40]

Figure 3 shows that there is a sufficient cohort of both professions in New Zealand available to provide AD services, given the provision of appropriate training and support, should AD become legal. Nearly one in 10 sub-sample doctors (n=11) responding to the question about actual provision of AD had at some time either provided or administered a lethal dose of medication "intentionally" to help someone to have a hastened death, and nearly one percent had done so "several" or "many" times. (Respondents could select only one of the response options [from 'never' to 'many times']). This finding is supported by a *NZ Doctor* survey in July 2015,[23] which showed that the number of doctors either providing AD or being willing to report doing so had doubled in the past decade.

Three percent of sub-sample nurse respondents had also knowingly provided AD "intentionally", one third of them "many times", while others had observed it occurring and tacitly supported that.

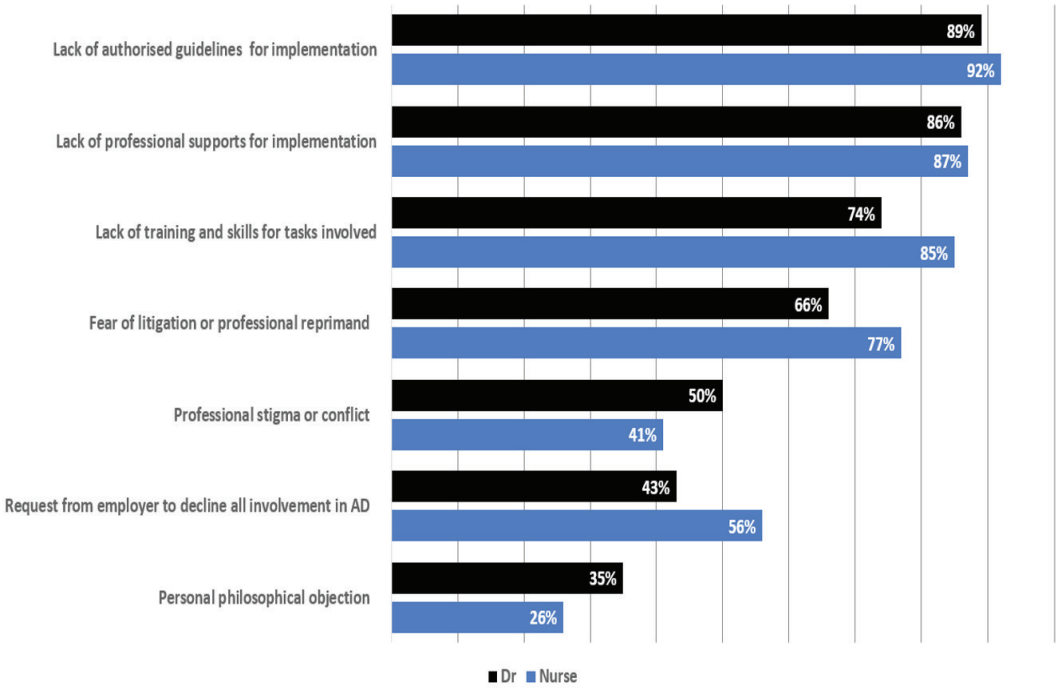
It is often unspoken but obvious that the amount of drugs going into the subcut pump of an unconscious person are going to hasten death. [Nurse]

As a nurse I have often witnessed (h) [an intentional AD] and I agreed with it. [Nurse]

Once again I will mention that I have worked in rest homes and assisted the RN with drugs for dying residents. [Doctor]

I know of maybe 5 cases that when I left private homes family members/patient administered doses that would hasten death. The people asked before hand questions which implied what they were going to do. No one wanted me there so that I could not be implied if anything arose or I could not see what they were doing as they knew it was not legal. [Nurse]

Figure 4: Factors that may deter health practitioner participation in legal assisted dying % responding "a lot" or "a bit" by doctor (n=155), nurse (n=356).



NZMJ 2 June 2017, Vol 130 No 1456
ISSN 1175-8716
www.nzma.org.nz/journal

What would deter doctors and nurses from engaging in legal AD, and how might barriers to health practitioner participation be mitigated?

Deterrents

As Figure 4 illustrates, the most common reasons why otherwise supportive doctors and nurses might be deterred from participating in legal AD were in three related areas—a lack of authorised guidelines for undertaking AD safely and competently, a lack of professional support and a lack of training and skills—followed closely by concerns about litigation or professional reprimand. Respondents' comments showed that they saw these factors as causally related.

If it is legalised I would assume that there will be training, protocols and guidelines around any occurrence. I would not want to be involved without any of these controls. [Doctor]

Unclear guidelines, need to be robust and protection of the vulnerable paramount. [Doctor]

An overall sense that an organisation [provider] did not have the correct policies or that they were not well entrenched and followed, leaving doubt. [Doctor]

I would need to be absolutely certain there would be no complaint by family, employer etc, and crystal clear guidelines would need to be provided along with a transparent pathway for actioning the request. [Doctor]

Small numbers of respondents' comments identified other potential deterrents in the following areas: strong opposition from the person's family; the respondent's personal objection to AD in particular circumstances (eg, minors; people with dementia); requests from personal acquaintances; concerns about sufficient moral support for participating professionals; fear of stigmatisation of participating professionals by the media, "anti-euthanasia organisations" or colleagues; potential negative impacts on their careers; or being harassed by opponents of AD. Nonetheless they recognised the seeker's right to request a legal assisted death.

My willingness to be part of the actual assisted dying process would be influenced by whether or not the person met my personal criteria for who should/should not be able to access assisted dying. In saying that, I believe it is much like abortion - a right to choose is a right to choose, not choose in only some instances. [Nurse]

Disagreement with a person who wanted to die where I thought that was a poor decision, a young person with depression for example, a younger person who was quite well at present but fearful of worsening, an advance directive I did not feel confident about, when i thought a person was under duress. I find this all quite hard, but I try to put myself in their shoes, and who am I to say I would not help them in their time of need and relief from suffering. I am very comfortable with terminal sedation, what's so different? [Doctor]

The taking of a persons life is a conflict to me therefore if the person is able to be set up to take their own life by administering it to themselves that would be preferable to me. [Doctor]

Other comments reflected respondents' uncertainty about how the service delivery processes might work, in particular the ethical aspects of decision-making and safety for all participants, and some suggested that AD provision might best be a specialist area.

There should be a specific medical facility where the procedure happens or alternatively in a person's home but with more than one health care professional present to witness procedures for safety of the health professional. It is important that the patient and their family are surrounded by health professionals who support the legislation and can support families going through this process. [Nurse]

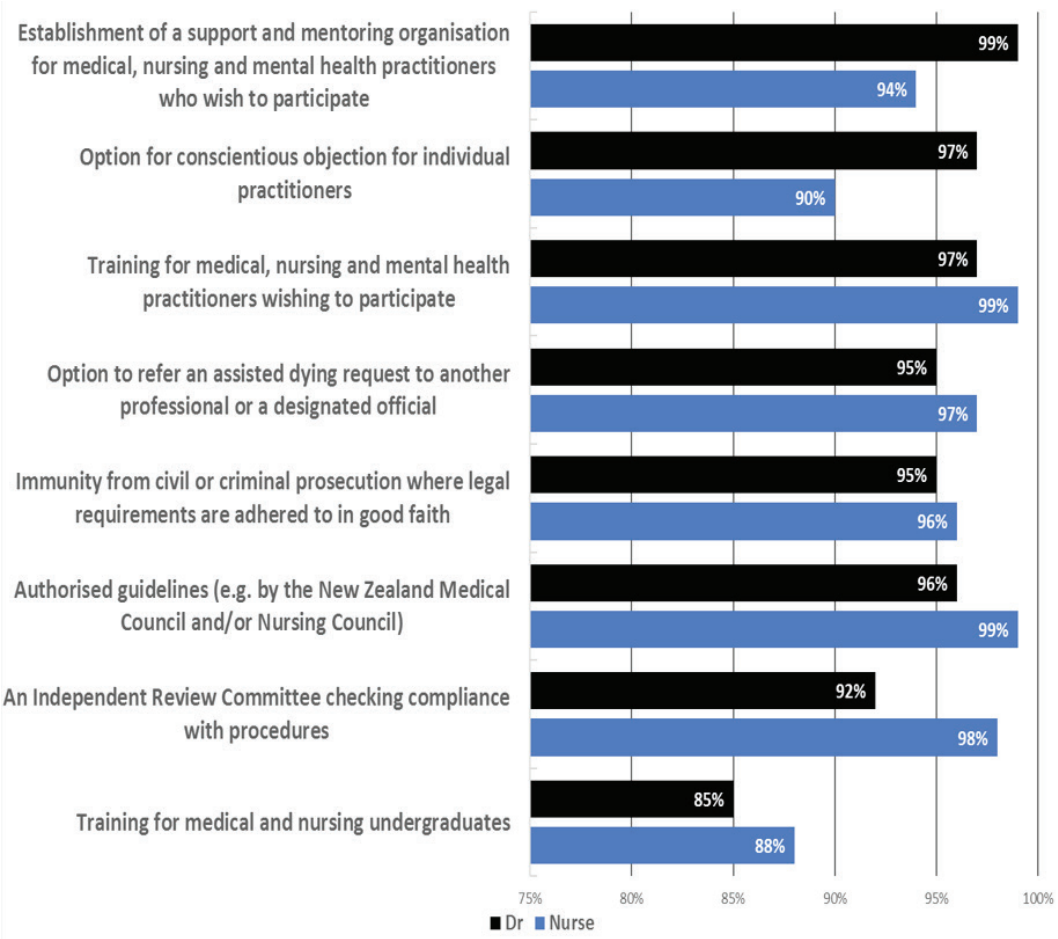
It is too difficult to envisage a scenario where I would be confident ethically to undertake actions that support assisted death without knowing the precise criteria/guidelines/ protoculs surrounding it. [Nurse]

Education/training re: legalised assisted dying would have to be over and above and other Nursing/Medical training, possibly a specialist area. [Nurse]

Professional safety measures

As Figure 5 shows, more than 90% of sub-sample doctors and nurses voiced a need for a range of protections to support their safe participation in legal AD, and more than 85% of both doctors and nurses thought that training for legal AD should be included in their profession's undergraduate curriculum.

Figure 5: Importance of measures to support safe participation in legal AD % responding "essential" or "desirable".



Support and peer review imperative COMPULSORY. [Doctor]

To have counselling available for staff. Even if you chose to help people in this area. Dealing with death dying all the time can impact on you unless able to discuss your work in safe environment. [Doctor]

Probably a group of doctors set up like the SCENS group in the Netherlands who can provide and independent doctor and also provide experience help and guidelines. [Doctor]

Some development of Good Medical Practice in Assisted Dying. This is so this is just not a default proccedure but an active positive culture as to how assisted dying should be a praiseworthy part of clinical work. [Doctor]

Absolute clarity that drs cannot be coerced into involvment with this and no adverse effect on them for declining. [Doctor]

Regular auditing to safe-guard against criminal or conflict of interest (as evidenced by health professionals aiding relatives) [Doctor]

The establishment of rigorous assessment, administration and accountability systems was a priority for many who made comments.

You would need the support of your employer and your facility should be able to accomodate people wanting to do this or there should be provision in the community or in the persons home to facilitate this. [Doctor]

Many respondents also commented on the need for mandatory referral of requests by a conscientiously objecting professional, to ensure seekers had fair access to the legislation.

All health professionals should be legally obliged to refer a patient who requests

assistance in dying to a suitable health professional, regardless of whether they professionally or personally object to assisted dying. [Nurse]

If this becomes legal then roadblocks need to be removed for the patient by professionals who will object due to their own beliefs. It needs to be mandatory that onward referrals are made and that the patient can Self Refer. [Doctor]

Conversely, some respondents voiced a concern that there would be pressure on health practitioners from colleagues, employers and the public to *not* participate.

That the uninformed, uneducated masses will rise to their soapboxes, on the internet, the press and various other media and spread misinformation and fear throughout the general public. Otherwise, I feel we are capable of legislating and implementing a secure, safe, ethical, auditable system to provide legal assisted death. [Doctor]

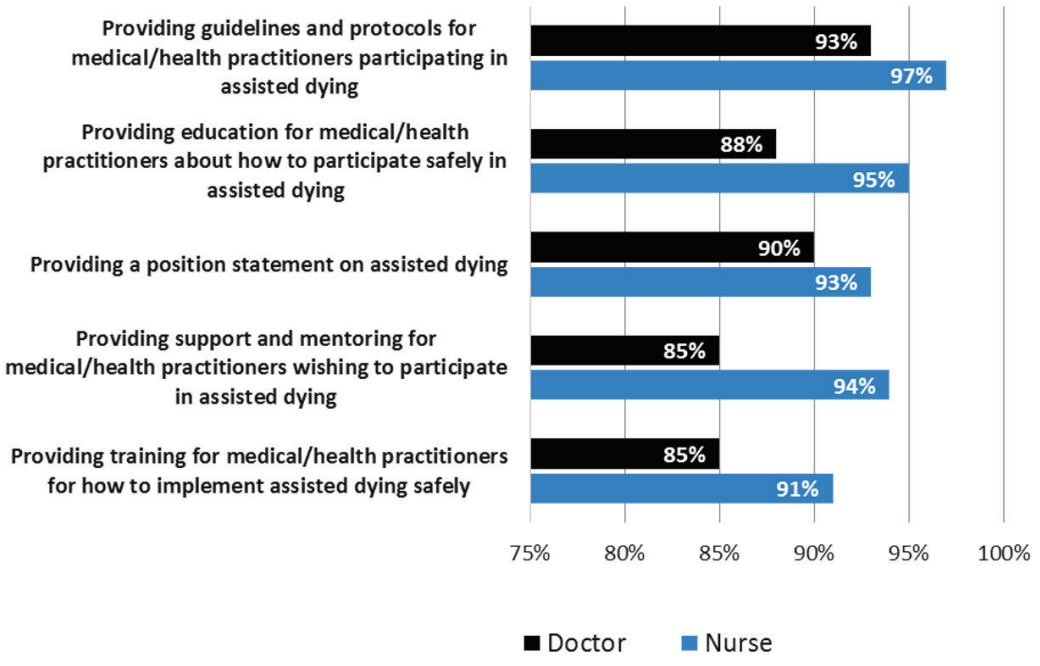
Targeting of practitioners who offer this service by religious zealots / idiots. [Doctor]

That it [legalising AD] will not happen soon enough, and that when it happens, the red tape involved will act as a barrier to those that are not as health literate and/or are resource poor. Legalised assisted dying legislation should take a multi cultural approach to the issue. [Nurse]

What is the perceived role of the professional bodies?

Respondents overwhelmingly indicated that it was the "essential" or "desirable" responsibility of their professional bodies to implement or ensure the various protections needed for health professionals to engage in providing AD services safely, in particular the provision of authorised guidelines and protocols, position statements from the professional associations and ensuring the provision of appropriate education and training (Response options for rating the "responsibility of your professional body/ies" were: Essential/Desirable/Optional/Not necessary/They should not be required to have any role/Not sure; see Figure 6).

Figure 6: Roles and responsibilities of professional bodies if assisted dying is legalised in New Zealand
% "essential" or "desirable" by doctor (n=155), nurse (n=356).



Guidance on ethics, programe structure and governance, checks and balances etc would be welcomed from the professional bodies. It will still be up to the individual practitioner as to whether their own moral conscience allows them to support the practice of legally assisted dying or not. [Doctor]

Each body needs to be very clear what their role/remit is. i.e. which body regulates, which body educates, which body reviews etc. Blurring roles, or a lack of role clarity would be disastrous. [Doctor]

Nursing Council to go around giving talks about how they can support nurses. NOT JUST SEND OUT LETTERS, SAYING HOW THEY ARE GOING TO DO IT [Nurse]

I see a potential conflict if it is passed as government legislation but is not supported by say Medical Council or Nursing Council. For example there are many medical practices undertaken by trained physicians and nurses that are unsupported by the statutory councils as being 'alternative' however break no legal boundaries. I would hate to see this legislation blocked by a few in positions of power on certain legislative boards. [Doctor]

A small minority of respondents were concerned that the professional bodies would be ethically compromised by appearing to support legal AD, but nonetheless identified ways in which such compromise could be avoided.

It is a difficult debate. I think the Geriatric society has been quite divided on the issue. I think there will need to be an agreement to disagree, not unlike abortion. [Doctor]

I do not think the nursing council should issue an official stance on the issue - it's role would be to support its members in carrying out the process in accordance with any new legislation. It should have a responsibilty to ensure its members are well educated on the matter and aware off all legal and ethical issues relating to any new legislation. [Nurse]

Discussion

Based on current trends internationally, it is entirely possible that AD will be legalised in New Zealand in the foreseeable future, and it is vital that the health professions be prepared for that situation. While no survey can claim to be entirely representative of the population surveyed, the results show that there is a substantial cohort of doctors and nurses in New Zealand who support legalising AD, potentially sufficient for reasonable seeker access to AD services once legalised. However, many doctors in particular still oppose AD, and international research shows that the main barrier to access to legal AD is a lack of capacity and capability among health professionals, due in large part to several related factors, in particular: a lack of either accredited training and education for the AD provider tasks and roles; inadequate immunities within the legislation to protect participating professionals; and most importantly, a lack of practice standards and guidelines authorised by the relevant medical and nursing professional bodies.[4,35,41-43] Ethicists and others have called repeatedly for AD statutes to include mandatory requirements for referral by objecting health practitioners, and also for medical practice guidelines with regulatory effect to this end.[44] Both doctors and nurses in this study voiced significant concerns about issues in AD provision that might deter their participation, highlighting gaps in relation to the development of essential competencies, strong accountability processes and robust professional supports for the safe provision of AD, together with a potential for professional stigma or coercion against participation.

The research evidence is that participating health professionals feel most confident and competent, and their colleagues and the general public have greatest confidence, where there is a formally established mentoring and guidance agency that supports doctors and nurses who wish to participate.[43] Our survey data show strong support from doctors and nurses for an organisation of this type providing evidence-based practice guidelines and standards, together with other supports for the ethical and emotional aspects of providing AD services, and that approach is proposed in the End of Life Choice Bill 2012 currently in the New Zealand parliamentary Members Bills Ballot. Models for comprehensive, practical evidence-based safe practice guidelines and protocols, and a range of other professional supports, are now readily available from the Royal Dutch Medical Association,[39,45-47] the Collège des Médecins in Québec[48] and most recently the College of Physicians and Surgeons of Ontario.[49]

The NZNO Submission to the Health Select Committee[15] acknowledges that it is a responsibility of the relevant professional bodies to ensure that these kinds of support are in place once AD is legal. However, the challenge is for such protections to be designed, tested for feasibility and ready for implementation in advance of a law coming into effect, so that health practitioners are not at risk ethically or otherwise in early participation. Planning of this kind was undertaken effectively in both Québec and federal Canada, adapting guidelines already developed in other jurisdictions; that planning avoided the confusion experienced in Vermont when their legislation took effect immediately on being signed into law, resulting in *"doctors and hospitals scrambling to figure out whether they will take part in the law, and … state officials scurrying to prepare guidelines for doctors"*[50]

A limitation of the study is the lesser number of responses from doctors than nurses, possibly as a result of the survey being advertised solely through the online newsletters of professional medical and nursing associations, thus confining awareness of the study to doctors who accessed those newsletters within the survey time frame. Nonetheless, representation was strong from GPs and members of the NZMA as well as other medical professional bodies, providing rich qualitative data that mirror findings from similar studies internationally and revealed evidence that many doctors and nurses are already thinking through the diverse issues in preparation for AD becoming legalised in New Zealand.

The strong and compelling voices of respondents in the quantitative and qualitative data are a strength of the survey and mirror findings elsewhere. It was clear from respondents' qualitative comments that considerable time and effort had been put into articulating their attitudes and actions in relation to AD, in wanting strong accountability processes and in professional supports for the safe provision of AD.

Competing interests:
Pam Oliver joined the Voluntary Euthanasia Society of New Zealand in 2014 for the purposes of obtaining information on that group's activities for doctoral and other research purposes. Phillipa Malpas is a member of the 'End of Life Choice' Voluntary Euthanasia Society of New Zealand.

Acknowledgements:
We wish to thank the nurses and doctors who participated in this research for their participation and their frank and heartfelt comments, and the nursing and medical professional bodies that supported recruitment of respondents. This research was funded by the Health Research Council of New Zealand. Reference 12/657.

Author information:
Pam Oliver, Director, Pam Oliver Ltd, Research and Evaluation, Waiheke Island; Michael Wilson, Independent Researcher, Wilson Associates, Adelaide, South Australia; Phillipa Malpas, Senior Lecturer in Clinical Medical Ethics, Department of Psychological Medicine, Faculty of Medical and Health Sciences, University of Auckland, Auckland.

Corresponding author:
Phillipa Malpas, Senior Lecturer in Clinical Medical Ethics, Department of Psychological Medicine, Faculty of Medical and Health Sciences, University of Auckland, Private Bag 92019, Auckland.
p.malpas@auckland.ac.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7258

REFERENCES:

1. Ganzini L, Black AL. The Challenge of New Legislation on Physician-Assisted Death. JAMA Intern Med. 2016; 176:427–8.
2. Bosshard G, Broeckaert B, Clark D, Materstvedt LJ, et al. A Role for Doctors in Assisted Dying? An Analysis of Legal Regulations and Medical Professional Positions in Six European Countries. Journal of Medical Ethics. 2008; 34(1):28–32.
3. Lewis P. Assisted Dying: What Does the Law in Different Countries Say? BBC News on-line. 2015. Accessible at: http://www.bbc.com/news/world-34445715
4. Oliver P. 'Another week? Another week! I can't take another week' Addressing barriers to effective access to legal assisted dying through legislative, regulatory and other means. Doctoral thesis, The University of Auckland, 2016. Accessible at: http://researchspace.auckland.ac.nz/bitstream/handle/2292/29864/whole.pdf?sequence=6
5. Buiting HM, Gevers JK, Rietjens JA, Onwuteaka-Philipsen BD, et al. Dutch Criteria of Due Care for Physician-Assisted Dying in Medical Practice: A Physician Perspective. Journal of Medical Ethics. 2008; 34(9):e12.
6. Gordijn B, Janssens R. Euthanasia and Palliative Care in the Netherlands: An Analysis of the Latest Developments. Health Care Analysis.2004; 12(3):195–207.
7. Pasman HRW, Rurup ML, Willems DL, Onwuteaka-Philipsen BD. Concept of Unbearable Suffering in Context of Ungranted Requests for Euthanasia: Qualitative Interviews with Patients and Physicians. BMJ. 2009; 339(b4362).
8. Rae N, Malpas PJ, Johnson MH. New Zealanders' Attitudes Towards Physician-Assisted Dying. Journal of Palliative Medicine. 2015; 18(3):259–65.
9. Johnston M. Legalising Euthanasia Wins Huge Support. NZ Herald on-line, 2010. Accessible at: http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10660398.
10. Horizon Research Limited. New Zealanders' Views on End of Life Choices. Auckland: Horizon Research, 2012; 1–29. Accessible at: http://www.horizonpoll.co.nz/attachments/docs/horizon-research-end-of-life-choices-survey--1.pdf
11. Gower P. Poll: Kiwis Want Euthanasia Legalised. Newshub. MediaWorks. 2015. Accessible at: http://www.newshub.co.nz/home/health/2015/08/poll-kiwis-want-euthanasia-legalised.html
12. Lee Carol HJ, Duck Isabelle M, Sibley Chris G. Demographic and Psychological Correlates of New Zealanders' Support for Euthanasia. New Zealand Medical Journal. 2017; 130(1448):9–17.
13. Mitchell K, Owens G. End of Life Decision-Making by New Zealand General Practitioners: A National Survey. New Zealand Medical Journal. 2004; 117(1196).
14. Malpas PJ. Mitchell K, Koschwanez Heidi. End-of-Life Medical Practices in General Practice in New Zealand - 13 Years On. New Zealand Medical Journal. 2015; 128(1418):29–36.
15. New Zealand Nurses Organisation. The Maryan Street Petition to Investigate Fully Public Attitudes Towards the Introduction of Legislation Which Would Permit Medically-Assisted Dying in the Event of a Terminal Illness or an Irreversible Condition Which Makes Life Unbearable. Submission to the Health Select Committee, 1–10. Accessible at: http://www.nzno.org.nz/Portals/0/Files/Documents/Activities/Submissions/2016-02%20Medically%20Assisted%20Dying%20Final.pdf. 2016.
16. Care Alliance Members. 2016. Accessible at: http://carealliance.org.nz/about/
17. Right to Life New Zealand. Overwhelming Opposition to Euthanasia in New Zealand. Media Release. 2016. Accessible at: http://righttolife.org.nz/2016/08/13/overwhelming-opposition-to-euthanasia-in-new-zealand/
18. Palliative Care Council of New Zealand. The Palliative Care Council of New Zealand's Position on Euthanasia. Cancer Control New Zealand. 2013; 1–3. Accessible at: http://www.health.govt.nz/system/files/documents/publications/pcc-euthanasia-position-statement-jun2013.pdf
19. McQueen Ewen. 2016. A Case against Legalising Euthanasia. Stuff Nation. Fairfax Media NZ. Accessible at: http://www.stuff.co.nz/stuff-nation/assignments/your-stance-on-euthanasia/14598254/A-case-against-legalising-euthanasia
20. Patton MQ. Qualitative Research and Evaluation Methods: Integrating Theory and Practice. USA, UK. Sage Publications Inc. 2015. Chapter 8. Qualitative analysis and interpretation. Pages 431–537

21. Nursing Council of New Zealand. The New Zealand Nursing Workforce. A profile of Nurse Practitioners, Registered Nurses and Enrolled Nurses 2011. Wellington, 2011:1–76. Accessible at: http://www.nursingcouncil.org.nz/
22. Medical Council of New Zealand. The New Zealand Medical Workforce in 2012. Wellington, 2012:1–57. Accessible at: http://www.mcnz.org.nz/assets/News-and-Publications/Workforce-Surveys/2012.pdf
23. Taylor C. GPs Admit to Helping Patients Die, Amid Calls for Law Change. New Zealand Doctor. 8th July 2015:20–20
24. Lee W, Price A, Rayner L, Hotopf M. Survey of Doctors' Opinions of the Legalisation of Physician Assisted Suicide. Psycho-Oncology. 2009; 18(3):328–28
25. Seale C. Legalisation of euthanasia or physician-assisted suicide: survey of doctors' attitudes. Palliative Medicine. 2009; 23:205
26. Medew J. Four in 10 Doctors Want Voluntary Euthanasia, Australian Medical Association Survey Shows. The Sydney Morning Herald. 24 November 2016. Accessible at: http://www.smh.com.au/national/health/doctors-should-be-involved-in-euthanasia-if-laws-change-australian-medical-association-survey-shows-20161123-gsw8s2.html
27. De Bal N, Gastmans C, Dierckx de Casterlè B. Nurses' Involvement in the Care of Patients Requesting Euthanasia: A Review of the Literature. International Journal of Nursing Studies. 2008; 45(4):626–44
28. Kouwenhoven PSC, van Thiel GJMW, Raijmakers NJH, Rietjens JAC, van der Heide A, van Delden JJM. Euthanasia or physician-assisted suicide? A survey from the Netherlands. European Journal of General Practice. 2014; 20:25–31
29. Trowell Frances. Exploring the Nursing Implications of Physician-Assisted Suicide in the UK. Nurs Times. 2009; 105(30):31–33
30. Beauchamp TL, Childress JF. Principles of Biomedical Ethics. 7th ed, Oxford University Press, Oxford, 2013
31. Sykes Nigel, Thorns Andrew. The Use of Opioids and Sedatives at the End of Life. Lancet Oncology. 2003; 4(5):312–18
32. Admiraal Pieter. Physician-Assisted Suicide: A Doctor's Perspective. In Giving Death a Helping Hand: Physician-Assisted Suicide and Public Policy. An International Perspective, edited by Dieter Birnbacher and Edgar Dahl:131–39. New York: Springer, 2008
33. Onwuteaka-Philipsen BD, Rurup ML, Pasman HRW, van der Heide A. The Last Phase of Life: Who Requests and Who Receives Euthanasia or Physician-Assisted Suicide? Medical Care. 2010; 48(7):596–603
34. De Boer ME, Dröes RM, Eefsting JA, Hertogh CMPM, et al. Advance Directives for Euthanasia in Dementia: How Do They Affect Resident Care in Dutch Nursing Homes? Experiences of Physicians and Relatives. Journal of the American Geriatrics Society. 2011; 59(6):989–96
35. Gamondi C, Oliver P, Borasio GD, Preston N, Payne S. Palliative care physicians' accounts of their attitudes and experiences of the Swiss civil model of assisted suicide: a qualitative interview study. Paper presented to the European Association for Palliative Care Conference, Dublin, May 2016.
36. De Bal N, Dierckx de Casterlé B, De Beer T, Gastmans C. Involvement of Nurses in Caring for Patients Requesting Euthanasia in Flanders (Belgium): A Qualitative Study. International Journal of Nursing Studies. 2006; 43(5):589–99
37. De Beer T, Gastmans C, Dierckx De Casterle B. Involvement of Nurses in Euthanasia: A Review of the Literature. J Med Ethics. 2004; 30(5):494–98
38. Dierckx De Casterlé B, Denier Y, De Bal N, Gastmans C. Nursing care for patients requesting euthanasia in general hospitals in Flanders, Belgium. J Adv Nurs. 2010; 66(11):2410–2420
39. Koninklijke Nederlandsche Maatschappij tot bevordering der Geneeskunst (KNMG). The role of the physician in the voluntary termination of life. Position Paper. Amsterdam. 2011; 1–62. Accessible at: http://www.consciencelaws.org/archive/documents/2011-08-30%20KNMG-position-paper.pdf
40. Criminal Code of Canada R.S.C. (1985) s 241.1. Accessible at: http://laws-lois.justice.gc.ca/eng/acts/C-46/page-54.html#h-79
41. Pereira J, Laurent P, Cantin B, Petremand D, et al. The Response of a Swiss University Hospital's Palliative Care Consult Team to Assisted Suicide within the Institution. Palliative Medicine. 2008; 22(5):659–67

42. Van Wesemael Y, Cohen J, Onwuteaka-Philipsen BD, et al. Establishing Specialized Health Services for Professional Consultation in Euthanasia: Experiences in the Netherlands and Belgium. BMC Health Serv Res. 2009; 9:220

43. Van Wesemael Y, Cohen J, Onwuteaka-Philipsen BD, Bilsen J, et al. Role and Involvement of Life End Information Forum Physicians in Euthanasia and Other End-of-Life Care Decisions in Flanders, Belgium. Health Services Research 44. 2009; 44(6):2180–92

44. Savulescu J, Schuklenk U. Doctors Have No Right to Refuse Medical Assistance in Dying, Abortion or Contraception. Bioethics. 2016. DOI: 10.1111/bioe.12288

45. Dutch Psychiatric Association. Guidelines for Responding to the Request for Assisted Suicide by Patients With a Psychiatric Disorder. 2009

46. KNMG/KNMP Richtlijn Uitvoering euthanasie en hulp bij zelfdoding. Amsterdam, August 2012

47. Regional Euthanasia Review Committee. Regional Euthanasia Review Committees Annual Report 2013. The Hague. 2014; 1–48

48. Dyer O. Euthanasia kits' are prepared for Quebec doctors as palliative care centres rebel on right to die. BMJ 2015; 351

49. The College of Physicians and Surgeons of Ontario. CPSO Interim Guidance on Physician-Assisted Death: Draft Copy. Policy number 4–16. Canada: CPSO, 2016. Accessible at: http://policyconsult.cpso.on.ca/wp-content/uploads/2015/11/CPSO-Interim-Guidance-on-Physician-Assisted-Death.pdf

50. Hallenbeck. T. Vermont governor signs end-of-life bill. USA Today. Accessible at: http://www.usatoday.com/story/news/politics/2013/05/20/vermont-physician-assisted-death-bill/2343481/2013

New Zealand tobacco control experts' views towards policies to reduce tobacco availability

Lindsay Robertson, Louise Marsh, Janet Hoek, Rob McGee

ABSTRACT

AIM: Higher tobacco retailer density promotes smoking by making cigarettes more accessible and available, and by increasing environmental cues to smoke. We aimed to examine tobacco control experts' views on policies that could reduce tobacco retail availability.

METHODS: Telephone interviews with 25 individuals drawn from academia, non-governmental organisations, Māori and Pacific health, smoking cessation services, district health boards and other public health-related organisations. We used a semi-structured interview guide to explore the perceived importance of reducing tobacco retail supply, views on different policy options and barriers to policy adoption. Qualitative content analysis was conducted using transcripts as the data source.

RESULTS: Participants believed tobacco retailer licensing was an important short-term step towards the 2025 goal. In the long-term, participants envisaged tobacco only being available at a small number of specialised outlets, either pharmacies or adult-only stores. To achieve that long-term scenario, participants suggested a sinking-lid policy on licences or a zoning approach could be adopted to gradually reduce outlet density. Policies banning sales at certain types of outlet were not considered feasible.

CONCLUSIONS: There is tension between the tobacco retail reduction policies seen as more likely to be politically acceptable, and the need to make substantial changes to the tobacco retail environment by 2025. Future research could investigate possible legal mechanisms for requiring existing tobacco retailers to transition out of selling tobacco.

New Zealand tobacco control advocates have consistently called for reductions in tobacco retail availability.[1–5] Higher tobacco retailer density promotes youth smoking[6] and reduces the odds of smoking cessation[7] by making cigarettes more accessible and available, and by increasing environmental cues to smoke.[6] Tobacco's widespread retail distribution—one of the few remaining forms of tobacco promotion in New Zealand—also presents a challenge for enforcing restrictions on sales to minors, since there is no accurate list of tobacco retail outlets in New Zealand.[8] Thus, fewer tobacco outlets could reduce smoking initiation among young people who are susceptible to smoking, and help quitters remain abstinent after a cessation attempt.

The Government's smokefree goal includes a commitment to "reducing smoking prevalence *and tobacco availability* to minimal levels by 2025".[9] Despite this, the Ministry of Health has described interventions to reduce tobacco availability and supply as a 'low priority'.[10] Previous research has identified different approaches to reducing tobacco retail availability, several of which have been implemented internationally.[8,11] Examples include registration of tobacco retailers, or licensing with conditions imposed on licensees (eg, no licences granted within a certain distance of a school; a maximum limit on licences for a given area; no tobacco sales at alcohol-licensed premises). More far-reaching options include tobacco sales only at limited adult-only ("R18") outlets, government-controlled outlets or pharmacy-only sales.[8] The National Smokefree Working Group (NSFWG) recognises that tobacco retailer licensing may restrict tobacco supply, but has called for examination of a wider

range of policy options.[4] No New Zealand studies have yet examined experts' views on different policies that could reduce tobacco retail availability. Identifying experts' preferred policies may support and refine advocacy efforts in this area.

We conducted an in-depth analysis of New Zealand tobacco control experts' views on policies that would reduce tobacco retail supply. We explored experts' views as we wanted to achieve an in-depth understanding about possible policy options from a public health perspective. Tobacco control experts were chosen because of their ability to offer detailed and articulate insights regarding the societal relevance of the interview topic and the public policy process.[12] The research questions were: i) how important do New Zealand tobacco control experts consider tobacco retail policies to be in achieving the 2025 goal; ii) which retail policies do they consider most likely to achieve the 2025 goal and why; and iii) what barriers may impede policy adoption?

Methods

Sample

A purposeful sampling strategy was used to select individuals who would be "information-rich" about tobacco retail regulation.[13] A list of possible participants, judged by the research team to have been influential in the tobacco sector for a minimum of one year, or whose organisation was actively involved in the tobacco control sector, were identified. Snowball sampling was also used when participants made suggestions about further individuals to contact. Thirty-eight individuals were invited to take part in the study, including representatives from non-governmental organisations (NGOs), smoking cessation services, Māori and Pacific health organisations, the Health Promotion Agency, Ministry of Health, district health boards (DHBs) and public health units (PHUs), former politicians, individuals working in clinical or academic roles and Smokefree Enforcement Officers (SEOs).

Qualitative approach

We used qualitative description, a pragmatic research method that emphasises practical application and providing "a rich, straight description" (p.2) of the data.[14] Qualitative description uses generic methods, such as interviews, reflection on the interviews and coding data into themes.[15] We used a semi-structured interview, whereby discussion topics were specified in advance, though flexibility in wording and sequencing of questions was retained to ensure the interview remained conversational.[13] Introductory questions probed participants' perceptions of the 2025 goal and priority interventions to reach the goal. We then asked participants to identify the changes they would make to the way that tobacco is sold in New Zealand (aside from a total ban on tobacco), their likely impact and potential barriers. The interview explored participants' views on the registration or licensing of tobacco retailers, since these interventions have been topical within the sector[3,4] and could potentially be mechanisms to reduce tobacco retail outlet density. Interviews also explored how participants viewed restrictions on the number, outlet type or location of tobacco retailers.

Procedure

LR contacted participants by telephone to explain the study, and subsequently emailed them the information sheet. Once participants had agreed to participate, interviews took place by telephone and were audio recorded and later transcribed. Data collection was conducted between May and December 2014 by LR. Interviews continued until the point of saturation, when no new themes emerged.

Analysis

Qualitative content analysis (QCA) was undertaken using transcripts as the data source. The focus of QCA is on summarising the informational content of the data (as opposed to theory development).[16] Data were predominantly analysed in a deductive manner using the interview guide as a framework, although inductive analysis was also used as additional patterns were identified.[13] After coding transcripts, data were sorted to identify themes using NVivo software. Commonalities and differences were identified for further consideration. A second author (LM) coded three randomly selected interviews; LR and LM then compared the themes identified before finalising themes through discussion.

Results

Participants

Of the 38 individuals invited, 25 (66%) participated in the research. To maintain anonymity, specific characteristics of each participant are not presented. Half of the participants were aged 45 years or younger (n=12) and the remainder were 46 years or above. Four identified as Māori, two as Pacific and the remainder as New Zealand European/ European. Participants had a median of 4.5 years' experience in tobacco control. Roles comprised: executive and clinical directors (n=4); team leader/strategic advisor/managers (n=5); research professors (n=2); Smokefree Coordinator/ health promotion advisor (n=2), and Smokefree Enforcement Officers (n=12). Nine were male; 16 were female. All were smokefree, and eight identified as former smokers. Interviews lasted a mean duration of 29 minutes (range 15–70 minutes; one interview lasted only 15 minutes due to the time constraints for the participant).

Of those individuals who did not take part: no contact was achieved with two former politicians, two managers working for government organisations were unable to take part due to role constraints (ie, having to maintain political neutrality), eight individuals from government organisations (one team leader and seven SEOs) did not respond to attempts to contact them and one NGO representative (director) agreed to take part although it was not possible to set up an interview within the data collection period.

Interview themes

The first section of results reports participants' perceptions about the interventions required to achieve 2025 and the importance of tobacco retail policies. Subsequent sections summarise views towards registration and licensing of tobacco retailers, strategies for reducing outlet density and perceived barriers to policy adoption.

Importance of tobacco retail interventions in achieving 2025

A comprehensive programme of interventions comprising taxation, plain packaging, smoking cessation initiatives, mass media campaigns and extending smokefree environments was seen as necessary to achieve the 2025 goal. The vast majority of participants considered tobacco retail interventions a priority within this policy programme, and cited the lack of tobacco retailing regulation as a key concern:

"I think it's really important to make selling and distributing tobacco across the nation as inconvenient as possible. That is priority number one." (Executive Director, Health Organisation)

"… It's absolutely nonsensical that anyone can sell tobacco in New Zealand with absolutely no restriction at all other than the ban on selling cigarettes to under 18s." (Clinical Director, Health NGO)

A countervailing view expressed by one participant was that advocating for retail interventions as a priority could undermine other policy campaigns, such as plain packaging:

"… it is important, but it's not top of the agenda for me … it could be a bit of a distraction and we should put all of our efforts at the present time into standardising packaging … I don't doubt the importance of a retail licence, but it's going to take energy, commitment and work from the NGO sector and also the Ministry of Health and that will detract, in my view, from other key issues." (Research Professor, University 1)

Registration of tobacco retailers

A short-term intervention, whether licensing or registration of tobacco retailers, was seen by the vast majority of participants as the crucial next step in tobacco retail regulation. Some understood registration as a scheme that would provide more accurate information about tobacco retailers, thus enhancing enforcement efforts:

"I visit every single lunch bar, every single premise that I can think of to find out if they do sell tobacco. So having a register of people who sell would be a lot easier for me." (Smokefree Coordinator, DHB)

Another potential benefit of registration was that it could deter some retailers from selling tobacco:

"It's just another step that people would have to go through in order to sell tobacco and … if a retailer doesn't have the patience to go through the registration process, then that would probably be somewhere where tobacco wouldn't be sold." (Programme Manager, Health NGO)

Others did not consider a registration system to be an effective way of enhancing enforcement:

"...a simple registration that would just provide us information with who was selling tobacco? The public health units already hold that information. As part of our contract with the Ministry of Health, we are supposed to have an up-to-date list of tobacco retailers ... all that will do is tell us what we already know." (Team Leader, PHU)

Overall, participants tended to see that there would be some benefits to registration of tobacco retailers, yet did not feel that this should be a sole focus of advocacy efforts.

Licensing of tobacco retailers

Unlike registration, licensing was seen as providing a means to introduce restrictions on tobacco sales:

"A register is just a list. A licence, I guess, will have a difference. Technically, there must be some conditions for a licence." (Research Professor, University 1)

One of the main advantages of licensing over registration was the means to revoke a retailer's ability to sell tobacco:

"... when they're found to be breaching the legislation, [rather] than being fined or simply warned you'd have the mechanism to suspend or completely revoke someone's licence to sell tobacco. I think that would be a really powerful tool for enforcing the age limit legislation." (Clinical Director, Health NGO)

Participants suggested a mandatory fee as a key component, and thought this could be set at a level that deterred retailers from selling tobacco, with the revenue used to fund tobacco control. Some additional requirements that could be incorporated into a licensing scheme were identified, for example, restrictions on the age of people selling tobacco, and retail staff training on smokefree legislation:

"... giving people the opportunity to know exactly what's legal and what's not would be an important element of a licensing regime. So they might have to pass a little test ..." (Research Professor, University 2)

As with registration, licensing was also seen as a way to enhance communication between government agencies and tobacco retailers, which could help counter the industry's influence on retailers. Overall, participants agreed on the need for a regulatory system for tobacco retailers; most preferred licensing over registration, citing several benefits specific to licensing.

Retailer reduction policies

The interviews explored various potential restrictions that could be introduced as part of licensing. A 'sinking-lid' policy was identified as a means of reducing tobacco outlet density, though this approach was conceptualised in different ways. One conceptualisation was based on a licensing fee initially set according to outlet sales volume; the fee would increase progressively so as to decrease the number of retailers choosing to sell tobacco. Alternatively, a sinking-lid model could mandate that licences are not transferred if a retailer ceased selling tobacco, moved or closed down. This would gradually decrease the number of tobacco retailers over time and represent a more acceptable outcome for existing retailers; the idea of imposing an immediate maximum quota of retailer licences was considered potentially unacceptable by one participant:

"... to arbitrarily go into the community and say that in this particular area there are currently 500 retail outlets, we think there should only be 400 or 250, therefore we're going to revoke licences for half of them ... seems quite capricious and arbitrary ... whereas a sinking-lid policy would say, 'well look, if a service station on the corner closes down, goes out of business for whatever reason, then that registration or that licence—whatever you want to call it—is not then issued to another retailer in that area'. We're not arbitrarily just taking it away from any retailer." (Clinical Director, Health NGO)

Another description of a sinking-lid policy involved banning tobacco sales at certain types of outlets, gradually extending the outlets prohibited from selling tobacco:

"Let's stop all of the corner dairies to start with. And then ... whether it's six months or a year down the track ... then let's stop it in licensed premises ... your supermarkets probably would be next, and then your petrol stations." (Smokefree Coordinator, DHB)

In particular, SEOs suggested removing the sale of tobacco from dairies, as they reported that dairy owners and employees were the usual perpetrators of sales to

minors. However, a contrasting view suggested this approach would be seen as unfair and unacceptable by stakeholders, and one that could potentially attract legal action by the tobacco industry:

"... they [the Government] open themselves up to litigation by the tobacco industry whenever they discriminate against a specific business type. It's against international trade laws to do that ... I wouldn't advise that." (Executive Director, Health Organisation)

Prohibiting the sale of tobacco at alcohol-licensed premises elicited mixed views. Some did not support the idea, which they thought could distract from higher priority interventions and may not be very effective. Others saw a need to break the association between alcohol and smoking:

"I don't think licensed premises should be able to sell smokes, because smoking and alcohol go hand in hand." (Smokefree Coordinator, DHB)

All participants considered it important to protect children from exposure to tobacco outlets. Creating zones around schools where tobacco sales were not permitted was viewed as a very worthwhile policy by all participants, and such zones could be extended to disallow tobacco sales at a broader range of locations where children tended to be present:

"... you could have some restriction around location, in regards to say, schools ... then you could look at phase two where you could consider ... community centres, libraries, youth centres, that kind of thing ..." (Research Professor, University 2)

An alternative possibility was only allowing tobacco sales at stores children could not access. Such outlets were identified as "specialised" or "R18" stores, or tobacconists:

"I've heard of a retailer somewhere in New Zealand that only sells tobacco and they were advocating for that, 'cos... you can't have kids in a tobacco store." (Chief Executive Officer, Health Service Provider)

Other restricted sales options included pharmacy-only sales, either via normal retailing or by prescription:

"... ultimately, I would like us to move towards the non-retail selling of tobacco... where you end up providing tobacco through some other mechanism, either through potentially pharmacies or doctors ..." (Team Leader, PHU)

The long-term scenario envisaged for New Zealand included only allowing tobacco sales from a very small number of outlets, whether pharmacies, or specialised outlets where children could not enter. A progressive reduction in outlet density, brought about by a sinking-lid policy, was seen as a possible way to realise that long-term scenario.

Risks and barriers to policy adoption

Participants' views highlighted some uncertainty about the number of tobacco control interventions that might feasibly be introduced within a relatively short space of time:

"If you kind've go for plain packaging, do you want to get their backs up if you tried to push this idea through at the same time? It might be the straw that breaks the camel's back politically and lose public support or something." (Research Professor, University 2)

There was also discussion around the preferred short-term intervention: registration or licensing. Registration was considered more politically acceptable, though ultimately less effective than a licensing scheme:

"Is it a registration system we're asking for or do we just go for the licensing system? Governments don't favour the licensing kōrero and the registration kōrero is much more palatable ... do you go in for what you really want or do you start with something simple?" (Manager, Health NGO)

Some viewed registration as a first step which, once in place, could be strengthened to include conditions on who could sell tobacco:

"...I would focus very much on the early stages at least on just getting the concept of a register acceptable to people ... then once it's established then you can make further legislation ..." (Clinical Director, Health NGO)

However, a contrasting viewpoint was that if registration was legislated, there was no guarantee that further conditions on retailers would ever be implemented:

"... I don't really like that idea of pussyfooting around and putting energy into a

registration system that's gonna do what? I'd rather go for a licensing system straight away …" (Manager, Health NGO)

Participants expressed pessimism about the likelihood of achieving the 2025 goal, due to a perceived lack of government leadership in the area and the loss of Dame Turia as the main political champion. While several participants believed tobacco retailers might view certain tobacco retail reduction measures as unfair, regulating the retail environment tended to be seen as crucial to public health goals:

"My view is if dairy owners are only going to be able to sustain their business by selling tobacco, alcohol and lotto tickets, then they do need to go out of business. And as a society we have to be tough-minded about that … they shouldn't be in business if all you can sell is stuff that's bad for people." (Chief Executive Officer, Professional Association)

Despite the varied perceived barriers, we identified two themes that expressed participants' views on policy changes. The first was the need to promote awareness of the 2025 goal to generate public support. The second was the need for stronger government leadership to introduce new policies that would achieve the goal:

"… if we're ever going to have any hope of reaching the goal it just really needs a lot more oomph behind it … the oomph needs to come from everybody but it needs to come from the Government particularly because it is their goal." (Smokefree Coordinator, DHB)

Discussion

Summary of findings

New Zealand's smokefree sector has long been influential in shaping New Zealand tobacco control policies.[17] Our participants' views reflect measures set out in the NSFWG's action plan and roadmap,[4] and align with international discourse about the role of supply-side policies in the tobacco endgame.[18–22] Participants considered that substantially reducing the number of tobacco outlets could reduce tobacco consumption, improve enforcement, prevent sales to minors, support tobacco denormalisation and assist realisation of the 2025 goal.

There is limited research to which our findings can be compared. A recent New Zealand study examined how key informants (politicians, managers of smoking cessation and tobacco-related organisations, researchers and advocates) viewed a reduction in tobacco availability of 90% or more, among other endgame policy ideas.[23] Most participants supported a large reduction in tobacco retail availability, yet tended not to see this outcome as politically feasible. However, that study did not examine the range of different policies that could reduce tobacco outlet density; without doing so, it is unsurprising that that study identified concerns regarding feasibility.

Policy implications

Despite the strong similarity in our participants' views, we identified some divergences. As with most tobacco control interventions, there is a trade-off between policy effectiveness and acceptability. Our study demonstrated some tension between licensing (seen as the option that would bring about the greatest benefits) versus registration (considered more acceptable but less effective). Further, the incremental approach to reducing tobacco availability advocated by most participants would see very gradual changes in outlet density over time, and does not align with calls for "radical" and "game-changer" policies to achieve 2025.[23] Research from the US suggests an amortisation approach could offer a compromise by providing retailers with a set period of time (eg, up to five years) to recoup their investment and adjust to new tobacco retail restrictions.[21] Future research could explore whether similar legal mechanisms could be used in New Zealand. Policy tools such as amortisation would require existing tobacco retailers to transition out of selling tobacco within a relatively short timeframe, thus contributing to the 2025 goal to a greater extent than a sinking-lid or zoning policy.

Despite participants' strong support for tobacco retailer licensing as a measure to achieve the 2025 goal, jurisdictions that have introduced tobacco retailer licensing without complementary policies have seen only relatively modest declines in tobacco retail availability. For example, the introduction of a licensing scheme in Finland is believed to have reduced the number of outlets selling tobacco, yet this reduction has occurred mostly at restaurants where tobacco retail was minor in the first place.[7]

In South Australia, after the cost of a tobacco retail licence fee increased from $12 (in 2006) to around $200AUD (from 1 January 2007), the number of tobacco retail licences decreased by 24% over the subsequent two years.[24] However, this decline was seen almost entirely at on-licensed venues (ie, venues where alcohol is available for consumption on the premises), and the tobacco licence fee increase had little impact on reducing licences in other retail outlet types.[24] It is also important to note that five of Australia's eight states and territories have implemented mandatory tobacco retailer licensing schemes, yet none of these have been amended to restrict the number, type or location of tobacco licensing schemes since their introduction.[25] The risk, therefore, is that if licensing was introduced as a short-term measure, there is no guarantee that the Government would ever proceed beyond this intervention alone.

Recent New Zealand modelling studies suggest that drastically reducing the number of tobacco outlets in New Zealand could reduce smoking prevalence, achieve health gains (as measured by quality-adjusted life years) and reduce health system expenditure.[11,26] Although the estimated effects were modest in size, the analyses undertaken were based on assumptions that may have resulted in conservative estimates. In reality, the positive effects of a substantial reduction in tobacco outlet density could be much larger, with the realisation of 'spill-over effects' such as tobacco denormalisation.[26]

Strengths and limitations

To our knowledge, this study is the first to explore how New Zealand tobacco control experts view future tobacco retail policies. Identifying where consensus exists could help to inform future advocacy and ensure that limited advocacy resources are used efficiently. Some limitations should be noted. The findings in the study represent a 'snapshot' of participants' views, which may change over time and are likely affected by the current political context. At the time of data collection, the Smokefree Environments (Tobacco Plain Packaging) Amendment Bill[27] had undergone its first parliamentary reading but had been put on hold pending the outcome of litigation in Australia.[28] Participants may have been more cautious about advocating for tobacco retail regulation, which they feared may distract political attention from plain packaging. We did not explore equity outcomes directly and most participants identified as New Zealand European ethnicity. Examining the impact of tobacco control policies on smoking among Māori, Pacific and people from more deprived communities is important, given that substantial reductions in smoking prevalence among these groups needs to occur for the 2025 goal to be realised. Furthermore, certain subgroups of New Zealand's tobacco control sector were not represented. Specifically, our attempts to recruit politicians and representatives from certain government agencies were not successful. Participants' views concerning the political feasibility of tobacco retail regulation may have differed had we successfully recruited from these subgroups. A limitation with all qualitative research is that the views and beliefs of the researchers invariably influence the study process, from conceptualisation, interaction with participants and data interpretation.[29] We attempted to minimise this possibility through using a post-interview reflective journal to encourage awareness of the factors (eg, our position) that may have influenced the research. Further, the views of participants are inherently subjective, though nonetheless reflect their expertise and experience. The relatively large and representative sample, comprising a wide range of participants from academia, health NGOs and government agencies is a strength of the study.

Conclusion

Overall, reducing tobacco retail availability was seen as one important part of the programme of interventions needed to achieve the 2025 goal. While this outcome was viewed as feasible, a perceived lack of government commitment meant that policies resulting in gradual decreases in outlet density were seen as more realistic than those that would have a more immediate effect on existing tobacco retailers. To achieve its goal of reducing tobacco availability to minimal levels by 2025, the Government must explore policy options that could affect substantial changes to the tobacco retail environment in the coming years.

Competing interests:
Dr Robertson reports that NZ Asthma Foundation provided project funding, and her PhD stipend was provided by NZ Lottery Health. Dr Robertson is based in The Cancer Society Social and Behavioural Research Unit. Dr Marsh is supported by The Cancer Society of New Zealand. Professor Rob McGee is based in the Cancer Society Social and Behavioural Research Unit and is supported by the Cancer Society of New Zealand.

Acknowledgements:
We wish to extend a sincere thank you to the individuals who took the time to participate in an interview. Funding for this study was provided by New Zealand Lottery Health and the New Zealand Asthma Foundation. LM, RM and LR are supported by the Cancer Society of New Zealand.

Author information:
Lindsay Robertson, Cancer Society Social & Behavioural Research Unit, Department of Preventive and Social Medicine, University of Otago, Dunedin; Louise Marsh, Cancer Society Social & Behavioural Research Unit, Department of Preventive and Social Medicine, University of Otago, Dunedin; Janet Hoek, Department of Marketing, University of Otago, Dunedin; Rob McGee, Cancer Society Social & Behavioural Research Unit, Department of Preventive and Social Medicine, University of Otago, Dunedin.

Corresponding author:
Miss Lindsay Robertson, Cancer Society Social & Behavioural Research Unit, Department of Preventive and Social Medicine, University of Otago, PO Box 56, Dunedin 9054.
l.robertson@otago.ac.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7259

REFERENCES:

1. Jaine R, Russell M, Edwards R, Thomson G. New Zealand tobacco retailers' attitudes to selling tobacco, point-of-sale display bans and other tobacco control measures: a qualitative analysis. New Zealand Medical Journal. 2014; 127:53–66.
2. Wilson N, Edwards R, Hoek J, Thomson G, Jaine R. Could New Zealand's law on "New Psychoactive Substances" provide lessons for achieving the Smokefree 2025 Goal? New Zealand Medical Journal. 2016; 129:94–6.
3. Perrin K. Register could help smokefree goals. Dominion Post. 7 November 2014
4. National Smokefree Working Group. Smokefree Aotearoa 2025 Action Plan 2015-2018. National Smokefree Working Group. Available from: http://www.sfc.org.nz/documents/nsfwg-action-plan-2015-2018.pdf
5. Marsh L, Doscher C, Robertson L. Characteristics of tobacco retailers in New Zealand. Health & Place. 2013; 23:165–70.
6. Henriksen L. Comprehensive tobacco marketing restrictions: promotion, packaging, price and place. Tobacco Control. 2012; 21:147–53.
7. Halonen J, Kivimäki M, Kouvonen A, et al. Proximity to a tobacco store and smoking cessation: a cohort study. Tobacco Control. 2014; 23:146–51.
8. Robertson L, Marsh L, Edwards R, Hoek J, Van der Deen F, McGee R. Regulating tobacco retail in NZ: what can we learn from overseas? New Zealand Medical Journal. 2016; 129:74–9.
9. New Zealand Government. Government response to the report of the Māori Affairs Committee on its Inquiry into the tobacco industry in Aotearoa and the consequences of tobacco use for Māori. Wellington: New Zealand Government. Available from: http://www.parliament.nz/en-NZ/PB/Presented/Papers/d/9/b/49DBHOH_PAP21175_1-Government-Final-Response-to-Report-of-the-M-ori.htm
10. Ministry of Health. Smokefree New Zealand 2025: presentation to Māori Affairs Committee. Wellington: Ministry of Health, 2015.
11. Pearson AL, van der Deen FS, Wilson N, Cobiac L, Blakely T. Theoretical impacts of a range of major tobacco retail outlet reduction interventions:

modelling results in a country with a smoke-free nation goal. Tobacco Control. 2015; 24:e32–e8.

12. Bogner A, Littig B, Menz W. Expert interviews - an introduction to a new methodological debate. In: Bogner A, Littig B, Menz W, (eds) Interviewing Experts. New York, US: Palgrave Macmillan, 2009.
13. Patton MQ. Qualitative research and evaluation methods. Third ed. Thousand Oaks, CA: Sage Publications, 2002.
14. Neergaard MA, Olesen F, Andersen RS, Sondergaard J. Qualitative description–the poor cousin of health research? BMC Medical Research Methodology. 2009; 9:52.
15. Caelli K, Ray L, Mill J. 'Clear as mud': toward greater clarity in generic qualitative research. International Journal of Qualitative Methods. 2003; 2:1–13.
16. Morgan DL. Qualitative content analysis: A guide to paths not taken. Qual Health Res. 1993; 3:112–21.
17. Studlar DT. The Political Dynamics of Tobacco Control in Australia and New Zealand: Explaining Policy Problems, Instruments, and Patterns of Adoption. Australian Journal of Political Science. 2005; 40:255–74.
18. Thomson G, Wilson N, Blakely T, Edwards R. Ending appreciable tobacco use in a nation: using a sinking lid on supply. Tobacco Control. 2010; 19:431–5.
19. Malone RE. Imagining things otherwise: new endgame ideas for tobacco control. Tobacco Control. 2010; 19:349–50.
20. Lipperman-Kreda S. Importance of reducing outlet density as a tobacco control strategy. Point-of-Sale strategies webinar series. CDC Office on Smoking and Health. Available from: http://www.changelabsolutions.org/sites/default/files/Reduce%20Retailer%20Density_3May2016.pdf
21. Ackerman A, Etow A, Bartel S, Ribisl KM. Reducing the density and number of tobacco retailers: policy solutions and legal issues. Nicotine & Tobacco Research. 2016; 19:133–40.
22. Tilson M, Cohen J, McDonald K, et al. Reducing Tobacco Retail Availability. Toronto, Ontario: Ontario Tobacco Research Unit, 2013.
23. Ball J, Waa A, Tautolo E, Edwards R. Future Directions to Achieve 2025? Stakeholder perceptions of the smokefree2025 goal and selected 'game-changer' policies for achieving it. Wellington: Aspire 2025. Available from: https://aspire2025.files.wordpress.com/2016/04/aspire-future-directions-report-16.pdf
24. Bowden JA, Dono J, John DL, Miller CL. What happens when the price of a tobacco retailer licence increases? Tobacco Control. 2014; 23:178–80.
25. Smyth C, Freeman B, Maag A. Tobacco retail regulation: the next frontier in tobacco control? Public Health Research & Practice. 2015; 25:e2531529.
26. Pearson AL, Cleghorn CL, van der Deen FS, et al. Tobacco retail outlet restrictions: health and cost impacts from multistate life-table modelling in a national population. Tobacco Control. 2016; doi:10.1136/tobaccocontrol-2015-052846.
27. New Zealand Government. Smoke-free Environments (Tobacco Plain Packaging) Amendment Bill. Wellington: New Zealand Government. Available from: http://www.parliament.nz/en-nz/pb/legislation/bills/00DBHOH_BILL12969_1/smoke-free-environments-tobacco-plain-packaging-amendment
28. Ministry of Health. Plain Packaging. Available from: http://www.health.govt.nz/our-work/preventative-health-wellness/tobacco-control/plain-packaging
29. Kuper A, Reeves S, Levinson W. Qualitative research: an introduction to reading and appraising qualitative research. British Medical Journal. 2008; 337:404–7.

Perspectives of key stakeholders and smokers on a very low nicotine content cigarette-only policy: qualitative study

Trish Fraser, Anette Kira

ABSTRACT

AIMS: To investigate views of New Zealand key stakeholders (stakeholders) and smokers on very low nicotine content (VLNC) cigarettes, and a policy mandating that only VLNC cigarettes are available for sale.

METHODS: Using a semi-structured interview schedule, we interviewed 17 stakeholders and held focus groups with 21 smokers. Questions were asked about VLNC cigarettes and a VLNC cigarette-only policy. Smokers were given approximately 15 VLNC cigarettes to take home and smoke. One week after the focus groups, 17 smokers were interviewed. Data were analysed using a general inductive approach.

RESULTS: Stakeholders and smokers were largely unconvinced of the value of a mandated reduction in nicotine in cigarettes. After smoking VLNC cigarettes, smokers had less interest in them but would support them being sold alongside high nicotine content (HNC) cigarettes at a much cheaper price.

CONCLUSION: The government is not likely to mandate nicotine reduction in cigarettes if there is a perceived lack of support from stakeholders or smokers. However, they could make VLNC cigarettes available as an option for smokers utilising a differential tax favouring VLNC cigarettes. If this were combined with better access to nicotine containing e-cigarettes, smokers may shift away from HNC cigarettes.

One strategy among many proposed for accelerating reductions in smoking prevalence is reducing nicotine content of tobacco.[1] This would expose new smokers to less nicotine, ensuring that they would be less likely to become addicted smokers,[2] and current smokers would increase quitting behaviour.[1]

Very low nicotine content (VLNC) cigarettes with a non-addictive nicotine level are defined as <2mg nicotine content and <0.05mg nicotine yield per stick.[1] This compares to cigarettes sold in New Zealand, which fall within a range of 5.6–12.4mg nicotine content.[3]

A policy that only allows VLNC cigarettes to be sold was first proposed in 1994[4] and then advocated by the American Medical Association.[5] Initially, it was proposed that a VLNC cigarette-only strategy should be gradually implemented,[5] but the WHO is now recommending that an immediate reduction of nicotine would be a better approach for practical reasons.[6]

Despite the potential of a VLNC cigarette-only policy, it has not been implemented by any government, indicating it may not be achievable[7] and there may be some challenges. The WHO warns that a VLNC cigarette-only policy should not be implemented without capacity for market surveillance and product testing, and sufficient resources to implement it.[6] It is a controversial policy with critics arguing it is 'de facto prohibition' of high nicotine content (HNC) cigarettes without acceptable alternatives,[8,9] such as electronic cigarettes (e-cigarettes). Worldwide e-cigarettes are increasing in popularity among smokers[10] and have recently been suggested as a viable alternative to tobacco that could be part of a more comprehensive and integrated nicotine policy.[2] Concern

has been raised about smokers increasing the intensity of smoking ('compensatory smoking'),[11] thereby increasing their intake of toxins, but recently this has largely been discredited.[2,12,13] New Zealand has a comprehensive tobacco control programme and could potentially be the first country to implement a VLNC cigarette-only strategy. This is supported by a call from public health experts[2] but countered by the argument that there is not enough evidence for any government to implement such a policy, even with an advanced tobacco control programme.[8]

To understand if a VLNC cigarette-only policy would be acceptable to key stakeholders (stakeholders) and smokers in New Zealand, and would be feasible to implement, it is necessary to understand their viewpoints. Stakeholder views, whether supported by evidence or not, can assist or hinder public health policies. Other controversial areas, such as genetic studies, have argued the importance of understanding stakeholder views.[14] No study, except an unpublished thesis in 2002, has investigated smokers' or stakeholders' opinions relating to a VLNC cigarette-only policy.[15] The qualitative study found there was not enough scientific evidence to support the introduction of a VLNC cigarette-only policy or political and public acceptability.[15]

The aims of this study were to investigate views held by stakeholders and smokers on VLNC cigarettes and a VLNC cigarette-only policy. As part of the investigation we repeated an in-depth examination of stakeholders' and smokers' views on a VLNC cigarette-only policy, conducted originally in 2002.[15]

Methods

This qualitative study was conducted between January and September 2015.

Selection criteria

Selection criteria were guided by the method described in the Fraser 2002 study.[15] Participants taking part in that research were politicians, government health officials, health reporters and tobacco control experts, smokers and ex-smokers.[15] Each participant group was analysed for their contribution to the study outcomes. For this study, we included non-health experts and political commentators but excluded ex-smokers. Inclusion criteria were smokers (over 16 years and smoked daily) and stakeholders (politicians associated with health or party leaders, government health officials with a responsibility for tobacco control, treasury advisers with regulatory experience, tobacco control and smoking cessation experts and tobacco or nicotine industry scientists with tobacco and/or nicotine manufacturing experience). Exclusion criteria were: pregnant smokers. Māori smokers were identified as a priority audience due to high rates of smoking.[16]

Recruitment

A purposive sampling strategy was used to recruit at least 16 stakeholders, with snowball sampling used when necessary. Focus groups were used to recruit at least 16 smokers.

Stakeholders

We contacted potential participants by email and invited them to be interviewed by telephone. We selected this method of interviewing for convenience and due to budgetary constraints. Stakeholders interested in participating were emailed participant information sheets and consent forms, which they signed and returned to the lead researcher.

Smokers

We recruited smokers for two focus groups through community newspapers and referrals from a Māori community organisation in Christchurch and a marae in Wellington. Focus groups were subsequently held on the marae and on the premises of the community organisation.

Interviews and focus groups

Stakeholders

An interview schedule was developed to guide the interview process with stakeholders. (See Table 1).

The range of duration of the interviews was 20 minutes to one hour.

Smokers

A focus group schedule was developed to guide the groups (see Table 2). Participant information sheets, consent forms and self-completing questionnaires were distributed to participants at the focus

Table 1: Interview schedule—key stakeholders.

Open-ended semi-structured questions about VLNC cigarettes and a VLNC cigarette-only policy
1. Can you give me a bit of background information on the work you do and how it relates to tobacco control?
2. What do you think of the present tobacco control programme in New Zealand?
3. Have you ever heard of VLNC cigarettes? If yes, what do you know about them? Do you know what they are?
4. Do you think that VLNC cigarettes should be available in New Zealand? If yes, why? If no, why not?
5. If VLNC cigarettes were available in New Zealand do you think that smokers would be interested in smoking them? If yes, why and do you think they should be available? If no, why not? *Lead researcher informed participant of the potential benefits of low-nicotine cigarettes and a mandated VLNC cigarette-only policy, such as prevention of addiction to nicotine, reduction of tobacco dependence leading to increased quitting smoking and that a VLNC cigarette-only policy might be the best policy option for VLNC cigarettes as it reduces the risk of smokers smoking both low and HNC cigarettes.*
6. Should there be a VLNC cigarette-only policy in New Zealand? If yes, why? If no, why not?
7. What do you think a VLNC cigarette-only policy should include/restrict?
8. What are the potential benefits or risks of introducing a VLNC cigarette-only policy in New Zealand?
9. How acceptable do you think a VLNC cigarette-only policy would be to: Policymakers? Health workers? Politicians? The general public? Smokers?
10. What do you think of such a policy, which would restrict the sale of cigarettes to only VLNC cigarettes?
11. What practicalities would need to be considered as part of implementing the policy?
12. Should implementation of a VLNC cigarette-only policy be sudden or gradual? Why?
13. Should the government promote the introduction of such a VLNC cigarette-only policy to the public to gain support? If yes, why and how? If no, why not?
14. What might the costs of implementation be?
15. What extra support should be made available to smokers to help them manage their withdrawal from nicotine?
16. What sort of unintended consequences might there be if a VLNC cigarette-only policy was to be implemented?
17. What would the impact be on socioeconomic and ethnic inequalities?
18. How would a VLNC cigarette-only cigarette policy 'fit' with international tobacco control strategies?
19. Any further comments?

Table 2: Focus group and interview schedules—smokers.

Semi-structured open-ended questions on VLNC cigarettes and a VLNC cigarette-only policy	
1.	Have you ever heard of VLNC cigarettes? If yes, what do you know about them? If not, have you heard of them as reduced nicotine cigarettes, nicotine-free cigarettes, denicotinised cigarettes, denics or non-addictive cigarettes?
2.	Do you think that VLNC cigarettes should be available in New Zealand? Why/why not?
3.	If they were to be available, how should they be available in New Zealand? Would you be interested in smoking them? *Lead researcher informed the participants of the potential benefits of VLNC cigarettes and a mandated VLNC cigarette-only policy, such as prevention of addiction to nicotine, reduction of tobacco dependence leading to increased quitting smoking and that a VLNC cigarette-only policy might be the best policy option for VLNC cigarettes as it reduces the risk of smokers smoking both low and HNC cigarettes.*
4.	Do you think that the government should consider introducing a low nicotine policy in New Zealand? Why/why not? If yes, what should this policy include/restrict?
5.	What are the potential benefits or risks to this policy?
6.	What might happen if the policy were to be introduced? Would it be acceptable to you and other smokers? How would you react?
7.	If the policy were implemented, should the government promote it to the public to gain support and increase public awareness? Why/why not? If yes, how?
8.	What potential issues and obstacles could arise from such a policy?
9.	What extra support could be made available to smokers to help them manage their withdrawal from nicotine?
10.	Any further comments?
Post-focus group interview schedule (after participants had smoked VLNC cigarettes)	
1.	What did you think of the experience (ie, taste, smell, feel) of smoking VLNC cigarettes?
2.	If low-nicotine cigarettes were available in New Zealand would you be interested in smoking them? If yes, how do you think they should be available?
3.	Do you think the government should consider introducing a low nicotine policy? Why/why not?
4.	What should such a policy look like?
5.	What extra support could be made available to smokers to help them manage their withdrawal from nicotine?

groups to complete. Consent forms were signed and returned with completed questionnaires to the lead researcher, who facilitated the focus groups.

A gift of $30 was given to each participant as well as a light lunch. At the end of the focus groups, participants were given approximately 15 VLNC cigarettes (MAGIC brand, 22nd Century, USA, 0.07mg nicotine content, mean 0.04mg nicotine yield) to take home and smoke. The duration of the focus groups was 24 minutes.

Smokers who attended the focus groups were contacted approximately one week later and interviewed by telephone (see Table 2). The range of duration of the interviews was from 1–8 minutes.

Analysis

Interviews and focus groups were recorded and transcribed. We utilised interpretivist and pragmatist research paradigms to gain an understanding of participants' views on reducing nicotine content in cigarettes and gather information to assist any future policy development.[17] Data were analysed using a general inductive approach. An initial analysis to form main themes and sub-themes, and select quotations was conducted by AK using NVivo software. The analysis was carefully read and criticised by TF. Disagreements were resolved through discussion between AK and TF.

Data collected on stakeholders' and smokers' characteristics were entered into an Excel spreadsheet and simple counts calculated.

Ethical approval

Ethics approval for this study was obtained from the Ministry of Health, Health and Disability Ethics Committee (Ethics Number 14/STH/217).

Results

Twenty-seven stakeholders were contacted, 10 refused to be interviewed or did not respond. We had some difficulty recruiting according to our criteria, so minor changes were made to ensure similar representation of stakeholders (see Table 3).

We recruited 21 smokers (see Table 4).

Seventeen smokers were interviewed following focus groups. Four did not answer their phone, respond to messages left on their answerphone or respond to text messages. One interview had to be discarded

Table 3: Stakeholder characteristics (N=17).

Category	Id number	Gender	Ethnicity
Political people			
Politicians x3	Political 1	F	NZ European
	Political 2	M	NZ European
	Political 3	F	Māori
Political commentator	Political 4	M	NZ European
Government people			
Government health official	Government 1	M	NZ European
Ex-government health Official	Government 2	M	NZ European
Ex-treasury official	Government 3	M	NZ European
Commercial people			
Tobacco company employee	Commercial 1	M	English
E-cigarette retailer	Commercial 2	M	Māori
Tobacco retailer	Commercial 3	F	NZ European
Nicotine expert (employed by tobacco company)	Commercial 4	M	English
Health people			
Tobacco control experts x4	Health 1	M	NZ European
	Health 2	M	NZ European
	Health 3	F	Pacific
	Health 4	F	Māori/ NZ European
Smoking cessation experts x2	Health 5	F	Māori/ NZ European
	Health 6	F	Māori

Table 4: Smoker characteristics (N=21).

Age	
16–30	4
31–45	10
46+	7
Gender	
Male	5
Female	16
Ethnicity (multiple responses)	
NZ European	9
Māori	14
Pacific	2
Did not answer	1
Time to first cigarette	
Non-daily	1
Within five mins	7
6–30 mins	9
31–60 mins	1
After 60 mins	3
Tried to quit during last 12 months	
Yes	17
No	3
Did not answer	1

because the participant did not smoke any of the VLNC cigarettes given to him.

Three key themes and sub-themes were identified in the data.

Negative views of VLNC cigarettes

Did not like the taste of VLNC cigarettes

Before smoking VLNC cigarettes, smokers were generally interested in them when they first heard about them. However, most did not like the cigarettes for a range of reasons, in particular the unpleasant taste and smell of them.

"At the group [focus] I thought 'this will be interesting' but once I tried, no, no, they were just terrible." Smoker (after smoking VLNC cigarettes)

"It [a VLNC cigarette] didn't really have a taste, it didn't smell too good and yeah it just had an awful smell ..." Smoker (after smoking VLNC cigarettes)

However, a couple of smokers were slightly more positive about the cigarettes.

"I actually thought they were okay." Smoker (after smoking VLNC cigarettes)

The taste of VLNC cigarettes is a problem.

"They don't taste as good as ordinary cigarettes. That's the main problem." Health 1

VLNC cigarettes still harmful

Several stakeholders and smokers stated that VLNC cigarettes could still cause harm to smokers.

"... ban all cigarettes ... cause I think they're going to be just as harmful because they're full of chemicals." Smoker (prior to smoking VLNC cigarettes)

There were concerns that VLNC cigarettes might be perceived as being healthy.

"I don't know whether you want to put those words [healthy] next to something that's still cigarettes." Political 3

Lack of support for a mandated VLNC cigarette-only policy

Most stakeholders and smokers did not want a VLNC cigarette-only policy to be implemented in New Zealand.

"I don't think the case has been made yet to mandate the removal of nicotine from tobacco and I think it would be hard to make that case without better evidence." Government 3

Lack of freedom of choice was considered an issue by a couple of participants.

"We'll have no choice, it'll be like North Korea." Smoker (before smoking VLNC cigarettes)

"First and foremost there would be freedom of choice. I would say there would be a pretty big storm if they were to disallow full strength cigarettes and bring in very low-nicotine cigarettes." Commercial 2

However, a few stakeholders (health) thought that mandating only VLNC cigarettes be available was important.

"I think if they were only selling low-nicotine cigarettes that they would work." Health 3

Equally, a couple of smokers thought that if VLNC cigarettes were the only cigarettes on the market people might quit smoking, as they would not like the taste of them.

"If it's going to be the only cigarettes then people are going to have to smoke them and if they don't like them, then they won't want to smoke them will they? Smoker (after smoking VLNC cigarettes)

Difficult to implement

Practically, it was considered that it would be quite complicated, difficult and time-consuming to introduce a VLNC cigarette-only policy.

"You have to have a mandated method of testing the nicotine content so that you can always guarantee that a reduced nicotine cigarette is in fact reduced nicotine." Health 1

"… if we couldn't create product [VLNC cigarettes] for the market that [pulling out of the market] would be I guess a consequence … the practicalities of creating these products [VLNC cigarettes] might be insurmountable." Commercial 1

Negative consequences of a VLNC cigarette-only policy

Negative consequences that could result from a mandated VLNC cigarette-only policy were highlighted. The tobacco industry would be likely to make it very difficult for the government to implement such a policy, eg, not manufacturing VLNC cigarettes for New Zealand and essentially changing the policy to one of prohibition.

"You could probably expect two consequences [from the tobacco industry] … a very hard fight, pulling out all stops we've seen on things like tobacco plain packaging … you could probably conjecture that equally they might play a brinksmanship game and threaten to actually pull out of the country altogether." Government 1

VLNC cigarette-only policy has never been implemented

Several stakeholders thought that because no other country has a VLNC cigarette-only policy, politicians would be nervous about introducing such a policy.

"That's going to make it difficult [that no other country has a mandated VLNC cigarette-only policy]. That would make our politicians nervous I would think, especially this Government." Health 1

On the other hand, a couple of the health stakeholders thought that New Zealand would be a good place to try implementing a VLNC cigarette-only policy.

"New Zealand's a great place to try [a VLNC cigarette-only policy] because of our border and our current tobacco framework … countries can see how it could be done." Health 6

While the policy has not been implemented anywhere in the world, some stakeholders were aware of discussions happening internationally about implementing a VLNC cigarette-only policy, particularly in the US.

"… the FDA was saying that they can regulate nicotine containing products. They can regulate it down, they just can't regulate it out." Government 1

Not a priority

A couple of politicians thought that other tobacco control policies were a higher priority.

"We need to take the steps to making plain packaging part of our legislation and then we also need to go to the smokefree cars where children are present. That would be the next move and then the low nicotine." Political 3

E-cigarettes

E-cigarettes were suggested by several stakeholders as an effective alternative product or addition to a VLNC cigarette-only policy to reduce smoking.

"I don't think e-cigarettes are the sole answer. I don't think there's any magic bullet out there, but I think there's a strong case as part of a spectrum of alternatives for smokers." Commercial 4

"I certainly think that the e-cigarettes present a much better way of dealing with those health issues. Political 4

"… so it would be a staged reduction … and doing it that way I think would be quite good, quite acceptable and the e-cigarettes would provide a bit of a backdrop, like they would provide nicotine in other ways." Health 1

VLNC cigarettes should be available for sale as an option

While most stakeholders and smokers were not in favour of a VLNC cigarette-only policy, they were in favour of VLNC cigarettes being available for sale in New Zealand as an option for smokers.

"I think that it [VLNC cigarettes] could help a lot of people, maybe not myself but others, or give them the option anyway." Smoker (after smoking VLNC cigarettes)

"Absolutely I've got no doubt at all that they [VLNC cigarettes] should be available as one option." Political 4

VLNC cigarettes would need to be cheaper than HNC cigarettes

Despite generally not liking the taste of VLNC cigarettes, most smokers stayed with the opinion that they should be available on the market provided they were much cheaper price than HNC cigarettes.

"Cost would need to be around $3 a pack." Smoker (after smoking VLNC cigarettes)

A differentiated tax on tobacco was thought to be a good way to encourage smokers to smoke VLNC cigarettes rather than their usual HNC cigarettes.

"Some people have suggested a differentiated tobacco excise tax levied on nicotine content rather than tobacco content … have a graduated taxation base or tax the hell out of HNC cigarettes to the exclusion of low-nicotine cigarettes and e-cigarettes for a period." Government 1

"I have no problem with them being clearly labelled high nicotine or even the potential for different prices for the different levels of nicotine, but as a blanket ban on high nicotine, I personally disagree with that." Political 4

Regulations would be needed

There was agreement that VLNC cigarettes should have to comply with the same regulations and legislation as HNC cigarettes.

"They [VLNC cigarettes] cause the same harm so they should be subject to the same requirements in terms of age restrictions, product displays, sale in whole packets, advertising controls." Government 3

One suggestion was that all tobacco brands should be required to have a VLNC cigarette option in addition to their HNC cigarettes.

"We would support the availability of these products [VLNC cigarettes] and probably a requirement that said every cigarette brand had to have this variant." Commercial 3

Discussion

Despite the potential of VLNC cigarettes to assist a reduction in smoking prevalence, a VLNC cigarette-only policy was not popular with many of the stakeholders and smokers in this study. Reasons are complex and varied. For stakeholders, while they are interested in such a policy, there is a belief that there is not enough evidence for it yet, it would be politically difficult to implement and it is not a priority for policy makers. For smokers, most did not like the taste of the cigarettes and they were concerned that the most harmful components remained in the cigarettes.

Many of the stakeholders and smokers expressed a preference for VLNC cigarettes to be available on the market in addition to HNC cigarettes. However, cigarettes with low nicotine content have been available for sale previously with very little success due to a lack of smoker interest.[18] While smokers do not generally like VLNC cigarettes[1,18] some thought there was a place for them on the market if they were much cheaper than HNC cigarettes and particularly for smokers wishing to quit. Smokers in New Zealand would be reluctant to purchase VLNC cigarettes unless there was a significant price differential, such as $15–$16.[1] Differential taxation on VLNC and HNC cigarettes was suggested by several stakeholders, and while it may not necessarily be the best policy option for VLNC cigarettes, it could still be an effective option for the New Zealand government to reduce smoking prevalence.[1]

A limitation of the study was that it was a small qualitative study, and while the results represent the breadth of participants' views, they do not represent the views of all key stakeholders and smokers in New Zealand. Participants were informed of the benefits of VLNC cigarettes but not the potential harms, drawbacks and alternative approaches. However, many of the questions initiated discussion on the potentially negative effects of the cigarettes. The study does have some strengths. It is the first time that smokers have been asked for their views on a VLNC cigarette-only policy before and after smoking VLNC cigarettes. Smokers in New Zealand are very supportive of reducing the addictiveness of cigarettes even if smoking would be less pleasurable,[19] but this study has given smokers the opportunity to experience the actual taste of VLNC cigarettes and then comment. Another strength is the high percentage of Māori smokers (68%) who participated in this study, which is important because of high rates of smoking among Māori.[16]

If the New Zealand government were to implement a significant differential taxation on very low and HNC cigarettes in combination with better access to nicotine containing e-cigarettes, smokers may shift away from HNC cigarettes. This variation on a VLNC cigarette-only policy would be a world first, have the potential to help New Zealand achieve its Smokefree 2025 goal (<5% smoking)[20] and be relatively easy for the government to implement.

Competing interests:
Nil.
Acknowledgements:
We thank all the participants in this study. We are grateful to Associate Professor Marewa Glover and Professor Chris Bullen for comments on the draft paper.
Author information:
Trish Fraser, Director, Global Public Health, Glenorchy; Anette Kira, Independent Researcher, Manawatu.
Corresponding author:
Trish Fraser, Director, Global Public Health, PO Box 82, Glenorchy 9350.
trish@tukuwahaglenorchy.com
URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7260

REFERENCES:

1. Walker N, Fraser T, Howe C, et al. Abrupt nicotine reduction as an endgame policy: a randomised trial. Tob Control. 2015; 24:e251–257. doi: 10.1136/tobaccocontrol-2014-051801.
2. Donny E, Walker N, Hatsukami, Bullen C. Reducing the nicotine content of combusted tobacco products sold in New Zealand. Tob Control. 2016; 0:1–6 doi: 10.1136/tobaccocontrol-2016-053186.
3. Laugesen M. Modelling a two-tier tobacco excise tax policy to reduce smoking by focusing on the addictive component (nicotine) more than the tobacco weight. N Z Med J. 2012; 125(1367):35–48.
4. Benowitz N, Henningfield J. Establishing a nicotine threshold for addiction. The implications for tobacco regulation. N Engl J Med. 1994; 331(2):123–5.
5. Henningfield J, Benowitz N, Slade J, et al. Reducing the addictiveness of cigarettes. Tob Control. 1998; 7(3):281–293.
6. World Health Organization Study Group of Tobacco Product Regulation. Advisory note: global nicotine reduction Switzerland: World Health Organization, 2015. http://apps.who.int/iris/bitstream/10665/189651/1/9789241509329_eng.pdf?ua=1 Accessed 9 February 2016.
7. Kozlowski L. Prospects for a nicotine-reduction strategy in the cigarette endgame: Alternative harm reduction scenarios. Int J Drug Policy. 2015; 26(6):543–547. doi: 10.1016/j.drugpo.2015.02.001.
8. Kozlowski L. Cigarette prohibition and the need for more prior testing of the WHO TobReg's global nicotine-reduction strategy. Tob Control. 2016;pii: tobaccocontrol-2016-052995. doi: 10.1136/tobaccocontrol-2016-052995.
9. Borland R. Paying attention to the 'elephant in the room'. Tob Control Published Online First: June 29,2016 doi: 10.1136/tobaccocontrol-2016-053150.
10. McRobbie H, Bullen C, Hartmann-Boyce J, Hajek P. Electronic cigarettes for smoking cessation and reduction. Cochrane Database Syst Rev. 2014; 12:CD010216.
11. Lindblom E. Filling in the blanks on reducing tobacco product addictiveness in the FCTC partial guidelines for articles 9 & 10. http://scholarship.law.georgetown.edu/cgi/viewcontent.cgi?article=2410&context=facpub Accessed 9 February 2017.
12. Hatsukami D, Zaatari G, Donny E. The case for the WHO Advisory Note, global nicotine reduction strategy. Tob Control. 2016; pii: tobaccocontrol-2016-053134. doi: 10.1136/tobaccocontrol-2016-053134.

13. Donny E, Denlinger R, Tidey J, et al. Randomized trial of reduced-nicotine standards for cigarettes. N Engl J Med. 2015; 373(14):1340–9 doi: 10.1056/NEJMsa1502403
14. Dingel M, Hicks A, Robinson M, Koenig B. Integrating genetic studies of nicotine addiction into public health practice: Stakeholder views on challenges, barriers and opportunities. Public Health Genomics. 2012; 15(1):46–55. doi: 10.1159/000328861.
15. Fraser T. Taking the nicotine out of tobacco. 2002; Master of public health thesis, unpublished http://files7.webydo.com/91/9171592/UploadedFiles/4C24719E-958E-0082-862F-001C406CE2CC.pdf Accessed 9 February 2017.
16. Ministry of Health. Tobacco use 2012/13: New Zealand Health Survey. 2014, Ministry of Health: Wellington, New Zealand. http://www.health.govt.nz/publication/tobacco-use-2012-13-new-zealand-health-survey Accessed 9 February 2017.
17. Goldkuhl G. Pragmatism vs interpretivism in qualitative information systems research. European Journal of Information Systems. 2012; (21)2:135–146.
18. Dunsby J, Bero L. A nicotine delivery device without the nicotine? Tobacco industry development of low nicotine cigarettes. Tob Control. 2004; (4):362–9.
19. Edwards R, Wilson N, Weerasekera D, et al. Occasional report: Attitude towards the tobacco industry and support for tobacco regulation in New Zealand: National survey data. Wellington, Department of Public Health, University of Otago, Wellington: 2010. http://www.researchgate.net/publication/266447327_Occasional_Report_Attitudes_towards_the_tobacco_industry_and_support_for_tobacco_regulation_in_New_Zealand_National_survey_data Accessed 9 February 2017.
20. Gendall P, Hoek J, Edwards R. What does the smokefree goal mean to the New Zealand public? N Z Med J. 2014; 127(1406):101–3.

Reduced tobacco consumption, improved diet and life expectancy for 1988–1998: analysis of New Zealand and OECD data

Murray Laugesen, Randolph C Grace

ABSTRACT

AIM: We compared changes in tobacco consumption and diet in relation to changes in life expectancy in 1988–1998 in 22 OECD (Organisation for Economic Cooperation and Development) countries.

METHOD: Between 1985 and 1995 using regression analysis we estimated differences in tobacco consumption per adult and the differences in the sum of atherogenic and thrombogenic indices against life expectancy. Each index was derived from the various fats per gram of food from standard texts, and from the annual measurements of fat in the food balance sheets of each country.

RESULTS: In 1985–1995, New Zealand showed the largest decrease in tobacco consumption per adult (41%) and the greatest decrease (except for Switzerland) in the sum of atherogenic and thrombogenic indices (17%) as a measure of diet. New Zealand ranked first for life expectancy increases from 1988–1998 for men (3.6 years), women (2.8 years) and both sexes combined. Regression analyses revealed that increases in life expectancy across the OECD for males, but not females, were strongly associated with decreases in tobacco consumption, with a weaker effect of diet improvement.

CONCLUSION: These results suggest that reduced tobacco consumption in 1985–1995 likely contributed to New Zealand's gains in life expectancy from 1988–1998.

In New Zealand, life expectancy at birth extended 3.6 years for males when measured in 1998 by changes over the previous 10 years. Life expectancy at age one was approximately half a year less than at birth, suggesting that the large gains in reducing sudden unexpected death in infancy (SUDI) below the three per 1,000 death rate in 1989–1990 did not affect life expectancy as much as might be expected.[1] Notwithstanding the steady annual decline in tobacco consumption per adult, large changes seen in tobacco deaths continued in the 1985–1995 period (Table 1). Tobacco was a major cause of death (4,137 annually in 1980–85).[2] In 1990, smoking caused 38% of male cancer deaths and 16% of female cancer deaths.[3]

Disregarding deaths under age 35 years of age, when tobacco deaths were rare except for some due to SUDI, tobacco deaths under 80 years of age accounted for at least one quarter and up to one third of all male deaths, and for one sixth to over one quarter of all female deaths. The last column of Table 1 shows that 27% of reductions in tobacco-related deaths in 1985–1995 would have accounted for the large gains in life expectancy seen in this period.

Secondly, to express these data differently, the mean years of life lost per death from smoking in Peto's data[3] showed that in 1990 the average smoker in New Zealand lost 14 years compared with non-smokers. (For Australia, the average smoker lost 14 years, in the UK, 13 years, and smokers in the US and Canada lost 15 years, compared with non-smokers.) These lost years would otherwise have been added to life expectancy. However, the percentage of male deaths due to tobacco declined consistently

ISSN 1175-8716

Table 1: Tobacco consumption per adult and tobacco deaths as a percentage of all deaths of any cause, age 35–79 years, New Zealand 1985–2000.

	Tobacco consumption per adult*	% of deaths due to tobacco		
		Male	Female	All
1985	2,493	32.0	18.4	27.6
1990	1,972	28.9	22.4	26.8
1995	1,477	27.6	25.2	26.8
2000	1,357	19.9	14.7	17.3

*Consumption measured in sticks of tobacco weighing 0.7g for manufactured and 1g for hand-rolled cigarettes. Hand-rolled were in the minority: 8% in 1985 rising to 19% in 1995.
Health New Zealand International Tobacco and Food and Nutrient databases, 1960–2000.
Source: Peto R et al 2015[3]

over five-year periods, but the percentage of female deaths did not, possibly explaining why changes in tobacco in 1985–1995 were a factor in explaining the life expectancy of males but not females.

The atherogenic and thrombogenic indices, measuring the types of fat consumed, improved (ie, decreased) with reference to causing heart disease and stroke, more or less in parallel from 1961 to 2000. The atherogenic index comprises the weights of the lighter saturated fats (denoted by the length of their carbon chains as C12.0, C14.0 times 4, and C16.0) divided by all unsaturated fats. A high value on this measure predisposes to atheroma of the coronary arteries.[4] The thrombogenic index is the heavier saturated fats divided by monounsaturated and polyunsaturated fats and marine polyunsaturated fats added in. Higher values mean predisposition to sudden cardiac events. These formulae were devised in 1991 by Ulbricht and Southgate.[4]

Because both tobacco and fat consumption were decreasing between 1985 and 1995 in New Zealand, the extent to which each might be responsible for the gains in life expectancy is unclear. Thus we analysed data from OECD countries to determine whether changes in tobacco consumption or atherogenic and thrombogenic indexes were more strongly associated with life expectancy gains.

Method

We compared the percentage decrease in tobacco consumption per adult and the percentage decrease in the dietary indices for the 1985–1995 period with the gain in years of life expectancy in years for the period 1988–1998, across 22 countries. This difference in time periods allows for some delay for life expectancy gains to show. Life expectancy is the average number of years that an individual of a given age group is expected to live if current mortality rates continue to apply. This form of (period) life expectancy enables comparison across countries. Period life expectancy is unlike life expectancy of a cohort, which does not incorporate future death rates that a cohort would expect if death rates continued to decline. Nor does it take account of reductions in lung cancer and other tobacco-caused diseases before or after the years in question, 1988–1998.

The 22 countries of the OECD were Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK and the US.

For the independent variables, percentage changes for tobacco consumption for 1985–1995 were obtained for each country from the Health New Zealand Tobacco control international database, 1960–2000, divided by United Nations population data.

Percentage changes in 1985–1995 of the atherogenic and thrombogenic indices per capita were taken from tables based on standard composition of nutrients per gram[5] and food consumption per capita based on food balance tables of the Food and Agricultural Organisation[6] included in the Health New Zealand Food and Nutrition International database. The atherogenic and thrombogenic indices were summed

and expressed as atherogenic-thrombogenic indices. Regression analyses were then performed to determine the extent to which changes in life expectancy across the OECD could be explained by changes in tobacco consumption and atherogenic-thrombogenic indices.

Results

Among the 22 OECD countries, New Zealand ranked first for changes in life expectancy in 1988–1998 for men, women and both sexes combined, and for 1985–1995 showed the largest decrease in tobacco consumption per adult. New Zealand also showed a greater decrease in atherogenic and thrombogenic indices, to measure improved diet with respect to their fat consumption, than any OECD country with the exception of Switzerland.

Smoking prevalence data for the 22 countries did not allow calculation of separate estimates for males and females.[7] Life expectancy at age 40 years for males and females did not differentiate male versus female or total response to changes in tobacco consumption per adult in 1985–1995.

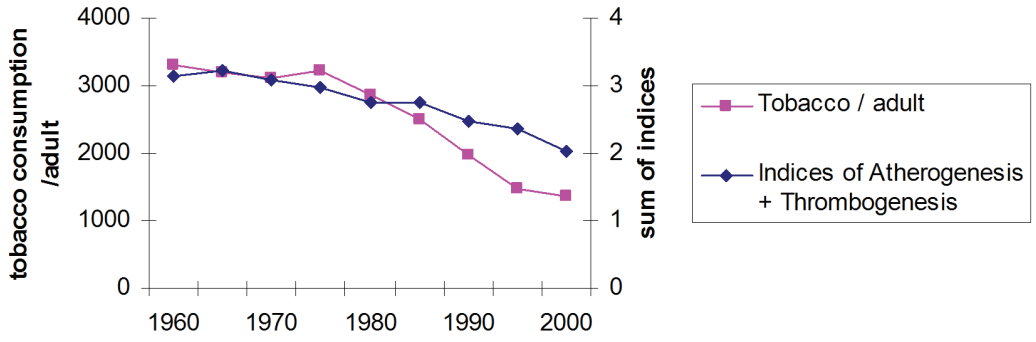
Tobacco consumption per adult began to decrease from 1975. The 41% decrease in tobacco consumption between 1985 and 1995 corresponded for New Zealand with the 35% decrease in cigarettes smoked (from 23 to 15 per day) during this period;[8] and the cigarettes per day (not subject to under-reporting) by estimation from smoking prevalence, decreased also.

In New Zealand, life expectancy at birth for 1998 was 80.4 for women and 75.2 for men, and compared with 10 years previous, the life expectancy for women was 2.8 years greater, for men 3.6 years greater, and was 3.2 years greater for both sexes combined. For the 22 countries of the OECD, this was the largest increase that year as the life expectancy 10 years previously had been 77.6 for New Zealand women and 71.6 for men. New Zealand men were now ranked 10th and women 16th across the OECD.[9]

The increase in life expectancy for men (3.6 years) was greater than for women (2.8 years), narrowing the life expectancy measured by sex at birth. This was in line with a striking reduction in tobacco consumption per adult in New Zealand in 1985–1995, and with a higher tobacco death rate among men as in Table 1. Averaged across the OECD countries, life expectancy increased overall, but significantly more for males (2.20%) than for females (1.73%), $t(21)=3.64$, $p=.002$, $d=.72$. Changes in life expectancy were negatively correlated with decreases in tobacco consumption and atherogenic-thrombogenic index, significantly for males, $r=-.81$, $p<.001$ and $r=-.66$, $p=.001$, but not for females, $r=-.30$, $p=.17$ and $r=-.27$, $p=.22$.

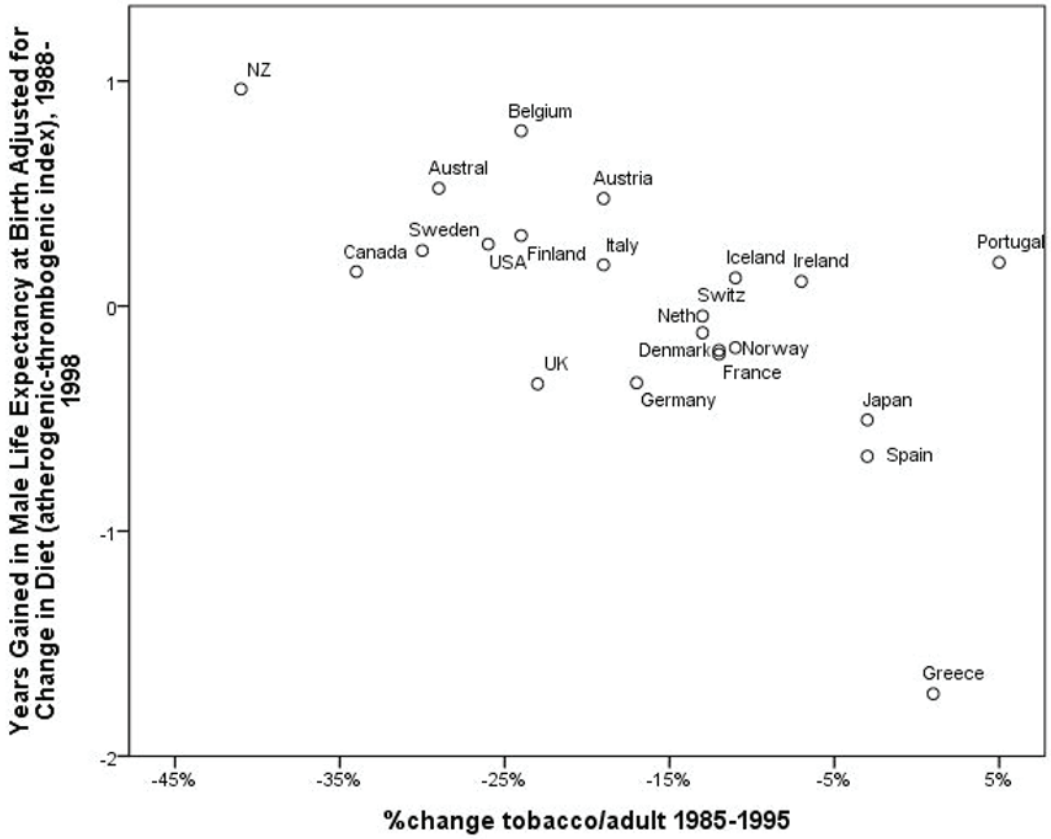
We conducted regressions to compare changes in tobacco consumption and diet with changes in life expectancy. For males, decreases in tobacco consumption were strongly associated with increases in life expectancy, $\beta=-.65$, $p<.001$, while decreased atherogenic-thrombogenic index approached significance, $\beta=-.30$, $p=.06$, and together both variables explained $R^2=.71$ $p<.001$. Of the 71.0% variance explained, 32.5% was uniquely associated with change in tobacco, 5.2% was uniquely associated with change in atherogenic-thrombogenic

Figure 1: Tobacco consumption and diet, New Zealand 1960–2000.



Health New Zealand databases 1960–1990 for tobacco (age 15 years and over) and for food and nutrition (all ages).

Figure 2: Tobacco per adult (1985–1995) versus male life expectancy at birth in 1988–1998, adjusted for changes in diet (sum of atherogenic and thrombogenic indices), 22 OECD countries compared.



Life expectancy is from OECD in Figures. stats.oecd.org (2001).
Health New Zealand International Tobacco and Food and Nutrient databases, 1960–2000.

indices, and 33.3% of the variance was shared by both predictors.

However, for females, neither decreases in tobacco consumption or decreased atherogenic-thrombogenic indices were significantly associated with increases in life expectancy, β=-.15, p=.58 and β=-.22, p=.41, respectively, and the overall model was not significant, R^2=.11, p=.34.

Figure 2 shows how tobacco consumption per adult affected male life expectancy at birth, after allowing for the atherogenic-thrombogenic indices as a measure of diet to affect the tobacco consumption per adult score on the y axis.

These results show that changes in tobacco consumption, and to a lesser extent improvements in diet, were responsible for the increases in male life expectancy from 1988–1998 and explain why New Zealand showed the greatest gains overall among the 22 OECD countries studied.

Discussion

New Zealand's life expectancy was increased by reducing tobacco consumption and improving diet together. The health gains of the comprehensive programme to control tobacco consumption were substantial. In 1985–1995, policy changes in New Zealand resulted from increased tobacco excise and resultant tobacco industry-led increases in price, raising over the counter tobacco prices 230%. In addition, the passage of the Smoke-free Environments Act in 1990 completely phased out tobacco advertising and sponsorship between 1990 and 1995, and made office workplaces smokefree.

Gains in life expectancy were significantly greater for men than women. Although reasons for this result are unclear—in particular, we did not have tobacco consumption data separately for men and

women—one possibility is that it may be related to females' overall lower cardiovascular risk.

Some limitations of our study should be noted. Because the research is correlational, it is not possible to rule out other variables that might have contributed to life expectancy gains. For example, differential improvements in quality of health care may have contributed to variance in life expectancy outcomes across the OECD from 1988–1998. Although we did not have a measure of health care quality, it seems unlikely that improvements in New Zealand over this period could entirely explain our results.

Another limitation is that the atherogenic and thrombogenic indices may not fully capture the link between dietary factors and health. New Zealand showed the greatest decrease after Switzerland in the sum of atherogenic and thrombogenic indices during 1985–1995. A more recent large study of pooled data with 24–28 years of follow-up from the US suggests that increased dietary intakes of individual saturated fats (length C12, C14, C16, C18) were positively associated with risk of coronary heart disease. Replacement of 1% of daily energy intake from the combined group of C12.0–C18.0,with equivalent energy from polyunsaturated fat, whole grain carbohydrates or plant proteins, was associated with a 6–8% reduced risk of coronary heart disease.[10]Among the 22 countries analysed for the decade 1985–1995, New Zealand showed a 4.0% decline in the C12.0–C18.0 saturated fats but a 20.6% increase in polyunsaturated fat as a proportion of total calories, along with an increase of 14.9% in calories from grains and an increase in protein in vegetables and fruit.

New Zealand achieved these dietary changes through manufacturers, supermarkets and increased ethnic varieties of food providing a wider range of healthy food choices. From 1987 with the first Heart Food Festival and Department of Health funding, the Heart Foundation increased the frequency of Heartbeat programmes in schools, workplaces and communities. It began its "Pick the Tick" food labelling programme in 1991.[11] The Cancer Society's Fit Food campaigns and the 5+ a day campaigns highlighted the benefits of a diet high in fruit and vegetables. These changes resulted in increased polyunsaturated fat and lowered saturated fat. In future, analyses used by *The Global Burden of Disease*,[12] citing low intakes of polyunsaturated fat as a risk factor for heart disease may need to be also considered. Our results, however, suggest that decreases in tobacco consumption were the most likely reason why New Zealand showed the greatest overall gains in life expectancy among the OECD countries in 1988–1998.

Competing interests:
Nil.

Author information:
Murray Laugesen, Adjunct Professor; Randolph C Grace, Professor, Department of Psychology, University of Canterbury.

Corresponding author:
Dr Murray Laugesen, Adjunct Professor, 267 Memorial Ave, Burnside, Christchurch 8053.
hnz@healthnz.co.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7261

REFERENCES:

1. Our Health, our Future. The Health of New Zealanders, 1999. Ministry of Health 1999, Tables 25 and 57.
2. Gray AJ, Reinken JA, Laugesen M. The cost of cigarette smoking in New Zealand. NZ Med J 25 May 1988; 101:270–3.
3. Peto R, Lopez AD, Boreham J, et al. Mortality from smoking in developed countries 1950–2000. London: Oxford University Press, 1994, with extension to September 2015.
4. Ulbricht TLV, Southgate DAT. Coronary Heart Disease: seven dietary factors. Lancet 19 Oct 1991; 338:985–992.
5. Paul A, Southgate D. The Composition of Foods. First Supplement. London: Royal Society of Chemistry and Ministry of Agriculture Food and Fisheries. HMSO: 1978.
6. Food and Agricultural Organization. Food Balance Sheets. Rome: FAO. Accessed July 2016.
7. Smoking prevalence in 24 OECD countries, 1975–2000. www.healthnz.co.nz/OECDsmoprev.pdf
8. Laugesen M. Swinburn B. New Zealand's tobacco control programme 1985–98. Tobacco Control 2000; 9:155–162.
9. Beston, Anne. NZ rises in world lifespan rankings. NZ Herald 12 February 2002, p. A1.
10. Zong F, Li Y, Wanders AJ, et al. Intake of individual saturated fatty acids and risk of coronary heart disease in US men and women: two prospective longitudinal cohort studies. BMJ 2016; 355:i5796.
11. Young L, Swinburn B. Impact of the Pick the Tick food information programme on the salt content of food in New Zealand. Health Promot Int. 2002 Mar; 17:13–19.
12. The Global Burden of Disease. 2015. Institute of Health Metrics and Evaluation. www.healthdata.org/results

The combination of bed sharing and maternal smoking leads to a greatly increased risk of sudden unexpected death in infancy: the New Zealand SUDI Nationwide Case Control Study

Edwin A Mitchell, John MD Thompson, Jane Zuccollo, Melanie MacFarlane, Barry Taylor, Dawn Elder, Alistair W Stewart, Teuila Percival, Nick Baker, Gabrielle McDonald, Beverley Lawton, Martin Schlaud, Peter Fleming

ABSTRACT

BACKGROUND: Despite a major reduction in overall infant mortality, sudden unexpected death in infancy (SUDI) continues to be of concern in New Zealand, as the rate is high by international standards, and is even higher in indigenous Māori.

AIM: To identify modifiable risk factors for SUDI.

METHODS: A three-year (1 March 2012–28 February 2015) nationwide case-control study was conducted in New Zealand.

RESULTS: There were 137 SUDI cases, giving a SUDI mortality rate of 0.76/1,000 live births. The rate for Māori was 1.41/1,000, Pacific 1.01/1,000 and non-Māori non-Pacific (predominantly European) 0.50/1,000. The parent(s) of 97% of the SUDI cases were interviewed. Six hundred and forty-nine controls were selected and 258 (40%) were interviewed. The two major risk factors for SUDI were: maternal smoking in pregnancy (adjusted OR=6.01, 95% CI=2.97, 12.15) and bed sharing (aOR=4.96, 95% CI=2.55, 9.64). There was a significant interaction (p=0.002) between bed sharing and antenatal maternal smoking. Infants exposed to both risk factors had a markedly increased risk of SUDI (aOR=32.8, 95% CI=11.2, 95.8) compared with infants not exposed to either risk factor. Infants not sharing the parental bedroom were also at increased risk of SUDI (aOR=2.77, 95% CI=1.45, 5.30). Just 21 cases over the three-year study were not exposed to smoking in pregnancy, bed sharing or front or side sleeping position.

CONCLUSIONS: This study has shown that many of the risk factors that were identified in the original New Zealand Cot Death Study (1987–1989) are still relevant today. The combination of maternal smoking in pregnancy and bed sharing is extremely hazardous for infants. Furthermore, our findings indicate that the SUDI prevention messages are still applicable today and should be reinforced. SUDI mortality could be reduced to just seven p.a. in New Zealand (approximately one in 10,000 live births).

Abbreviations	
aOR	Adjusted odds ratio
CI	Confidence interval
NIIO	National Initial Investigation Office
OR	Odds ratio
PAR	Population attributable risk
PMMRC	Perinatal and Maternal Mortality Review Committee
SIDS	Sudden infant death syndrome
SUDI	Sudden unexpected death in infancy

We previously conducted a three-year (1987–1990) case-control study examining risk factors for sudden infant death syndrome (SIDS), the New Zealand Cot Death Study.[1,2] The major risk factors identified were prone sleeping position, maternal smoking, lack of breast-feeding and bed sharing. We subsequently showed that there was an interaction between bed sharing and smoking, so that infants of mothers who smoked in pregnancy were at a much higher risk of death when bed sharing than infants of mothers who did not smoke.[3]

The study identified several new risk factors for SIDS, including the interaction between bed sharing and smoking,[3] side sleeping position,[2] postnatal depression,[4] the independent effect of smoking by the father,[5] the protective effect of pacifiers[6] and the protective effect of sleeping in same bedroom as parents.[7] We also showed that the high rate of SIDS in Māori is based largely on the high prevalence of risk factors (especially smoking and bed sharing) in the Māori population.[8]

In February 1991, the official SIDS prevention campaign began,[9] although the prevalence of prone sleeping position had started to decrease from August 1989.[10] Within 1–2 years there was a substantial reduction in SIDS (from 250 to 120 deaths p.a.) and total postneonatal mortality rates.[11]

We followed the original study with a prospective case-cohort study with data collected from 1991 to 1993. This confirmed the dramatic decrease in the prevalence on prone sleep position and demonstrated that the previously described risk factors were still important.[12]

Terminology changed from cot death (crib death in the US) to SIDS, which is unexplained infant death and is a diagnosis of exclusion. More recently Sudden Unexpected Death in Infancy (SUDI) is used because a thorough clinical history, a review of details of the circumstances of death and the autopsy may provide a contributory or causative diagnosis. Furthermore, some pathologists and coroners prefer to use the term 'undetermined' or 'unascertained' for a death previously considered to be SIDS. This change is causing diagnostic shift in the mortality data. A set of ICD-10 codes that encompasses the codes used in different countries for most SUDI cases have been proposed.[13] Use of these codes will allow for better comparisons over time and place.

The original New Zealand Cot Death Study is now more than 25 years old, and the prevalence of risk factors has changed due to the SIDS prevention programme, and this may have changed the relative importance of the risk factors at a population basis. In 2010, there was concern about SIDS mortality rates in New Zealand as mortality rates had plateaued in the previous decade and were higher than other comparable countries.[14] Furthermore, 62% of cases were in Māori (CYMRC, 2009) and over 50% occurred in a co-sleeping context.[15,16] There were knowledge gaps, including lack of information on individual SUDI cases and the estimation of the current prevalence of risk factors in the community as these previously were based on small surveys in Auckland.[17,18] Thus it was felt appropriate to reinvestigate this problem.

The aim of this study is to reduce New Zealand's high infant mortality rate,

especially in Māori, by carrying out a nationwide study to identify the modifiable risk factors for sudden unexpected death in infancy (SUDI) using a more detailed death-scene investigation protocol in collaboration with the coronial investigation of deaths across New Zealand.

Methods

A prospective national case-control study enrolled cases with deaths occurring from 1 March 2012 to 28 February 2015. The source population for this study was the whole of New Zealand. The number of live births in the years 2012–2014 was used as the denominator for the calculation of mortality rates.

Cases

The death of an infant that was referred to the coroner was potentially eligible for inclusion. The cases had to be born and domiciled in New Zealand, and be between seven days of age and the first birthday (post-perinatal age group).

SUDI cases included the following categories of death:

- Clear asphyxia deaths occurring during sleep
- Unsafe sleeping, ie, bed sharing with no direct evidence of facial occlusion, wedging, sleeping on couch or in car seat. Prone and side sleeping position were not included in this category
- Congenital anomalies, infection and other findings insufficient to explain the death
- Unascertained and
- Unexplained causes of sudden unexpected death (normal history, autopsy and scene investigation, which fulfils the usual definition of SIDS)

It excluded

- Non accidental injury, including suspected homicide and neglect, obvious accidental causes, such as road traffic crashes and concealed pregnancies
- No autopsy (parental objection)
- Perinatal asphyxia, prenatal problems and complications of prematurity
- Clearly identified cause at autopsy with prodromal symptoms and signs
- Congenital anomalies that clearly led to death

Cases could be categorised in more than one category. Note that this definition of SUDI is broader than the definition of SIDS.

All sudden, unnatural, violent or unexplained deaths have to be reported to the Coroner.[19] All infant deaths referred to the coroner were potentially cases for the study. In New Zealand, the National Initial Investigation Office (NIIO) is a single point of contact for cases to be referred to the coroner. NIIO staff were responsible for notifying the project manager (MM) that a SUDI had occurred. At times it was initially unclear to NIIO whether the death was within the scope of the study, for example, a death of an infant with a pre-existing medical condition in a bed-sharing situation. NIIO were advised to make the notification even if they were unsure the case was within scope for the study. The project manager would confirm whether the death was in scope and, if necessary, would seek advice from the lead investigator (EAM). In all cases, the SUDI liaison sought clearance from New Zealand police prior to making first contact with the family. This provided opportunity for the SUDI liaison to be informed about whether the death was considered by New Zealand police to be suspicious and to obtain contextual and relevant background information. Cases "known to the justice system" were excluded only if they met the exclusion criteria. In cases where New Zealand police were considering a case of criminal culpability for the infant's death, the SUDI liaison would maintain regular contact with the designated police officer until such time as the death was no longer considered to be suspicious or clearance was given for the SUDI liaison to contact the family. The timeframe for this varied from one day to several weeks, however, the majority of cases were cleared of suspicion within 3–5 days.

It was anticipated that autopsies would be carried out on a high proportion of cases and that these would be carried out by forensic or perinatal/paediatric pathologists. Full autopsies were conducted predominantly by forensic and paediatric pathologists following a standard protocol modified from the International SUDI Protocol to conform to cultural guidelines and New Zealand Coronial Practice. (This included measurement of body weight and dimensions, assessment of nutritional status, the

recording of the weights of all major organs and histological examination of sections from each lung, the myocardium, trachea, medulla, cerebellum and thalamus and all major organs as well as all macroscopic abnormalities. Vitreous humour biochemistry, bacterial cultures of lung and blood, virological studies for the main respiratory viruses and toxicology were also performed.)

Data collection for cases

After notification by NIIO there was an initial assessment by a specially trained investigator (SUDI liaison), which was conducted under the auspices of the coroner. This included a death scene investigation, which also included photography and doll reconstruction of the position in which the infant was placed to sleep and found dead and of the sleeping surface and bedding. A detailed research interview (with informed consent) with the caregivers was also undertaken subsequently or at the same time as the initial assessment.

Allocation of a cause of death

An expert group comprising two pathologists, two paediatricians, a public health physician and the project manager met and considered the information from the initial and research datasets and the pathology report and classified the cause of death for each case in the study. This was done independently from the certified cause of death or the cause of death determined by the coroner.

Controls

The following method was used to select controls:

1. A date of interview (nominated date) was randomly selected from all days in the three-year study (1 March 2012 to 28 February 2015).
2. The control was then randomly allocated an age at which to be interviewed to ensure that the control group had a similar age distribution to that previously described for cases.
3. The date of birth was calculated from the age and nominated date at interview.
4. An obstetric hospital was randomly chosen in proportion to the obstetric hospital of birth of SUDI cases over the previous four years.
5. Ethnicity was randomly allocated to each control in proportion to the ethnicities of the cases over the previous four years.
6. Random numbers were used to select a particular ethnic specific infant from among those born on the nominated date at that obstetric hospital. For obstetric hospitals where there were no deliveries of ethnic-specific babies on the nominated date, a randomly allocated direction indicator was used to indicate whether to go forwards or backwards in time to select an infant.

This selection meant that the distributions of the cases and the controls were very similar (over hospital, ethnicity and age) but there is no direct matching. The advantage of an unmatched study is that there will be no loss of efficiency because of failure to find a match. This method resulted in a control group that is enriched for the major risk factors (ethnicity and residence/socioeconomic status) and allows the identification of more subtle differences between cases and controls.

The initial plan was to select two controls for the anticipated number of cases, however, the participation rate of controls was lower than expected, so if the selected control could not be obtained, then a further control was selected. In total, 649 controls were selected.

Data collection for controls

The parents of control infants were sent a patient information sheet, and were phoned one to two weeks later to arrange an interview close to the nominated date. Written consent was obtained and the parents or guardians were interviewed and a "sleep scene" investigation conducted, the components of which were similar to the death scene investigation of the cases.

Variables

Most of the information for this report came from interviews with the parent or guardian.

Maternal ethnicity was self-reported. If missing it was taken from other sources, such as the notification information from NIIO. Multiple ethnicities could be given, and were prioritised using the following hierarchy: Māori, Pacific, Other and New Zealand European.[20] Bed sharing was

defined as sleeping on the same surface at the time of death or end of nominated sleep for controls. Maternal age (years), birthweight (kg) and age of infant (weeks) were treated as continuous variables. All other variables were categorised: sex (boy/girl), multiple birth (yes/no), number of previous live births (0, 1, 2, 3+), marital status (married, cohabitating, single), maternal smoking in pregnancy (yes/no), ever been breastfed (yes/no), position placed to sleep for the last sleep prior to death/nominated sleep (back, side, front) and sharing parental bedroom at the time of death/nominated sleep (yes/no; note: this refers to the parental bedroom, so an infant can be bed sharing but not be in the parental bedroom, such as sleeping on a sofa in the lounge).

Statistical analysis

Statistical analysis was carried out using the standard methods of the Mantel-Haenszel odds ratio analysis used in case-control studies.[21] Logistic regression for unmatched analysis of categorical variables was used to adjust for potential confounders. The multivariable analysis adjusted for: maternal ethnicity, maternal age, marital status, number of previous live births, age of infant, sex of baby, birth weight, singleton/multiple birth, breastfeeding, position placed to sleep, smoking in pregnancy, sharing parental bedroom and bed sharing. The interaction between maternal smoking and bed sharing was also examined. The analyses were conducted in SAS (Version 9.3, SAS Institute, Cay, NC, USA). Population attributable risk (PAR) for smoking, bed sharing and not sleeping in the parental bedroom were calculated to estimate the proportion of deaths explained by exposure to particular risk factors.[22] The number of SUDI cases not exposed to maternal smoking, bed sharing and not sharing the parental bedroom was calculated. Missing values were not imputed. Statistical significance was set at 5% level.

Ethics

Ethical approval for this study was obtained from Central Regional Ethics Committee (CEN/11/09/045). Parents/guardians of both cases and controls gave written consent.

Results

During the three-year study there were 303 deaths referred to the coroner that were considered for inclusion in the study. Excluded infants were:

- Born and domiciled outside New Zealand, n=1
- Greater than 12 months of age, n=43
- Less than seven days of age, n=63
- Non-accidental injury, obvious accidental causes, concealed pregnancies, n=19
- No autopsy, n=1
- Perinatal asphyxia, perinatal problems, including complications of prematurity, n=8
- Identified cause with prodromal symptoms and signs, n=18
- Congenital anomalies that clearly led to death directly, n=13

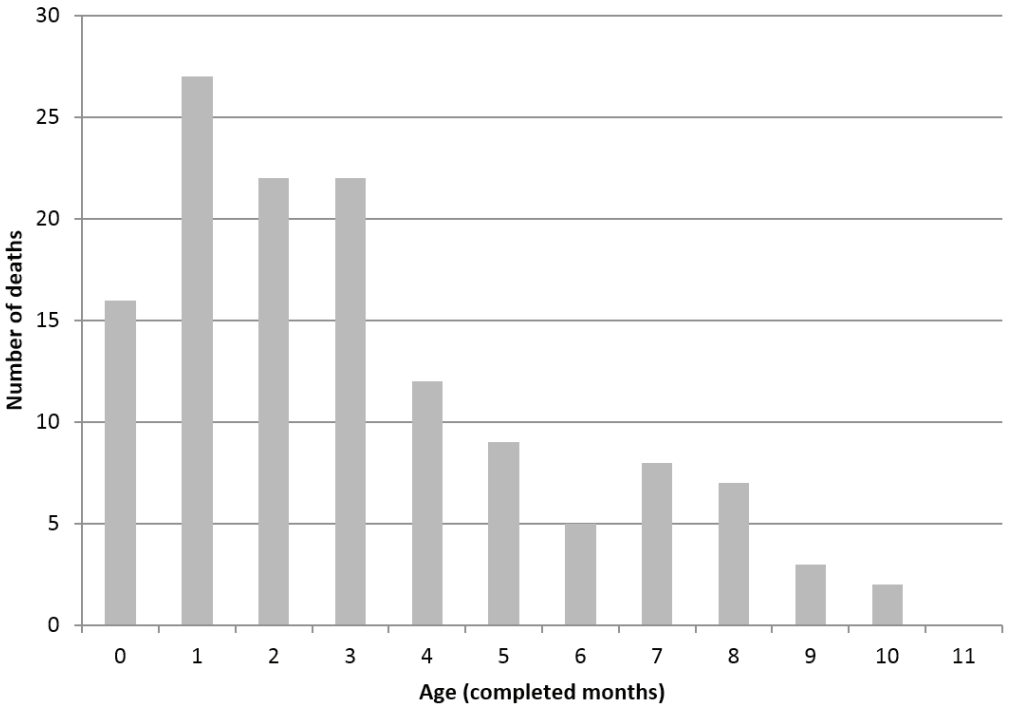
Thus there were 137 SUDI cases. These deaths were subcategorised as:

- Clear asphyxia mechanism, n=20
- Unsafe sleeping, n=50 and an additional 18 which also had minor pathological findings not thought to have contributed to the death
- Presence of minor pathological findings not thought to have contributed to the death, n=13 and
- Unexplained, n=36.

The SUDI mortality rate in the study period was 0.76/1,000 live births. The rate for Māori was 1.46/1,000, Pacific 1.01/1,000 and non-Māori non-Pacific (predominantly European) 0.45/1,000. The SUDI mortality rate by region was Upper North Island 0.70/1,000, Central North Island 1.00/1,000, Lower North Island 0.75/1,000 and South Island 0.61/1,000. There was no seasonal distribution of SUDI cases (spring=26, summer=38, autumn=31, winter=38). Figure 1 shows the age distribution of cases. The peak occurrence is 1–3 months of age with 74% of all SUDI deaths occurring before four months of age.

Parental (or guardian) interviews were completed in 133 (97%) cases and 258 (40%) controls. The initial interview occurred at

Figure 1: The age distribution of SUDI cases.



Number of deaths in the first month of life includes deaths from seven days of age through to 27 days of life.

a median of six days (interquartile range two to 12 days). No information other than ethnicity and obstetric hospital of birth were available for the non-participating controls.

Tables show the univariable and multivariable odds ratios (OR) for the variables relating to sociodemography, pregnancy, infant and infant care practices (Table 1).

Ethnicity and age were included in the multivariable analysis as they were part of the selection criteria for the control population. Because there were missing values for some variables the final multivariable model had 99 cases and 255 controls.

Significant findings at the 5% level in the multivariable analysis were number of previous live births, maternal smoking in pregnancy, multiple births, position placed to sleep, bed sharing and the protective effect of sharing the parental bedroom.

Maternal smoking in pregnancy increased the risk of SUDI (adjusted OR=6.01, 95% CI=2.97, 12.15) and was present in 74% of cases. Infants placed prone (on their front) to sleep were at an increased risk (aOR=3.85, 95% CI=1.07, 13.89) compared to infants placed on their back to sleep. Infants placed on their side had a non-significant increased risk of SUDI (aOR=1.94, 95% CI=0.85, 4.43).

57.5% of deaths occurred in a bed sharing situation. Bed sharing increased the risk of SUDI (aOR=4.96, 95% CI=2.55, 9.64) and was present in 57.5% of cases. Infants not sharing the parental bedroom were at increased risk of SUDI (aOR=2.77, 95% CI=1.45, 5.30).

The interaction between bed sharing and maternal smoking in pregnancy was examined (Table 2). Infants of mothers who smoked in pregnancy and were bed sharing were at a markedly increased risk of SUDI (aOR=32.8, 95% CI=11.2, 95.8) compared with infants not exposed to maternal smoking and bed sharing. The combination of bed sharing and smoking was associated with 48.0% of the deaths. Infants only exposed to maternal smoking in pregnancy and not bed sharing had a non-significant increased risk of SUDI (aOR=1.91, 95% CI=0.77, 4.72), and infants only exposed to bed sharing but not maternal smoking in pregnancy also had a non-significant increased risk (aOR=1.59, 95% CI=0.52, 4.87).

In the multivariable model, 34 cases and two controls were removed due to missing values. To assess the effect of this on the ORs, a multivariable model was run removing four variables with varying

Table 1: The number (percentage) or mean (SD) and univariable and multivariable odds ratios (95% CI) of sociodemographic, pregnancy, infant and infant care practice variables.

	Cases (%) N=133	Controls (%) N=258	Univariable OR (95% CI)	Multivariable* OR (95% CI)
Ethnicity (missing=6)			p=0.08	**p=0.048**
European	28 (22.0)	73 (28.3)	1.00	1.00
Māori	63 (49.6)	135 (52.3)	1.22 (0.72, 2.06)	0.57 (0.26, 1.26)
Pacific	19 (15.0)	34 (13.2)	1.46 (0.72, 2.97)	1.61 (0.58, 4.48)
Other	17 (13.4)	16 (6.2)	**2.77 (1.23, 6.23)**	2.15 (0.65, 7.12)
Marital status (missing=23)			**p=0.002**	p=0.62
Married	19 (17.0)	89 (34.8)	1.00	1.00
Cohabiting	53 (34.6)	100 (39.1)	**2.48 (1.37, 4.51)**	1.52 (0.65, 3.58)
Single	40 (35.7)	67 (26.2)	**2.80 (1.49, 5.26)**	1.46 (0.60, 3.57)
Number of previous live births (missing=13)			**p<0.0001**	**p=0.011**
0	63 (52.5)	59 (22.9)	1.00	1.00
1	14 (11.7)	62 (24.0)	**0.23 (0.11, 0.42)**	**0.23 (0.09, 0.57)**
2	16 (13.3)	41 (15.9)	**0.37 (0.19, 0.72)**	0.61 (0.24, 1.55)
3+	27 (22.5)	96 (37.2)	**0.26 (0.15, 0.46)**	**0.39 (0.17, 0.89)**
Maternal age at birth (mean years, SD) (missing=11)	25.3 (6.5)	28.7 (6.6)	**p<0.0001**	p=0.096 0.96 (0.91, 1.01)
Smoking during pregnancy (missing=9)			**p<0.0001**	**p<0.0001**
No	32 (25.8)	167 (64.7)	1.00	1.00
Yes	92 (74.2)	91 (35.3)	**5.28 (3.28, 8.50)**	**6.01 (2.97, 12.15)**
Multiple birth (missing n=5)			**p=0.010**	**p=0.029**
Yes	8 (6.3)	4 (1.6)	**4.23 (1.25, 14.34)**	**6.57 (1.21, 35.70**)
No	120 (93.8)	254 (98.4)	1.00	1.00
Baby sex (missing=0)			p=0.31	p=0.27
Female	56 (42.1)	95 (36.8)	1.00	1.00
Male	77 (57.9)	163 (63.2)	0.80 (0.52, 1.23)	0.71 (0.39, 1.31)
Birthweight (mean g, SD) (missing n=14)	3158 (619)	3466 (581)	**p<0.0001** **0.42 (0.28-0.61)**	p=0.057 0.60 (0.36, 1.01)
Age of infant (mean weeks, SD) (missing=0)	14.3 (18.1)	15.3 (10.4)	p=0.50	p=0.98 1.00 (0.97, 1.03)
Position placed to sleep (missing=7)			**p=0.0006**	**p=0.051**
Back	83 (65.9)	215 (83.3)	1.00	1.00
Side	31 (24.6)	31 (12.0)	**2.59 (1.48, 4.53)**	1.94 (0.85, 4.43)
Front	12 (9.5)	12 (4.7)	**2.59 (1.12, 6.00)**	**3.85 (1.07, 13.89)**
Breastfed (missing=5)			**p=0.014**	p=0.50
Yes	115 (89.8)	248 (96.1)	1.00	1.00
No	13 (10.2)	10 (3.9)	**2.80 (1.19, 6.58)**	1.53 (0.45, 5.24)
Sharing parental bedroom (missing=6)			**p=0.006**	**p=0.002**
Yes	69 (54.3)	177 (68.6)	1.00	1.00
No	58 (45.7)	81 (31.4)	**1.84 (1.19, 2.84)**	**2.77 (1.45, 5.30)**
Bed sharing (missing=6)			**p<0.0001**	**p<0.0001**
No	54 (42.5)	212 (82.2)	1.00	1.00
Yes	73 (57.5)	46 (17.8)	**6.23 (3.88, 10.02)**	**4.96 (2.55, 9.64)**

Bold indicates significant at the 5% level.
*Variables in model: ethnicity, marital status, number of previous live births, maternal age, maternal smoking in pregnancy, multiple birth, sex, birthweight, age of infant, position placed to sleep, breastfeeding, sharing parental bedroom and bed sharing.

Table 2: Interaction between maternal smoking in pregnancy and bed sharing on risk of SUDI.

		Cases	Controls	Univariable OR (95%CI)	Multivariable * OR (95%CI)
Smoking	Bed sharing	(missing=10)		**p=0.033** (interaction)	**p=0.002** (interaction)
No	No	21 (17.1)	138 (53.5)	1.00	1.00
No	Yes	11 (8.9)	29 (11.2)	**2.75 (1.17, 6.48)**	1.59 (0.52, 4.87)
Yes	No	32 (35.2)	74 (28.7)	**2.64 (1.33, 5.26)**	1.91 (0.77, 4.72)
Yes	Yes	59 (48.0)	17 (6.6)	**31.1 (14.0, 69.3)**	**32.8 (11.2, 95.8)**

Bold indicates significant at the 5% level.
*Bed sharing and maternal smoking combinations were adjusted for ethnicity, marital status, number of previous live births, maternal age, maternal smoking in pregnancy, multiple birth, sex, birthweight, age of infant, position placed to sleep, breastfeeding and sharing parental bedroom.

amount of missing data (marital status, 23 missing; parity, 13 missing; maternal age, 11 missing; and birthweight, 14 missing). This showed an increase in the point estimates of the odds ratios (smoking in pregnancy OR=6.44, 95% CI=3.52, 11.81; not sharing parental bedroom OR=2.98, 95% CI=1.66, 5.36; bed sharing OR=6.27, 95% CI=3.48, 11.30). Additionally we compared the prevalence of the four major risk factors for those cases not able to be included in the multivariable model (n=34) and those in the multivariable model. Those not in the model had a higher prevalence of all risk factors and were significantly more likely to be prone or side sleepers and to not ever breastfeed (data not shown).

Population attributable risk (PAR) for maternal smoking in pregnancy was 60%, bed sharing 48% and infants not sleeping in parental bedroom 31% for this high-risk population. If a representative control population was selected the odds ratios would have been higher but the prevalence lower. However, this results in a similar PAR (Table 3).

Discussion

The SUDI mortality rate in this three-year study was 0.76/1,000 live births, and the rate was higher in Māori (1.46/1,000) than Pacific (1.01/1,000) and non-Māori non-Pacific (mainly European, 0.45/1,000). SUDI occurred more frequently in male infants than female as expected. Deaths were more common in twins and those that were low birthweight. The peak age of death was 1–3 months of age. The age distribution is slightly younger than in the New Zealand Cot Death Study, which is consistent with other recent population-based studies, such as the SWISS study in southwest England.[23] Younger infants are probably more vulnerable to the combined effects of maternal smoking in pregnancy and bed sharing, which results in an interaction between bed sharing and infant age as well as with maternal smoking.[24,25] Infants of young and not married mothers were at higher risk of SUDI in the univariable analysis but not after adjustment for potential confounders.

Table 3: Proportion of the population exposed to risk (p), relative risk (OR) and population attributable risk (PAR) seen in this study and the estimated p, OR and PAR if the controls had been representative of all births.

	High-risk controls			**Representative of all births**		
	p	**OR**	**PAR**	**p**	**OR**	**PAR**
Smoking	0.353	5.28	0.60	0.159*	15.20	0.69
Bed sharing	0.178	6.23	0.48	0.134†	8.74	0.51
Not sharing parental bedroom	0.314	1.84	0.21	0.304†	1.93	0.22

*From the New Zealand National Maternity Collection (PMMRC).
†Data from 2013 Auckland survey of infant care practices (Hutchison et al, 2015).

The major modifiable risk factor was maternal smoking in pregnancy. The mothers of 74% of cases smoked. Infants of smokers were at a six-fold increased risk of SUDI compared to infants of non-smokers. Maternal smoking is a well-established risk factor for SIDS. A meta-analysis found that the magnitude of the risk increased after the decrease in prone sleeping position.[26] The OR reported here is even higher than that reported previously. The population attributable risk (PAR) is 60% for this high-risk population. As we sampled high-risk controls the smoking rate was higher (35.3%) than that reported nationally in pregnancy (15.9%).[27] Thus the magnitude of the risk would have been even higher if we had compared the cases to a nationally representative sample of births (estimated OR=15.2). Furthermore, the PAR would have been 68% if all births are considered.

Consistent with previous retrospective reports,[15,16] 57.5% of infants died while bed sharing, compared with 17.8% of the high-risk controls bed sharing. Bed sharing increased the risk five-fold. The PAR is 48% in this higher-risk population (and 51% in all infants).

The original New Zealand Cot Death Study identified a significant interaction between maternal smoking and bed sharing,[3] which has been confirmed by other studies.[25,28] In this study, the risk of SUDI for an infant exposed to both these risks was strikingly high, a 32-fold increased risk, compared with infants not exposed to either risk factor. It should be noted that if an infant was only exposed to one of these risk factors (smoking only or bed sharing only) the risk was increased but did not reach statistical significance in the multivariable analysis (smoking only OR=1.91, bed sharing only OR=1.59). This should not be interpreted as meaning these risks, such as bed sharing in the absence of maternal smoking, are safe, as previous larger studies have identified these as a significant risk.[24,25] The absence of a statistically significant result is almost certainly a consequence of the small sample size and the fact that we chose high-risk controls, which meant they were more similar to the cases, as seen with maternal smoking.

The interaction between bed sharing and smoking has been shown in other studies to be further complicated by alcohol and drug use.[25] These factors have not been included in this preliminary report of the results of the present study, but will be examined in more detail in subsequent analyses and publications. The importance of the present study is to draw attention to the extremely high risk attached to bed sharing by mothers who smoke.

Despite these controls being high risk, the study showed that only 4.7% of control infants were placed prone to sleep and only 12.0% were placed on their side. Clearly the message "Back to Sleep" has been received and implemented in the majority of this population. However, the study also illustrates that continued promotion of this message is required as prone sleep position increased the risk 3.8-fold and side 1.9-fold. Although the side sleeping position did not reach statistical significance, the point estimate is consistent with meta-analyses, which show a two-fold increased risk.[29] In the period before "Back to Sleep" there was a large excess of winter deaths, and there was a north-south mortality gradient. Following the "Back to Sleep" campaign these risks were attenuated. Now that very few infants sleep prone these risks have been almost entirely eliminated.

Almost half (45.7%) of the cases were not sharing the parental bedroom, and this was associated with an increased risk of SUDI. This risk factor has been recognised since 1996.[7] In the original study we showed that the protective effect was from sharing with adults (plus/minus other children) but not with children only. The effect was separate to bed sharing, and the lowest risk was in infants that shared the parental bedroom but not the parental bed. More could be done to promote the protective effect of infants sharing the parental bedroom, as in this high-risk population 31% of infants did not share the parental bedroom and the population attributable risk was 21%.

The association with the number of previous live births were unexpected. 52.5% of cases were first born vs 20.4% in the New Zealand Cot Death Study, and the risk decreased with increasing parity, whereas the risk of SUDI associated with parity is usually reported to increase. For controls, 23% were born to primiparous mothers compared with the national figure of 41% in

2014. This might in part be due to selection of high-risk controls who tend to have more children than the general population or may be due to selection bias—controls are more likely to participate if they have had previous children.

It is worth examining some of the risk factors that did not reach statistical significance. Lack of breastfeeding was significantly associated with risk of SUDI in the univariable analysis but not after adjustment for potential confounders. Breastfeeding rates are high in New Zealand, and even in this high-risk control population only 10 (3.9%) control infants were not breastfed, thus limiting our ability to identify this as a risk. Our original study identified lack of breastfeeding as a risk,[1,2] and this has been confirmed in subsequent meta-analyses.[30] We should continue to promote breastfeeding for this and other infant and maternal health benefits. The mean birthweight of cases was 308g less than that of the controls. However, after adjustment for other factors this approaches significance (p=0.057).

Just 21 cases over three years were not exposed to smoking in pregnancy, bed sharing or front or side sleeping position, which illustrates how few SUDI deaths might occur if no baby was exposed to these risks.

The strengths of the study were an excellent participation rate by the cases (97%), and that only one potential case was excluded due to no autopsy. However, a number of limitations must be considered. Firstly, the number of SUDI deaths (n=137) was 35% lower than that expected (n=210). This is real as shown by the 29% reduction in the number and rate of postperinatal deaths that has been reported recently.[31] This reduction was attributed to the Safe Sleep Programme, which consists of universal education and targeted supply of Infant Safe Sleep Devices (wahakura and Pepi-Pods) to infants at high risk. The wahakura is a flax basket in which the infant sleeps that can be taken into the parental bed. The Pepi-Pods is a polypropylene version of the wahakura. In our study no deaths occurred in a wahakura or Pepi-Pods. This reduction in SUDI mortality of course limits the power of the study to detect differences between the cases and controls. Secondly, we chose high risk controls, who were more likely to be socioeconomically disadvantaged, Māori and smokers. Ethnic minorities and those socioeconomically disadvantaged are less likely to participate in surveys,[32] and this resulted in only 40% of the selected controls participating, which introduces the possibility of selection bias. However, the controls that did participate were still of high risk (Māori 52%, smokers 35%).

Three (1%) of the controls and 34 (25%) of the cases had missing variables, and thus were excluded from the multivariable models. Removing four variables with the most missing data increased the point estimates for maternal smoking in pregnancy, not sharing the parental bedroom and bed sharing. Further, those with missing data had a higher prevalence of all risk factors examined. This would suggest that the increase in the point estimates in the model excluding the four variables is likely a combination of the exclusion of these variables, which are related to socioeconomic disadvantage, and the inclusion of some higher risk cases. Thus our results are likely to be conservative.

In conclusion, this study has shown that many of the risk factors, which were identified in the original New Zealand Cot Death Study (1987–1989), are still relevant today. Our findings indicate that the prevention messages are still applicable today, indeed these findings suggest the prevention messages should be reinforced. If these identified risks could be avoided, there could be a further substantial fall in SUDI mortality to just seven infant deaths per annum.

Competing interests:
Nil.

Acknowledgements:
We thank the Health Research Council of New Zealand for funding the feasibility study and this study, Cure Kids for their support of EAM and JMDT, and Communio who managed the project. We also thank Yvonne Ledesma-Allard, Lead Medicolegal Investigator, Miami-Dade Medical Examiner, Miami, Florida who trained the SUDI Liaison staff in conducting scene investigations.

A steering group met monthly by teleconference. This comprised: Professor Ed Mitchell (Principal investigator and Chair), Chief Coroner Neil MacLean, Ms Jackie Andrews (Office of the Chief Coroner), Coroner Morag McDowell, Mr Glenn Dobson (Charlotte Davies) (Operations Manager, Coronial Services), Mr Dave Aro (Director, Communio), Ms Melanie MacFarlane (project manager), Professor Dawn Elder (co-investigator), Dr Nick Baker (co-investigator and chair of the Child and Youth Mortality Review Committee), Associate Professor Beverley Lawton (Māori adviser), Dr Jane Vuletic and Dr Jane Zuccollo (pathologists), Inspector Patricia O'Shaughnessy (NZ Police).

We thank the SUDI Liaison staff who conducted the interviews: Shelley Jonas, Elaine McLardy, Genevieve Ali, Jazz Heer, Tracy Rewiri, Rebecca Passi and Judy McIntyre.

Finally, we especially thank the families of both bereaved and control infants for participating in this study, which would not have been possible without their willingness to share their stories with us.

Author information:
Edwin A Mitchell, Professorial Research Fellow, Department of Paediatrics: Child and Youth Health, University of Auckland, Auckland; John MD Thompson, Epidemiologist/Statistician, Department of Paediatrics: Child and Youth Health, University of Auckland, Auckland; Jane Zuccollo, Perinatal Pathologist, Department of Obstetrics and Gynaecology, University of Otago, Wellington; Melanie MacFarlane, Project Manager, Communio, Auckland; Barry Taylor, Dean, Department of the Dean, Dunedin School of Medicine, University of Otago, Dunedin; Dawn Elder, Professor and HOD, Department of Paediatrics and Child Health, University of Otago, Wellington; Alistair W Stewart, Biostatistician, Section of Epidemiology & Biostatistics, School of Population Health, University of Auckland, Auckland; Teuila Percival, Senior Lecturer, Pacific Health Section, School of Population Health, University of Auckland, Auckland; Nick Baker, Paediatrician, Nelson Hospital, Nelson; Gabrielle K McDonald, Senior Lecturer, Department of Women's and Children's Health, Dunedin School of Medicine, University of Otago, Dunedin; Bev Lawton, Senior Research Fellow, Department of Obstetrics and Gynaecology: Women's Health Research Centre, University of Otago, Wellington; Martin Schlaud, Professor of Epidemiology, Department of Epidemiology and Health Monitoring, Robert Koch Institute, Berlin, Germany; Peter Fleming, Professor of Infant Health and Developmental Physiology, School of Social and Community Medicine, University of Bristol, Bristol, England.

Corresponding author:
Professor Ed Mitchell, Department of Paediatrics: Child and Youth Health, University of Auckland, Private Bag 92019, Auckland 1142.
e.mitchell@auckland.ac.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7262

REFERENCES:

1. Mitchell EA, Scragg R, Stewart AW, et al. Results from the first year of the New Zealand cot death study. NZ Med J 1991; 104:71–76.
2. Mitchell EA, Taylor BJ, Ford RPK, et al. Four modifiable and other major risk factors for cot death: The New Zealand Study. J Paediatr Child Health 1992; 28(Suppl 1):S3–8.
3. Scragg R, Mitchell EA, Taylor BJ, et al. Bedsharing, smoking and alcohol in the sudden infant death syndrome: Results from the New Zealand cot death study. BMJ 1993; 307:1312–1318.
4. Mitchell EA, Thompson JMD, Stewart AW, et al. Postnatal depression and SIDS: a prospective study. J Paediatr Child Health 1992; 28(Suppl 1):S13–16.
5. Mitchell EA, Ford RPK, Stewart AW, et al. Smoking and the Sudden Infant Death Syndrome. Pediatrics 1993; 91:893–6.
6. Mitchell EA, Taylor BJ, Ford RPK, et al. Dummies and the Sudden Infant Death Syndrome. Arch Dis Child 1993; 68:501–4.
7. Scragg RKR, Mitchell EA, Stewart AW, et al. Infant room sharing and prone sleeping position in the sudden infant death syndrome. Lancet 1996; 347:7–12.
8. Mitchell EA, Stewart AW, Scragg R, et al. Ethnic differences in mortality rate from Sudden Infant Death Syndrome in New Zealand. BMJ 1993; 306:13–16.
9. Mitchell EA, Aley P, Eastwood J. The national cot death prevention programme in New Zealand. Aust J Public Health 1992; 16:158–161.
10. Mitchell EA, Tonkin S. Publicity and infants' sleeping position. BMJ 1993; 306:858 (letter).
11. Mitchell EA, Brunt JM, Everard C. Reduction in mortality from sudden infant death syndrome in New Zealand: 1986–92. Arch Dis Child 1994; 70:291–294.
12. Mitchell EA, Tuohy PG, Brunt JM, et al. Risk factors for sudden infant death syndrome following the prevention campaign in New Zealand: a prospective study. Pediatrics 1997; 100:835–839.
13. Taylor BJ, Garstang J, Engelberts A, et al. International comparison of SUDI rates using a newly proposed set of cause-of-death codes. Arch Dis Child 2015; 100:1018–23.
14. Child and Youth Mortality Review Committee, Te Ròpù Arotake Auau Mate o te Hunga Tamariki, Taiohi. 2009. Fifth Report to the Minister of Health: Reporting mortality 2002–2008. Wellington: Child and Youth Mortality Review Committee 2009. http://www.hqsc.govt.nz/assets/CYMRC/Publications/cymrc-5th-report-chp1-sudi.pdf (accessed 23 December 2016).
15. Escott A, Elder DE, Zuccollo JM. Sudden unexpected infant death and bedsharing: referrals to the Wellington Coroner 1997–2006. N Z Med J 2009; 122(1298):59–68.
16. Hutchison BL, Rea C, Stewart AW, Koelmeyer TD, Tipene-Leach DC, Mitchell EA. Sudden Unexpected Infant Death in Auckland: a retrospective case review. Acta Paediatrica 2011; 100:1108–12.
17. Hutchison BL, Stewart AW, Mitchell EA. SIDS protective infant care practices among Auckland mothers. NZ Med J 2006; 119:1–10 (URL: http://www.nzma.org.nz/__data/assets/pdf_file/0003/17841/Vol-119-No-1247-15-December-2006.pdf).
18. Tipene-Leach D, Hutchison L, Tangiora A, et al. SIDS-related knowledge and infant care practices among Māori mothers. NZ Med J 2010; 123:88–96.
19. Coroners Act 2006, (Reprinted October 2016), Wellington, New Zealand. http://www.legislation.govt.nz/act/public/2006/0038/latest/whole.html (accessed 18/01/2017).
20. Ministry of Health. 2004. Ethnicity Data Protocols for the Health and Disability Sector. Wellington: Ministry of Health. http://www.health.govt.nz/system/files/documents/publications/ethnicitydataprotocols.pdf (accessed 2/3/2017).
21. Breslow N, Day N. Statistical methods in cancer research. Volume 1- The analysis of case-control studies. Lyon: IARC; 1980.
22. Whittmore AS. Estimating attributable risk for case-control studies. Am J Epidemiol 1983; 117:76–86.
23. Blair PS, Sidebotham P, Evason-Coombe C, et al. Hazardous cosleeping environments and risk factors amenable to change: case-control study of SIDS in south west England. BMJ 2009; 339:b3666.
24. Carpenter RG, Irgens LM, Blair PS, et al. Sudden unexplained infant death in 20 regions in Europe: case control study. Lancet 2004; 363(9404):185–91.

25. Carpenter R, McGarvey C, Mitchell EA, et al. Bed sharing when parents do not smoke: Is there a risk of SIDS? An individual level analysis of five major cases-control studies. BMJ Open 2013; 3:e002299.
26. Mitchell EA, Milerad J. Smoking and the sudden infant death syndrome. Review Environmental Health 2006; 21:81–103.
27. PMMRC. Tenth Annual Report of the Perinatal and Maternal Mortality Review Committee: Reporting mortality 2014. Wellington: Health Quality & Safety Commission. 2016.
28. Vennemann MM, Hense HW, Bajanowski T, et al. Bed sharing and the risk of sudden infant death syndrome: can we resolve the debate? J Pediatr 2012; 160(1):44–8.e2.
29. Scragg RKR, Mitchell EA. Side sleeping position and bed sharing in the sudden infant death syndrome. Ann Med 1998; 30:345–349.
30. Hauck FR, Thompson JM, Tanabe KO, et al. Breastfeeding and reduced risk of sudden infant death syndrome: a meta-analysis. Pediatrics 2011; 128(1):103–10.
31. Mitchell EA, Cowan S, Tipene-Leach D. The recent fall in post-perinatal mortality in New Zealand and the Safe Sleep Programme. Acta Paediatrica 2016; 105(11):1312–20.
32. Shavers VL, Lynch CF, Burmeister LF. Racial differences in factors that influence the willingness to participate in medical research studies. Ann Epidemiol 2002; 12:248–256.

A kick in the butt: time to address tobacco waste in New Zealand

Scott Metcalfe, Peter Murray, Carsten Schousboe

ABSTRACT

Tobacco consumption is a significant national public health issue. The waste it generates—tobacco product waste (TPW)—is also an environmental hazard. Targeting TPW through novel policies/regulations—such as a cigarette butt deposit scheme—may serve the dual purposes of reducing an environment nuisance and progressing Aotearoa New Zealand to its goal of being smokefree by 2025.

Could New Zealand's response to our tobacco challenge[1] be furthered by targeting tobacco product waste?

Delany et al in the *Journal* in recent months have proposed a new smokefree legislative framework that could progress Aotearoa New Zealand to being smokefree by 2025.[2] The authors outlined a number of aspects of tobacco control that this proposed legislation would address, including a focus on the product and on the need to visually denormalise smoking.[2] We think the targeting of tobacco product waste (TPW), concentrating on cigarette butts in particular, could provide a novel strategy to address these dual aims and also reduce an environmental nuisance.

Regulation of TPW has received modest attention in the tobacco control space.[3] However, it is an issue, with claims of 4.5–5 trillion cigarette butts littered worldwide each year.[4,5] Cigarette butts are a common (possibly the most common) item collected during urban litter surveys.[6] This waste is not inert; rather it contains a myriad of noxious chemicals, many posing environmental[4,5,7] and direct health hazards.[8]

Like secondhand smoke exposure, TPW on our streets, bus stops, parks and beaches is a visible reminder of tobacco use.[9–12] For smokers, the exposure may serve to normalise further the already ritualised nature of TPW disposal.[13–15] Unsurprisingly, the tobacco industry has long been concerned that public resistance to TPW would negatively impact the acceptability of smoking and be a target for anti-tobacco policy.[9] In response the industry has funded/supported a number of strategies to address this risk to their business.[9]

A number of policies have been proposed/implemented internationally to reduce TPW and which may be relevant to New Zealand, including:[3,5,9,13,16–19]

- a fee/tax on TPW;
- designated TPW littering fines;
- product stewardship frameworks for tobacco products (modelled on examples like the mandatory take-back policy in the European Union for electronics);
- legislating for extended producer responsibility, eg, a Model Tobacco Waste Act;[13]
- cigarette pack or cigarette butt deposit schemes (similar to other products,[16] and as trialled in Vancouver for cigarette butts[9,17,18]);
- cigarette butt collection/recycling,[5,9,13,16–18] eg, as tried recently in Vancouver[19] that creates new products and composts the residual tobacco;
- using bags or pouches for collecting TPW (for an example, see Figure 1).

Adopting similar strategies in New Zealand may also serve to further highlight the hazardous nature of tobacco products and reduce an environmental nuisance. As a corollary, they could, in a small way,

help simultaneously progress towards the Smokefree 2025 goal[1,2] and improve our street and recreational environments. Such an approach could be supported through greater local government action in addressing TPW.

None of this of course lets tobacco companies off the hook. Any strategy aiming to address TPW needs to primarily target the product and industry, not the individual who smokes. In fact, the tobacco industry has a long history of denying its role in TPW generation and management, preferring to shift the debate to one of individual responsibility and on blaming smokers for littering.[9]

So now imagine the following scenario, using cigarette butt pouches as a way to collect TPW:

"As a tobacco company, I have to pay to insert a pouch into each cigarette packet and have to pay the 10 dollar TPW levy to central government. I may decide to charge extra for each cigarette packet, to defray costs."

"As a smoker, I may be paying more for my cigarettes (or not, depending on whether the tobacco company decides to increase the cost). I have to collect my cigarette butts and put them into a pouch supplied in the cigarette pack. I'm facing the need to collect and carry around my used cigarette butts. To get a portion of the levy back, I have to take a full pouch to a pharmacy or my general practice and swap the pouch for a cheque and smoking cessation advice."

"As a pharmacy or general practice, I'm pleased to be involved with this health issue. I have the opportunity to, in the short-term, gain some revenue (I receive $4 of the levy for every full pouch collected) while promoting health and supporting people to quit. Every two weeks I send the collected and sealed pouches to a central depot that processes the litter in a safe and environmentally sound way. I'm engaging more often with my patients who smoke than I used to, and this is a great opportunity to help them."

The disagreeable nature of the task could actually be its most redeeming feature. It would internalise an externality–where the fact that people who smoke do not then want to do the transaction, simply highlights the cost borne by others who do not smoke. We will know that the pricing is right once we no longer see cigarette butts in the streets. Requiring all smokers to receive smoking cessation advice/support within this process may also help quit attempts and long-term quit success,[20–22] thereby further contributing to the Smokefree 2025 goal.

Figure 1: Example of a cigarette butt collection bag or pouch.

However, there are caveats and cautions that will need thought. To start, with any TPW collection scheme, there would need to be due safeguards (including hygiene and safe collection)—albeit exchange programmes have been workable, effective and safe in New Zealand in the past (eg, needle exchange).[23–27] Compensation for collectors would need to be enough to be financially viable, and we cannot, perversely, have windfalls to cigarette manufacturers from monies not uplifted by consumers and collectors—in effect, 'bonds' that go uncollected (which may inadvertently and paradoxically raise the profitability of tobacco).

There could be other risks too, with potential unintended consequences. Although there are reviews highlighting issues around implementing policy,[28] local and international research or evaluation evidence to support such a TPW collection scheme (eg, around acceptability, likely interest, impact, costs, etc.) is sparse—albeit similar deposit/return schemes have been successful with other waste products (eg, glass bottles in Oregon and South Australia[16]). Clearly we have not begun to assess costs of administration or exactly how the supply chain for collection bags would work. Such practicalities need to be thoroughly considered.

Likewise, although any TPW collection also imposes a cost on tobacco companies, might arguably smokers bear the greatest burden, and thus does this approach implicitly support the 'individual responsibility' argument the tobacco industry relies on so heavily?[9,16,29] Would such levies risk being passed onto smokers and create other problems, given the increasing resentment of existing excise tax increases?[30]

Alternatively, the tobacco industry could be made more directly responsible for its producing a product component (the filter) that offers no benefit in reducing the harm from smoking and creates a considerable environmental menace. Might a better strategy in fact be to simply impose a direct cost on tobacco companies (pro rata by market share) and recoup the costs of TPW collection and disposal?[13] Funds could be used to meet costs currently borne by local authorities (and rate payers) and could also be used to support more direct cessation services.

We will need to assess evidence of wider impacts elsewhere (eg, shifts in attitudes towards smokers, tobacco industry or changes in smoking behaviours) where TPW management has been introduced, including accompanying costs and risks. It is too early to answer such questions; to date evaluations are still happening, eg, the City of Vancouver continues to evaluate its pilot project to recycle cigarette butts[31]—albeit meantime with reports there of barriers, although those obstacles have apparently been political rather than practical.[32]

So in short, we do not have answers yet. But we want to at least encourage the New Zealand health sector as a whole to start thinking about ways of developing solutions and undertaking robust costings. Regardless of options and their costs, the earlier these conversations happen, the better. Perhaps now it is time for us to begin to consider such novel approaches locally?

Competing interests:
Nil.
Acknowledgements:
The *Journal*'s reviewers provided helpful comments on an earlier draft, some of which we have integrated into this viewpoint article.
Author information:
Scott Metcalfe, Public Health Medicine Specialist, Wellington; Peter Murray, Advanced Trainee in Public Health Medicine, Wellington; Carsten Schousboe, Senior Health Economist, Wellington.
Corresponding author:
Scott Metcalfe, Public Health Medicine Specialist, 16 Chatham Street, Wellington 6023.
scott.metcalfe2@gmail.com
URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7263

REFERENCES:

1. McCool J, Bullen C. Making the next steps the right ones: progress towards the Smokefree Aotearoa 2025 Goal. N Z Med J. 2016; 129(1439):6–7. http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2016/vol-129-no-1439-5-august-2016/6956
2. Delany L, Thomson G, Wilson N, Edwards R. Key design features of a new smokefree law to help achieve the Smokefree Aotearoa. N Z Med J 2016; 129(1439):68. http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2016/vol-129-no-1439-5-august-2016/6963
3. Curtis C, Collins S, Cunningham S, Stigler P, Novotny TE. Extended producer responsibility and product stewardship for tobacco product waste. Int J Waste Resour. 2014; 4(3). pii:157. http://www.omicsonline.com/open-access/extended-producer-responsibility-and-product-stewardship-for-tobacco-product-waste-2252-5211-157.php?aid=30405
4. Moerman JW, Potts GE. Analysis of metals leached from smoked cigarette litter. Tob Control. 2011; 20(Suppl 1):i30–5. http://tobaccocontrol.bmj.com/content/20/Suppl_1/i30.long
5. Barnes RL. Regulating the disposal of cigarette butts as toxic hazardous waste. Tob Control. 2011; 20(Suppl 1):i45–8. http://tobaccocontrol.bmj.com/content/20/Suppl_1/i45.long
6. Novotny T. Time to kick cigarette butts—they're toxic trash. New Scientist 2014; 2975. https://www.newscientist.com/article/mg22229750-200-time-to-kick-cigarette-butts-theyre-toxic-trash/
7. Novotny TE, Slaughter E. Tobacco product waste: an environmental approach to reduce tobacco consumption. Curr Environ Health Rep. 2014; 1(3):208–16. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4129234/
8. Centers for Disease Control and Prevention (CDC). Ingestion of cigarettes and cigarette butts by children—Rhode Island, January 1994–July 1996. MMWR Morb Mortal Wkly Rep. 1997; 46(6):125–8. http://www.cdc.gov/mmwr/preview/mmwrhtml/00046181.htm
9. Smith EA, McDaniel PA. Covering their butts: responses to the cigarette litter problem. Tob Control. 2011 1; 20(2):100–6. http://tobaccocontrol.bmj.com/content/20/2/100.long
10. Patel V, Thomson GW, Wilson N. Cigarette butt littering in city streets: a new methodology for studying and results. Tob Control. 2013; 22(1):59–62. http://tobaccocontrol.bmj.com/content/22/1/59.long
11. Wilson N, Oliver J, Thomson G. Smoking close to others and butt littering at bus stops: pilot observational study. Peer J. 2014; 2:e272. http://peerj.com/articles/272/
12. Oliver J, Thomson G, Wilson N. Measurement of cigarette butt litter accumulation within city bus shelters. N Z Med J. 2014; 127(1395):91–3. http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2014/vol-127-no.-1395/6159

13. Curtis C, Novotny TE, Lee K, et al. Tobacco industry responsibility for butts: a Model Tobacco Waste Act. Tob Control. 2016. pii: tobaccocontrol-2015-052737. http://tobaccocontrol.bmj.com/content/early/2016/03/03/tobaccocontrol-2015-052737.long
14. Schultz PW, Bator RJ, Large LB, et al. Littering in context: personal and environmental predictors of littering behaviour. Envir Behav 2013; 45:35–59. http://eab.sagepub.com/content/45/1/35
15. Hoek J, Ferguson S, Court E, Gallopel-Morvan K. Qualitative exploration of young adult RYO smokers' practices. Tob Control. 2016. pii: tobaccocontrol-2016-053168. http://tobaccocontrol.bmj.com/content/early/2016/10/19/tobaccocontrol-2016-053168.full
16. Novotny TE, Lum K, Smith E, et al. Cigarettes butts and the case for an environmental policy on hazardous cigarette waste. Int J Environ Res Public Health. 2009; 6(5):1691–705. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2697937/
17. CBC News. Cigarette butt deposits proposed for B.C. 17 June 2013. http://www.cbc.ca/news/canada/british-columbia/cigarette-butt-deposits-proposed-for-b-c-1.1359400
18. CBC News. North Vancouver mayor pushes plan for cigarette butt deposit. 27 June 2016. http://www.cbc.ca/news/canada/british-columbia/cigarette-butt-deposit-1.3654357
19. Vancouver launches world's first cigarette-butt recycling program. Montreal Gazette, 11 December 2017. http://www.montrealgazette.com/health/Vancouver+launches+worlds+-first+cigarettebutt+recycling/9156519/story.html
20. Aveyard P, Begh R, Parsons A, West R. Brief opportunistic smoking cessation interventions: a systematic review and meta-analysis to compare advice to quit and offer of assistance. Addiction. 2012; 107(6):1066–73. http://onlinelibrary.wiley.com/wol1/doi/10.1111/j.1360-0443.2011.03770.x/full
21. Brown T, Todd A, O'Malley CL, et al. Community pharmacy interventions for public health priorities: a systematic review of community pharmacy-delivered smoking, alcohol and weight management interventions. Southampton (UK): NIHR Journals Library; 2016. http://www.ncbi.nlm.nih.gov/books/NBK349092/
22. Saba M, Diep J, Saini B, Dhippayom T. Meta-analysis of the effectiveness of smoking cessation interventions in community pharmacy. J Clin Pharm Ther. 2014; 39(3):240–7. http://onlinelibrary.wiley.com/wol1/doi/10.1111/jcpt.12131/full
23. Sheridan J, Henderson C, Greenhill N, Smith A. Pharmacy-based needle exchange in New Zealand: a review of services. Harm Reduct J. 2005 Jul 12; 2:10. http://harmreductionjournal.biomedcentral.com/articles/10.1186/1477-7517-2-10
24. Lichtenstein B. Needle exchange programs: New Zealand's experience. Am J Public Health. 1996 Sep; 86(9):1319. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1380600/pdf/amjph00520-0137a.pdf
25. Aitken C. New Zealand Needle and Syringe Exchange programme review. Final report. Auckland: Centre for Harm Reduction, 2002. http://www.moh.govt.nz/moh.nsf/pagescm/1026/$File/needlesyringeexchange.pdf
26. Hagan H, Pouget ER, Des Jarlais DC. A systematic review and meta-analysis of interventions to prevent hepatitis C virus infection in people who inject drugs. J Infect Dis. 2011 Jul 1; 204(1):74–83. http://jid.oxfordjournals.org/content/204/1/74.full
27. Arnold BJ, Blackmore TK. Reflections on the evolving role of Infection Services in New Zealand. N Z Med J. 2015; 128(1410):9–12. http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2015/vol-128-no-1409-20-feb-2015/6453
28. Tobacco Control Legal Consortium. Policy tools for minimizing public health and environmental effects of cigarette waste. 2014. http://publichealthlawcenter.org/sites/default/files/resources/tclc-guide-cigarette-waste-2014.pdf
29. Milberger S, Davis RM, Douglas CE, et al. Tobacco manufacturers' defence against plaintiffs' claims of cancer causation: throwing mud at the wall and hoping some of it will stick. Tob Control. 2006; Suppl 4:iv17–26. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2563590/
30. Hoek J, Smith K. A qualitative analysis of low income smokers' responses to tobacco excise tax increases. Int J Drug Policy. 2016; 37:82–89. http://www.sciencedirect.com/science/article/pii/S0955395916302754
31. City of Vancouver. http://vancouver.ca/green-vancouver/on-the-street.aspx, accessed 13 February 2017.
32. Cahute L. Vancouver campaigners take aim at discarded cigarette butts. The Province, 16 February 2016 (updated 15 June 2016). http://cityhallwatch.wordpress.com/2014/08/19/cigarette-butt-recycling-program/

A comparison of the use of interpreters in New Zealand and the US

Ben Gray, Eric J Hardt

ABSTRACT

Cultural competency in medicine is not possible unless language differences are addressed effectively. Many disparities that appear to be based on cultural, socioeconomic, demographic and other differences can be reduced or eliminated with the use of qualified medical interpretation and translation in multilingual situations. The development of this precious resource varies from country to country around the world as most developed countries face increasingly diverse groups of immigrants and refugees as well as inclusion of more indigenous groups of patients. The US has been one of the leaders in this area since the 1980s. Countries like New Zealand are in different stages of development and on different pathways. Increased international collaboration may facilitate evolution of cost-effective inclusion of professional medical interpreters as part of multidisciplinary health care teams.

Whitehead defined health outcome inequities as *differences which are unnecessary and avoidable…unfair and unjust*.[1] Language-based disparities are among the easiest to resolve, as solutions are already available. Pressure to increase interpreter use is driven by three areas of concern:

1. **Respect for patients' human rights**: Historically, language differences were treated as acceptable reasons for disparities in quality, satisfaction, access and utilisation of health care resources. Charts included comments like, "history unobtainable secondary to language barriers". A veterinary standard of care seemed unavoidable and normal. *Ad hoc* interpreters were used; family, friends, other patients, hospital secretaries and janitors. All were presumed to be bilingual but had no medical training. Confidentiality was a low priority. Limited English Proficient patients [LEPs] were inappropriately regarded as "problem patients." This is unacceptable.
2. **Patient safety and quality of care**: Research has demonstrated disparities based on language differences and their resolution or reduction with the appropriate use of qualified interpreters. Serious adverse events with negative impact on LEPs are more common than for other patients, and that the events are more likely due to poor communication.[2] Patient safety has attained higher priority in the US and New Zealand.
3. **Cost**: The evolution of interpreter services has been delayed by concerns over high cost. Questions have been raised, and perhaps answered, about the cost of providing professional medical interpretation as compared to the money wasted when an interpreter is not used. The cost per minute of new technology, including telephone and video, has been falling with higher volume, better devices and more training.

We will describe the progress made to date in New Zealand and the US to draw out the lessons on how to increase the role of the medical interpreter.

Defining Limited English Proficiency [LEP]

Every 10 years, the US Census asks what language is primarily spoken in the home. Those who speak other than English [NES] are asked how well they also speak English:

Table 1: Comparative demographic and language data.

	New Zealand[3]	US[4]
Total population	4,242,051	318,900,000
Proportion born overseas	25%	13%
Source of migrants 2013(NZ) 2014(US)	England (21%) China (9%) India (6%) Australia (6%)	Mexico (28%) India (5%) China (5%) Phillipines (5%)
Proportion born overseas of most diverse city	39% (Auckland)	39% (Los Angeles)
Speak only English at home	81%	79% (primarily)
Common languages (% of foreign language speakers)	Able to hold a conversation Māori (16%) Chinese (15%) Samoan (9%) Hindi (7%)	Spoken in the home Spanish (62%) Chinese (5%) Tagalog (3%)
% Speakers of other languages	18.6%	17.9%
Number of LEP patients	2.2% no English (unknown LEP)	9%

very well, well, not well or not at all. The 1980 census data raised issues of the validity of the categories. In 1982, the Census Bureau administered the English Language Proficiency Study, a validated instrument, which showed that only those NES subjects who spoke English "very well" were proficient. After this correction, the incidence of LEPs in the 1990 Census was much higher.

New Zealand does not have useful data on the number of LEPs. The census asks "*In which language(s) could you have a conversation about a lot of everyday things?*". This identifies the numbers who speak no English, and the numbers who speak English and another language for social conversation but not the number who might be LEP and need an interpreter. As a result, it is difficult to study language-based disparities. We know that Samoan people, many of whom are LEP, have significant health outcome disparities.[5] Even without good data, it has been shown that interpreter use is inadequate.[6] One study found that in only 0.7% of consultations was a professional interpreter used for patients who spoke no English.[7]

In both countries, evaluation of language disparities is difficult if the definitions used in the census differ from those used at medical care sites.

Better understanding of LEP prevalence in the US has led to a number of changes:

Organisation of interpreters

In the US, state-wide organisations for interpreters emerged. One in particular, the Massachusetts Medical Interpreter Association, ultimately evolved into an international organisation working with several other countries, the International Medical Interpreters Association. New Zealand has a society of interpreters and translators, but no organisations dedicated to medical interpreting.

Research and LEP patients

Previously, LEPs had been excluded from research.[8] Research in the US on language-based disparities has increased on issues like cancer screening,[9] access to primary care,[10] patient satisfaction,[11] specific clinical outcomes[12] and many other areas. Studies have been done on elimination of disparities with appropriate interventions.[13] Other studies compared telephone interpreting with use of family and other *ad hoc* interpreters.[14] A literature review found that the use of professional interpreters is "*associated with improved clinical care more than is use of ad hoc interpreters and that professional interpreters appear to raise the quality of clinical care for LEPs to approach or equal that for patients without language barriers*."[15] Such research has supported advocacy for professionalisation of medical interpretation in the US. Because of poor census data, research in New Zealand on

LEPs is difficult and limited. Research from the US and Australia may be relevant but health system differences could limit this.

Politics

Attention to the use of interpreters is influenced by politics. In the US, President Clinton delivered Executive Order 13166 in 2000, which directed that "*Each federal agency shall examine the services it provides and develop and implement a system by which LEP persons can meaningfully access those services, consistent with, and without unduly burdening, the fundamental mission of the agency.*" The US Department of Justice reasoned that LEP status was a marker for foreign-born status, and thus LEPs are protected from discrimination under Title VI of the Civil Rights Act of 1964. Some states responded with specific state laws. Professional groups supported new policies and procedures. Civil rights actions were taken in cases where LEPs suffered injury attributed to lack of interpretation.

A few famous medical malpractice cases were made public, but development was limited until a specific standard of care was established by the Joint Commission, the independent organisation that accredits most medical facilities in the US. Supportive data included a study documenting that LEPs were more likely to suffer adverse events with physical harm, and that these were more likely to result from communication errors.[2] With established standards now in effect, medical malpractice cases are likely to proliferate.

The New Zealand political response to this issue has been more muted. The New Zealand Code of Consumer Rights[16] establishes the rights consumers have when receiving health care in New Zealand. Right #5 says "*Every consumer has the right to effective communication in a form, language and manner that enables the consumer to understand the information provided. Where necessary and reasonably practicable, this includes the right to a competent interpreter.*" All rights are qualified by section 3 that says that a provider is not in breach if they have taken reasonable actions considering clinical circumstances and resource constraints. The Code is widely used as the basis for compliance and accreditation documents for hospitals and other health sites. Any patient can complain to the commissioner if they feel a right has been breached. In the 2014/15 year, 1,880 complaints were received; only 70 were found to have breached the rights.[17] Since 1997, there has been only one breach opinion that mentioned the failure to use an interpreter. Thus there is a process, but it functions more by describing standards than enforcing them, with little acknowledgement that without an interpreter many other rights are not available.

The right for New Zealanders to sue doctors for alleged medical treatment injury was removed with the Accident Compensation Corporation Act,[18] which provides no fault insurance for all accidents, including medical treatment injury. This has many benefits as a scheme, but it does remove the fear of litigation; removing one of the pressures to provide an interpreter.

The New Zealand Health Quality and Safety Commission is the body responsible for developing programmes to improve patient safety. As yet they have not focussed on quality and safety issues relating to LEP patients.

The political climate In New Zealand towards LEPs has been muted, although the recent Syrian crisis has led to popular public pressure for New Zealand to take more refugees, increasing the focus on providing supports when they arrive in New Zealand.

Costs

There are many ways to improve health care with higher expenditure. Studies with major impact on policy and procedures looked at costs incurred in the US. Theoretical excess costs might result from inadequate health maintenance, late presentation of disease, recurrent illness, poor compliance and other situations hard to quantify. Early studies demonstrated that care of LEPs can cost extra time and money.[19] Others showed that use of professional interpreters can eliminate these excess costs in various situations.[20] Lindholm[21] showed that use of professional interpreters can reduce length of inpatient stay and readmission rates, areas of very high cost savings, suggesting that money saved overall is more than the overall cost of a well-organised interpreter services budget.

New Zealand does not have useful data on the cost benefit of using an interpreter.

Because of health funding differences between New Zealand and US, there is a limit to which US experience can be generalised to New Zealand. As in the US,[22] it is very common in New Zealand[23] for family members to be used to interpret. Research has suggested that this is satisfactory at least some of the time.[23] Designing a study to compare cost benefit of current practice versus increased use of professional interpreter is difficult as highlighted in a recent USA study.[24] This study showed no significant difference in length of stay or readmission between LEP inpatients with or without use of professional interpreters. Although these unexpected findings could result from methodological problems,[25] it is plausible that clinicians were doing well using professional interpreters for more serious cases where the outcome on length of stay and readmission was significantly affected and not using them in less serious cases where length of stay and readmission rate was not affected. Alternate factors might be the use of the clinician's second language or of family members being particularly good at interpreting.

Current provision of interpreter services

In the US there is widespread availability and uptake of interpreter services, with a high use of video and telephonic interpreting meaning that in theory there is access to an interpreter anywhere in the country. Two thirds of LEPs speak Spanish. Actual usage is far from comprehensive.[26] Progress has been made towards documented accredited training and certification by organisations led by their peers. The US has yet to achieve licencing of all interpreters as happens for other members of the health team. Because of the geography, density and relatively small numbers of LEPs, New Zealand will never be able to provide comprehensive face-to-face interpreting services. There are many languages needed with no one language dominating. Video interpreting is currently barely used. Telephone interpreting services are available during business hours and Saturday morning through the government run Language Line. Auckland, the region with the highest number and density of LEPs, provides its own 24/7 interpreting service to all health sites. New Zealand is considering the issue of professionalisation[27] but little formal progress has been made. It is time that the Health and Disability Commissioner's code of patient rights were amended to require a "professional" (rather than just competent) interpreter. It is impossible at the very least to gain valid informed consent without a professional interpreter. Without assurance of the interpreter's competence, any challenge to the validity of informed consent would not hold up in court.[28]

The future: lessons from the US to New Zealand

In New Zealand, a census question that measures LEP is essential. Medical interpreters are professional members of our teams and need a professional framework like any other health professional. Provider training must convey skills to work with interpreters of all types. Remote interpretation is optimal in certain situations but should be seen as an adjunct rather than a substitute for our team members. Providers who wish to practice in a second language must pass proficiency testing.

The future: lessons from New Zealand to the US

New Zealand is much more conscious of cost effectiveness than the US when providing health care. As interpreter services grow, they will compete for budget from other health services and be prioritised according to cost benefit. The cost and availability of interpreter services vary considerably from face-to-face interpreter, video interpreter, telephone interpreter, bilingual clinician or "free" *ad hoc* interpreter. We need the clinical skills to make decisions about which tools are adequate and cost-effective for the clinical situations we face.[29] Insisting on always using a face-to-face interpreter, or banning bilingual clinicians from using their language skills unless certified, may be essential for the most complex consultations, but if clinicians hone the clinical skill of judging the quality of communication, the benefits of using family members and speaking directly to patients may be available without the risks.

Competing interests:
Nil.

Author information:
Ben Gray, Senior Lecturer, Department of Primary Health Care & General Practice, University of Otago, Wellington; Eric J Hardt, Geriatrics Section, Boston Medical Center, Associate Professor of Medicine, Boston University School of Medicine, Boston, USA.

Corresponding author:
Dr Ben Gray, Senior Lecturer, Department of Primary Health Care & General Practice, Te Tari Hauora Tūmatanui me te Mātauranga Rata Whānau, University of Otago, 23a Mein Street, PO Box 7343, Wellington.
ben.gray@otago.ac.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7264

REFERENCES:

1. Whitehead M. The concepts and principles of equity and health. International journal of health services. 1992; 22(3):429–45.
2. Divi C, Koss R, Schmaltz S, Loeb J. Language proficiency and adverse events in US hospitals: a pilot study. International Journal for Quality in Health Care. 2007.
3. Statistics New Zealand. 2013 QuickStats; Cultural Diversity Wellington New Zealand: Statistics New Zealand; 2013 [Available from: http://www.statisticsnz.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-national-highlights/cultural-diversity.aspx
4. Migration Policy Institute. Frequently Requested Statistics on Immigrants and Immigration in the United States Washington DC USA,2016 [Available from: http://www.migrationpolicy.org/print/15611#.Vx95y3qQl-J
5. Minister of Health and Pacific Island Affairs. 'Ala Mo'ui: Pathways to Pacific Health and Welllbeing 2010-2014 Wellington: New Zealand Minstry of Health; 2010 [Available from: http://www.health.govt.nz/publication/ala-moui-pathways-pacific-health-and-well-being-2010-2014
6. Gray B, Stanley J, Stubbe M, Hilder J. Communication difficulties with limited English proficiency patients: clinician perceptions of clinical risk and patterns of use of interpreters. The New Zealand Medical Journal. 2011; 124(1342):23.
7. Seers K, Cook L, Abel G, Schluter P, Bridgford P. Is it time to talk? Interpreter services use in general practice within Canterbury. Journal of Primary Healthcare. June 2013; 5(2):129.
8. Frayne SM, Burns RB, Hardt EJ, Rosen AK, Moskowitz MA. The exclusion of non-English-speaking persons from research. Journal of general internal medicine. 1996; 11(1):39–43.
9. Woloshin S, Schwartz LM, Katz SJ, Welch HG. Is language a barrier to the use of preventive services? Journal of General Internal Medicine. 12(8):472–7.
10. Weinick RM, Krauss NA. Racial/ethnic differences in children's access to care. American Journal of Public Health. 2000; 90(11):1771.
11. Carrasquillo O, Orav EJ, Brennan TA, Burstin HR. Impact of language barriers on patient satisfaction in an emergency department. Journal of general internal medicine. 1999; 14(2):82–7.
12. Wisnivesky JP, Kattan M, Evans D, Leventhal H, Musumeci-Szabó TJ, McGinn T, et al. Assessing the relationship between language proficiency and asthma morbidity among inner-city asthmatics. Medical care. 2009; 47(2):243–9.
13. Bagchi AD, Dale S, Verbitsky-Savitz N, Andrecheck S, Zavotsky K, Eisenstein R. Examining Effectiveness of Medical Interpreters in Emergency Departments for Spanish-Speaking Patients With Limited English Proficiency: Results of a Randomized Controlled Trial. Annals of Emergency Medicine. 2011; 57(3):248–56.e4.
14. Lee LJ, Batal HA, Maselli JH, Kutner JS. Effect of Spanish interpretation method on patient

satisfaction in an urban walk-in clinic. J Gen Intern Med. 2002; 17(8):641–5.

15. Karliner LS, Jacobs EA, Chen AH, Mutha S. Do professional interpreters improve clinical care for patients with limited English proficiency? A systematic review of the literature. Health Services Research. 2007; 42(2):727–54.
16. Health and Disability Commissioner. Code of Health and Disability Services Consumers' Rights [Available from: http://www.hdc.org.nz/media/24833/brochure-code-white.pdf
17. Health and Disability Commissioner. Annual Report year ending June 2015 Wellington: Health and Disability Commissioner; 2015 [Available from: http://www.hdc.org.nz/media/294868/hdc%20annual%20report%202015.pdf
18. New Zealand. Accident Compensation Act, Stat. 2001/49 (2001).
19. Hampers LC, Cha S, Gutglass DJ, Binns HJ, Krug SE. Language barriers and resource utilization in a pediatric emergency department. Pediatrics. 1999; 103(6 Pt 1):1253–6.
20. Bernstein J, Berstein E, Dave A, Hardt EJ, James T, Linden J, et al. Trained Medical Interpreters in the Emergency Department: Effects on Services, Subsequent Charges, and Follow-up. Journal of Immigrant Health. 2002; 4(4):171–6.
21. Lindholm M, Hargraves JL, Ferguson WJ, Reed G. Professional language interpretation and inpatient length of stay and readmission rates. Journal of general internal medicine. 2012; 27(10):1294–9.
22. Diamond LC, Schenker Y, Curry L, Bradley EH, Fernandez A. Getting by: underuse of interpreters by resident physicians. Journal of General Internal Medicine. 2009; 24(2):256–62.
23. Gray B, Hilder J, Donaldson H. Why do we not use trained interpreters for all patients with limited English proficiency? Is there a place for using family members? Aust J Prim Health. 2011; 17(3):240–9.
24. López L, Rodriguez F, Huerta D, Soukup J, Hicks L. Use of Interpreters by Physicians for Hospitalized Limited English Proficient Patients and Its Impact on Patient Outcomes. J Gen Intern Med. 2015:1–7.
25. Jacobs EA, Press VG, Vela MB. Use of Interpreters by Physicians. J Gen Intern Med. 2015; 30(11):1589.
26. Schenker Y, Pérez-Stable EJ, Nickleach D, Karliner LS. Patterns of interpreter use for hospitalized patients with limited English proficiency. J Gen Intern Med. 2011; 26(7):712–7.
27. Clark D, McGrath C, editors. Interpreting in New Zealand the pathway forward,. Wellington New Zealand: The Office of Ethnic Affairs; 2009.
28. Gray B. Informed Consent in patients with limited English proficiency. New Zealand Health and Hospital. 2011; 63(3):1.
29. Jacobs EA, Diamond L, editors. Providing Health Care in the Context of Language Barriers; International Perspectives. Bristol UK: Channel View Publications; In Press.

Melioidosis with possible Haemophagocytic lymphohistiocytosis

Junaid Beig, Kerry Read, Darren Welch, Hasan Bhally

We report a case of *Burkholderia pseudomallei* bacteremia without pulmonary involvement, complicated by possible Haemophagocytic lymphohistiocytosis (HLH).

Melioidosis is a tropical disease caused by *B. pseudomallei,* a highly pathogenic gram-negative bacillus endemic in South-East Asia and Northern Australia.[1–3] Transmission via percutaneous inoculation, aerosol inhalation and ingestion through contact with contaminated soil and water. Incubation period varies from 1–21 days.[1–3] Clinical manifestations vary from sub-acute disease with localised skin lesions to fulminant septic shock.

Case report

A 47-year-old systems security engineer in Brunei was admitted one week after arriving in Auckland with two weeks of fevers, dry cough, lethargy and anorexia. There was no recent exposure to wet muddy outdoors. He had poorly controlled type 2 diabetes. Fever 38.8°C with tachycardia, and no focal signs of infection were noted. Laboratory investigations are shown in Table 1. Chest x-ray was normal. Cefuroxime and Metronidazole were started.

An ultrasound revealed multiple 5–10mm hypoechoic lesions suspicious of liver abscesses with no hepatosplenomegaly.

On day three, he developed hypotension (80/50mmHg) with ongoing high-grade fevers, worsening liver function, thrombocytopenia and an elevated ferritin (Table 1).

A CT abdomen showed new hepatosplenomegaly and confirmed multiple liver abscesses (Figures 1A and 1B), hypo-attenuated splenic lesions likely infarction, and ascending colitis. The combination of thrombocytopenia, high ferritin and hepatosplenomegaly raised the possibility of HLH. High dose prednisone (60mg) was started with early clinical response within 48 hours. Blood cultures were positive for gram-negative bacilli with bipolar staining. *B. pseudomallei* was identified and later confirmed with 16S rRNA.

Ceftazidime and Meropenem were commenced. Bone marrow biopsyraised possibility of HLH due to profound haemophagocytic activity (Figure 1C).

He responded well and completed total of four weeks of Ceftazidime after discharge on day 14. Prednisone was tapered over four weeks to reduce the risk of relapse. Follow-up confirmed ongoing improvement (Table 1), resolving splenomegaly and liver abscesses. Co-trimoxazole 960mg BD was given for three months in view of non-surgical management of liver abscesses, disseminated infection and concomitant Prednisone use.

Discussion

Melioidosis is rare in New Zealand.[4] To our knowledge, this is the first case of extrapulmonary melioidosis with liver abscesses complicated with possible HLH. Melioidosis is commonly characterised by pneumonia and intra-organ abscesses with mortality rate of 40%.[2,3] Recognised risk factors for melioidosis are diabetes, alcoholism, chronic lung disease and renal disease reflecting impairment in innate immune function.[1–3] Longer antibiotic course (up to six months), including 'induction' with intravenous agents, is recommended for treatment.[5]

HLH is a life-threatening hyperinflammatory state mediated by impaired natural-killer (NK) and cytotoxic T cell functions. Laboratory features include pancytopenia; transaminitis; hyperferritinemia; hypofibrinogenemia or hypertriglyceridemia; high soluble IL -2

Table 1: Laboratory results of patient at baseline, day three, and at follow-up in four weeks.

Investigations	Reference value	Day 0	Day 3	Week 4
Haemoglobin	115–155g/L	127	109	103
MCV	80–99fl	76	76	87
WBC	4–11x10^9/L	8.6	7.4	7.8
Neutrophils	1.90–7.5x10^9/L	7.5	6.4	5.8
Platelets	150–400x10^9/L	193	60	382
CRP	0–5mg/L	328	224	27
Sodium	135–145mmol/L	122	123	132
Creatinine	45–90µmol/L	86	127	53
Lactate	0.3–1.3mmol/L	ND*	9.7	ND*
Non-fasting glucose	3.5–11mmol/L	14.5	16.9	ND*
HbA1c	<40mmol/mol	97	ND*	ND*
Ferritin	20–450µg/L	ND*	24321	1815
Bilirubin	<25µmo/L	33	63	12
ALT	<45U/L	63	108	31
GGT	0–50U/L	346	403	314
ALP	40–110U/L	512	533	229
Albumin	25–48g/L	23	16	30
APTT	25–48g/L	47	55	ND
PR	0.8–1.2	1.4	2.1	ND
Fibrinogen	1.5–4.5g/L	7.0	5.0	ND

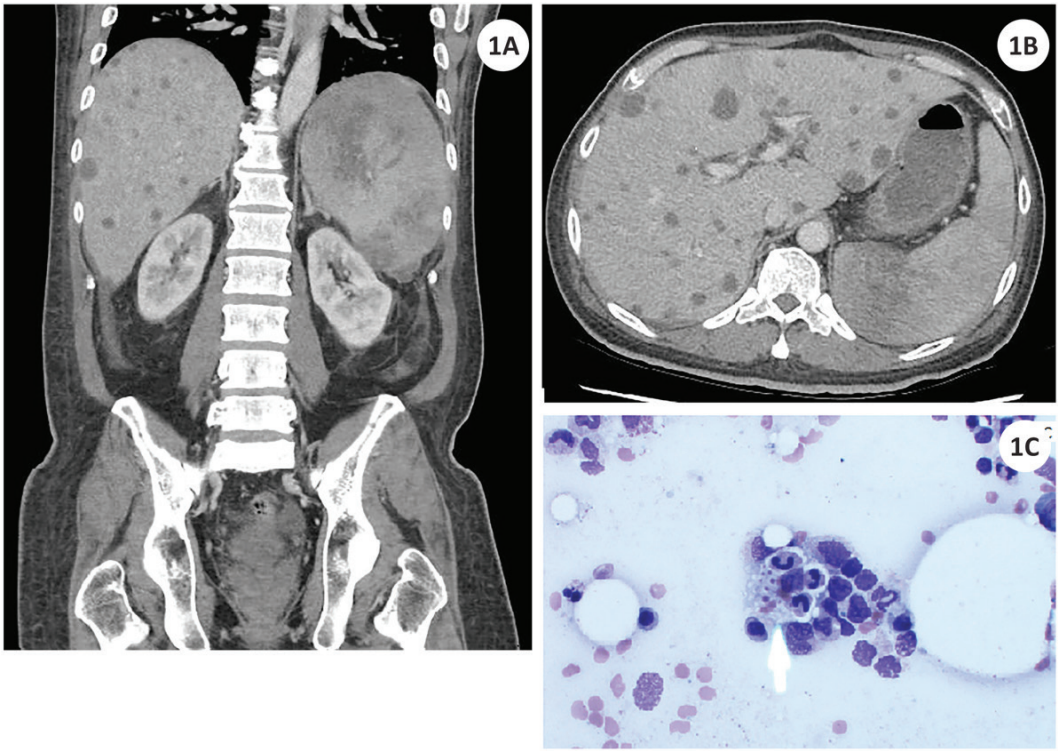
MCV: Mean corpuscle volume; WBC: White cell count; CRP: C - reactive protein; ALT: Alanine transaminase; ALP: Alkaline phosphatase;GGT: Gamma glutaryl transpeptidase; APTT: Activated partial thromboplastin; HbA1c: Glycosylated haemoglobin; PR: Prothrombin ratio; ND*: Not done.

receptor levels; low/absent NK cells activity and haemophagocytosis on bone marrow biopsy (Henter et al Criteria 2004).[6] HLH can be familial. Viral infections (commonly EBV, HIV), lymphoid malignancy, connective tissue diseases can also trigger HLH.[7–9]

Five out of eight Henter HLH criteria were fulfilled in our case. We could not perform high soluble IL -2 receptor, NK cells assay or molecular/genetic testing. Therefore, it cannot be confirmed whether this patient developed HLH or a syndrome mimicking HLH on the basis of cyptopenias, hepatosplenomegaly, high ferritin and bone marrow changes from severe melioidosis. High ferritin levels, although non-specific for HLH, may predict high mortality with levels >2000µg/L in non-malignancy related cases.[11] Treatment of HLH is based on combination of early immunomodulators to suppress dysregulated immune response, directed treatment for underlying trigger/s, and good supportive care. Immunotherapeutic agents like steroids, etoposide, methotrexate and cyclosporine have been used.[10]

The outcome in our patient was excellent with multidisciplinary care, appropriate antibiotics and early use of steroids.

Figure 1:



1A and 1B: Coronal and Axial CT—showing hepatosplenomegaly with low attenuating cystic abscess collections. Area of wedge shaped hypoattentating area—splenic infarct.
1C: Bone marrow biopsy—showing erythoid phagocytosis.

Competing interests:
Nil.

Acknowledgements:
Dr Kirsten Pearce (Radiologist, North Shore Hospital), Dr Merit Hanna (Haematologist, North Shore Hospital), Lisa Couldrey (Graphic Designer, Auckland City Hospital), Prof Bart Currie (Royal Darwin Hospital, Australia).

Author information:
Junaid Beig, Department of Medicine and Infectious Diseases, North Shore Hospital, Auckland; Kerry Read, Department of Medicine and Infectious Diseases, North Shore Hospital, Auckland; Darren Welch, Department of Microbiology Laboratory, North Shore Hospital, Auckland; Hasan Bhally, Department of Medicine and Infectious Diseases, North Shore Hospital, Auckland.

Corresponding author:
Dr Hasan Bhally, Department of Medicine and Infectious Diseases, North Shore Hospital, Auckland, NSH Private Bag 93503, Takapuna 0740, Auckland 0622.
hasan.bhally@waitematadhb.govt.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7265

REFERENCES:

1. Cheng AC, Currie BJ. Melioidosis: epidemiology, pathophysiology, and management. Clin Microbiol Rev. 2005; 18(2):383–416.
2. Currie BJ, Ward L, Cheng AC. The epidemiology and clinical spectrum of melioidosis: 540 cases from the 20 year Darwin prospective study. PLoS Negl Trop Dis. 2010; 4(11):e900.
3. Wiersinga WJ, Currie BJ, Peacock SJ. Melioidosis. N Engl J Med. 2012; 367(11):1035–44.
4. Corkill MM, Cornere B. Melioidosis: a new disease to New Zealand. N Z Med J. 1987; 100(818):106–7.
5. Currie B. Melioidosis: evolving concepts in epidemiology, pathogenesis, and treatment. Semin Respir Crit Care Med. 2015; 36(1):111–25.
6. Ramos-Casals M, Brito-Zeron P, Lopez-Guillermo A, et al. Adult haemophagocytic syndrome. Lancet. 2014; 383(9927):1503–16.
7. Maakaroun NR, Moanna A, Jacob JT, et al. Viral infections associated with haemophagocytic syndrome. Rev Med Virol. 2010; 20(2):93–105.
8. Fardet L, Lambotte O, Meynard JL, et al. Reactive haemophagocytic syndrome in 58 HIV-1-infected patients: clinical features, underlying diseases and prognosis. AIDS. 2010; 24(9):1299–306.
9. Murase T, Nakamura S, Kawauchi K, et al. An Asian variant of intravascular large B-cell lymphoma: clinical, pathological and cytogenetic approaches to diffuse large B-cell lymphoma associated with haemophagocytic syndrome. Br J Haematol. 2000; 111(3):826–34.
10. Jordan M, Allen C, Weitzman S, et al. How I treat haemophagocytic lymphohistiocytosis. Blood. 2011; 118(15):4041–52.
11. Grange S, Buchonnet G, Besnier E, et al. The use of ferritin to identify critically ill patients with secondary haemophagocytic lymphohistiocytosis. Crit Care Med. 2016; 44:e1045–1053.

Intramural oesophageal haematoma—a rare complication of dabigatran

Jonathan Trip, Peter Hamer, Richard Flint

ABSTRACT

An 85-year-old female presented to hospital with haemoptysis. She underwent investigations which confirmed oesophageal submucosal haematoma. Oesophageal haematoma along with Mallory-Weiss and Boerhaave's syndromes make up acute mucosal injury of the oesophagus. It can be managed conservatively in the majority of cases.

An 85-year-old female with a history of AF was prescribed dabigatran. She presented to the emergency department with haemoptysis following ingestion of her first tablet. During swallowing she felt an unusual sensation in her throat causing her to cough and regurgitate. She then developed odynophagia. She woke up the next day complaining of haemoptysis and shortness of breath. She was taking no other antiplatelet or anticoagulants.

Her haemoglobin was 114g/L and her coagulation markers were normal. CXR with lateral neck soft tissue showed a rounded opacity at the level of the hyoid posteriorly consistent with the ingested tablet and demonstrated signs consistent with congestive cardiac failure.

She was admitted under the medical team who investigated her for the possibility of a pulmonary embolus. Computed topography showed a filling defect in the oesophageal lumen on the lateral aspect of the oesophagus consistent with an oesophageal haematoma. A gastroscopy was performed five days after presentation, which showed an oesophageal mucosal tear and underlying haematoma. On referral to the general surgical team a repeat CT chest with oral contrast was performed to exclude oesophageal perforation. It confirmed the diagnosis and that the haematoma was already resolving.

Patient was treated conservatively with reintroduction of diet and recovered uneventfully.

Discussion

Intramural haematoma of the oesophagus is a rare disease where a rupture of blood vessels in the submucosal layer haemorrhage and cause the formation of haematoma.[1] Underlying vessel fragility with an insult is thought to be the predisposing pathophysiology. The location of the haematoma is submucosal due to the weak attachment of the muscularis propria. The presentation of oesophageal haematoma consists of the triad of haematemesis, retrosternal pain and dysphagia/odynophagia. Eighty percent of patients will have two-thirds of the triad, while only 32–35% will have all three.[2,3,4] Risk factors are middle age, female (RR1.8+++), a history of vomiting or coughing and foreign body ingestion.[2,4] Patients without precipitating factors are more likely to have coagulation abnormalities such as idiopathic thrombocytopenic purpura or be using anticoagulant therapy.[4]

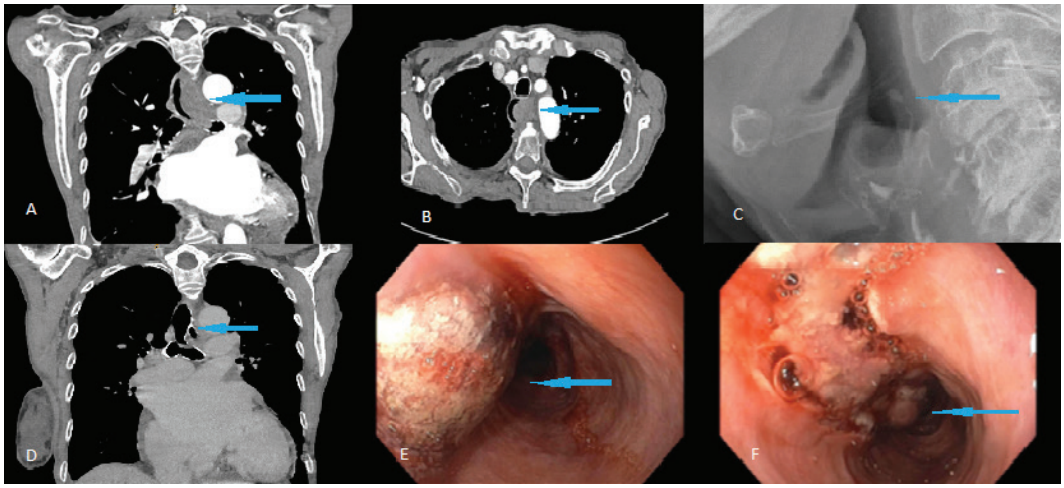
Intramural haematoma of the oesophagus must be differentiated conceptually from Boerhaaves syndrome and Mallory-Weiss tears. Boerhaaves syndrome is a *full thickness* oesophageal perforation, due to barogenic injury from forceful vomiting or retching with sudden increase in intra-abdominal pressure.[4] The main symptom is chest pain with an appropriate history; conversely, patients who present with shock are difficult to diagnose as they are less likely to have a classic history.[4] They must be managed aggressively to control mediastinal contamination.

Mallory Weiss tears are a shear injury to the oesophageal mucosa. They occur when abrupt upward diaphragm movement along with rapid increase of intra-abdominal pressure causes the gastric cardia to move through the hiatus into the thoracic cavity. This results in a longitudinal laceration, which is likely to arise at the point of maximal dilatation (Laplace's law), which is usually within 2cm of the cardia on the lesser curvature.[4] Alternatively, 10% of patients will present with melena and 10% with shock.[4]

Computed topography with oral contrast is both sensitive and specific for IHE and can exclude other differentials such as Boerhaave's syndrome, aortic dissection or aneurysms.[2,4] Contrast studies can also be used to exclude perforation. Gastroscopy is useful to confirm the diagnosis of oesophageal haematoma and further assess the condition of the oesophagus. Treatment of suspected oesophageal haematoma is 1) to exclude full thickness oesophageal perforation and 2) manage conservatively as most haematomas/tears resolving spontaneously. On occasion, nasojejunal feeding or total parenteral nutrition may be needed to maintain nutrition in the short-term while awaiting resolution of the haematoma.[5] In our patient, oral diet was able to be reintroduced immediately. Complications of oesophageal haematoma are rare but include severe bleeding or oesophageal perforation from pressure effects of the haematoma on the oesophageal wall.[2]

With the ever-increasing availability of cross-sectional imaging, intramural haematoma of the oesophagus will be diagnosed more often. It is an under-recognised condition which is important to be aware of, as exclusion of oesophageal perforation is mandatory, but subsequent management is conservative and prognosis is excellent.

Figure 1:



A—Coronal view of the haematoma. It can be seen on the left side of the oesophagus.
B—CT scan showing soft tissue mass on the left oesophageal wall.
C—Lateral x-ray showing residual tablet at posterior aspect of hyoid.
D—Three days later from A showing resolution of haematoma.
E and F—Middle third of oesophagus showing large, elongated haematoma and ulceration. F shows the residual tablet at the distal end of the oesophagus.

Competing interests:
Nil.

Author information:
Jonathan Trip, General Surgery, Christchurch Hospital, Christchurch; Peter Hamer, General Surgery, Christchurch Hospital, Christchurch; Richard Flint, General Surgery, Christchurch Hospital, Christchurch.

Corresponding author:
Dr Jonathan Trip, General Surgery, Christchurch Hospital, Riccarton Ave, Christchurch 8041.
jono.trip91@gmail.com

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7266

REFERENCES:

1. Oe S, Watanabe T, et al. A Case of Idiopathic Gastroesophageal Submucosal Hematoma and Its Disappearance Observed by Endoscopy. J UOEH 36(2): 123–128, 2014.
2. Seneviratne SA, Kumara DS, Drahaman A. Spontaneous Intramural Oesophageal Haematoma: A Case Report. Med J Malaysia Vol 67 No 5 October 2012.
3. Crispin MD, Chan KJ, Winter N, et al. Esophageal Apoplexy. Journal of Gastrointestinal Surgery. August 2016, Volume 20, Issue 8, pp 1535–1536.
4. Younes Z, Johnson DA. Spontaneous and iatrogenic esophageal injury. Journal of clinical gastroenterology, vol 29, No. 4, 1999.
5. Cullen SN, McIntyre AS. Dissecting intramural haematoma of the oesophagus. European journal of gastroenterology & hepatology. 2000; 12(10):1151–62.

Ocular exposure to paraquat resulting in keratopathy, pseudomembranous conjunctivitis and symblepharon

Neil Avery, Benjamin LaHood, Albert Covello, Daniel Allbon

Paraquat is a powerful herbicide still used in rural areas of New Zealand. We report the case of an 82-year-old man who had accidental exposure of 50:1 diluted paraquat to his right eye. He immediately irrigated the eye and presented two days later to his general practitioner with worsening vision. He was then referred to the hospital ophthalmology department.

He was seen the same day with right visual acuity (VA) of 6/60 improving with pinhole (PH) to 6/30. Examination revealed severe papillary conjunctivitis with superior pseudomembrane and a devitalised corneal epithelium. There was no frank corneal epithelial defect or apparent limbal ischaemia. The pseudomembrane was debrided and he was started on hourly prednisolone (1.0%) drop (Bausch & Lomb, New Zealand) and chloramphenicol (0.5%) drop (Bausch & Lomb, New Zealand) four times daily (QID).

On day three he had worsening discomfort and erythema. Examination showed 200 degrees of superior limbal ischaemia with a shallow epithelial defect. Oral doxycycline 100mg once daily, oral vitamin C 1g (QID), topical sodium ascorbate 10% every two hours (Q2H) and topical sodium citrate 10% (Q2H) were added to the existing treatment.

By day five, comfort was improved, with vision stable at 6/48 PH 6/24. There was 270 degrees of limbal ischaemia, with a large (80%) non-healing epithelial defect. Symblepharon was divided with a glass rod. A bandage lens was placed in case mechanical irritation from conjunctival papillae was contributing to the non-healing epithelial defect.

On day nine an amniotic membrane graft was sutured to the limbus with interrupted 10–0 nylon and continuous 8–0 vicryl to the fornices. Complete epithelial healing occurred by day 14 post-operatively. Vision had improved to 6/15 PH 6/9. Chloramphenicol (0.5%) QID was continued for 14 days post-operatively and prednisolone drops (1.0%) tapered over two weeks. At two months post-operatively, vision was 6/9–1 PH 6/7.5 with mild inferior symblepharon.

Discussion

Paraquat is a non-selective herbicide. It is extremely toxic to humans and as treatment outcomes are extremely poor,[1] it is banned in many countries, though not in New Zealand. Fortunately, paraquat is rapidly rendered biologically inactive on contact with soil, somewhat limiting its toxicity to the surrounding environment.[2] It is a commonly used agent for self-poisoning and has life-threatening effects when ingested at 20mg/kg, primarily via toxicity of the pulmonary tract, kidneys, liver and heart.[3] Its mechanism of toxicity is thought to be via generation of free radicals, resulting in oxidative damage due to depletion of NADPH. This occurs as paraquat recycles in the redox reaction interrupting cellular metabolism. Reduced paraquat then re-oxidises, using oxygen to generate a superoxide radical, which binds macromolecules and damages membrane lipids.[1]

The immediate effects of ocular exposure include irritation, lacrimation and conjunctivitis. Short-term effects occur one to four weeks later, including conjunctival defects,

corneal epithelium loss (limbal stem cells are especially vulnerable) and anterior uveitis. Long-term effects include chronic conjunctivitis, symblepharon and epiphora due to punctual stenosis. Corneal oedema, superficial scarring and recurrent ulceration are also common.[2]

Histologically, the conjunctiva may show sub-epithelial fibrosis. Impression cytology of the conjunctiva in the case presented by Vlahos[2] showed variable grades of squamous metaplasia and keratinisation with inflammatory infiltrate. The cornea may show loss of Bowman's layer, with epithelial thickening and pannus formation under these areas.

Periocular tissues may also be affected by paraquat exposure. Fortunately, absorption across the skin is slow and limited, though significant local toxicity may be evident with contact dermatitis, blistering and ulceration.[2]

Previous case reports of ocular paraquat injury have been uncommon but share generally long recoveries and poor visual outcomes. Both Vlhaos[2] and Cant[4] described young adults accidentally exposed to paraquat who developed pseudomembranous conjunctivitis, punctual occlusion, corneal pannus as well as anterior uveitis and symblepharon, respectively. Mckeag[5] described a bilateral exposure resulting in progressively deteriorating corneal epithelial defects which took one month to fully heal. Joyce[6] presented a case of paraquat toxicity with delayed presentation four weeks post-injury requiring a penetrating keratoplasty due to persisting corneal opacity.

Treatment of paraquat injury is difficult and limited options are available.[1] Recommended first aid for ocular exposure includes copious irrigation with water for 30 minutes.[7] Initial treatment should include preservative free steroid, antibiotic and lubricants.[1] The use of topical ascorbic and citric acid and oral ascorbate is less clear though may be useful. Autologous serum should be considered for non-healing epithelial defects.[8] The use in this case of amniotic membrane graft to aid healing of the persistent and worsening corneal epithelial defect was successful and has been shown to be effective with similar ocular surface defects.[9] More recently the modification of amniotic membrane transplantation with coverage of the entire ocular surface has shown promising outcomes both for vision and symblepharon prevention.[10]

Competing interests:
Nil.

Author information:
Benjamin R LaHood, Ophthalmology Department, The Queen Elizabeth Hospital, Adelaide, Australia; Neil Avery, Ophthalmology Department, Dunedin Hospital, Dunedin; Albert Covello, Ophthalmology Department, Dunedin Hospital, Dunedin; Daniel Allbon, Ophthalmology Department, Dunedin Hospital, Dunedin.

Corresponding author:
Dr Benjamin R LaHood, Ophthalmology Department, The Queen Elizabeth Hospital, Adelaide, Australia.
benlahood@gmail.com

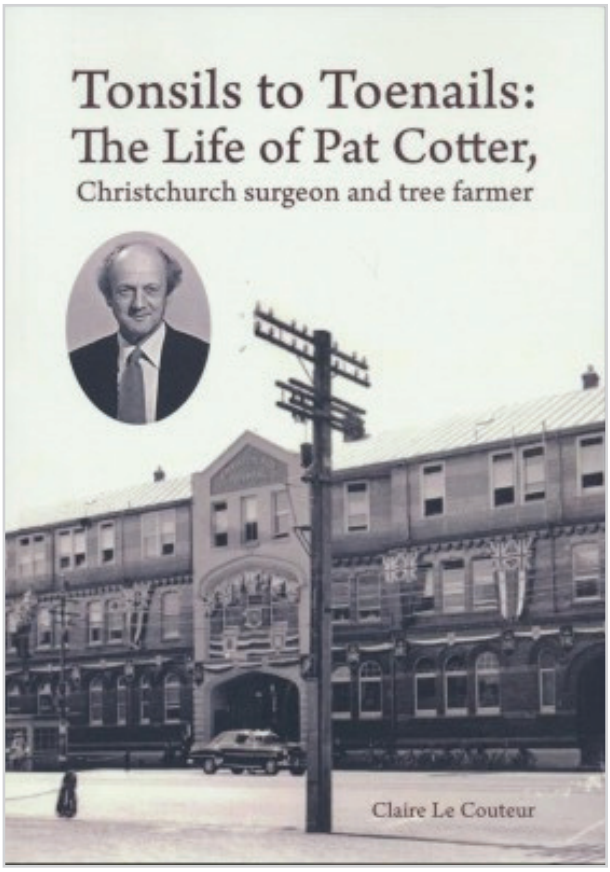
URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7267

REFERENCES:

1. Gawarammana IB, Buckley NA. Medical management of paraquat ingestion. British journal of clinical pharmacology. 2011; 72(5):745–57.
2. Vlahos K, Goggin M, Coster D. Paraquat causes chronic ocular surface toxicity. Australian and New Zealand journal of ophthalmology. 1993; 21(3):187–90.
3. Vale J, Meredith T, Buckley B. Paraquat poisoning: clinical features and immediate general management. Human & Experimental Toxicology. 1987; 6(1):41–7.
4. Cant JS, Lewis D. Ocular damage due to paraquat and diquat. British medical journal. 1968; 3(5609):59.
5. Mckeag D, Maini R, Taylor H. The ocular surface toxicity of paraquat. British journal of ophthalmology. 2002; 86(3):350–1.
6. Joyce M. Ocular damage caused by Paraquat. The British journal of ophthalmology. 1969; 53(10):688.
7. The New Zealand National Poisons Centre; 2016 [Available from: www.toxinz.com]
8. Tsubota K, Goto E, Shimmura S, Shimazaki J. Treatment of persistent corneal epithelial defect by autologous serum application. Ophthalmology. 1999; 106(10):1984–9.
9. Tandon R, Gupta N, Kalaivani M, Sharma N, Titiyal JS, Vajpayee RB. Amniotic membrane transplantation as an adjunct to medical therapy in acute ocular burns. British Journal of Ophthalmology. 2011; 95(2):199–204.
10. Wang T, Liang C, Xu X, Shi W. Total ocular surface amniotic membrane transplantation for paraquat-induced ocular surface injury. Canadian Journal of Ophthalmology/ Journal Canadien d'Ophtalmologie. 2015; 50(6):461–5.

Tonsils to Toenails: the life of Pat Cotter, Christchurch surgeon and tree farmer

Geoffrey Rice



Claire Le Couteur. Cotter Medical History Trust, Christchurch, 2016.
ISBN 9780473371357. Contains 245 pages.
Price NZ$30.00

Many of us with a sense of history lament the loss of archives and artefacts to the ravages of time, neglect and indifference, but few of us do much about it. Here is one man who did, rescuing many obsolete instruments and even very large pieces of medical equipment as they were about to be discarded by Christchurch Hospital. He also collected information about Canterbury doctors past and present, amassing a remarkably detailed biographical dictionary that often goes beyond the bare details of Rex Wright-St Clair's national medical dictionary. After the Christchurch earthquake of 2011 had damaged the former Nurses' Home where the collection was housed, Pat Cotter supervised its transfer to Hillmorton Hospital, doing his share of the carrying. He was aged 91 at the time, and blind in one eye. He died in 2012, just short of his 93rd birthday.

Claire Le Couteur has done us a great service by thoroughly researching and reconstructing the life of this unassuming yet remarkable New Zealander. Born in Greymouth, Pat Cotter was the son of a surgeon, William Makura Cotter (1894–1980), who had been sent to Denniston as a

final year medical student during the 1918 influenza pandemic, and in 1919 became the medical officer for the State Miners' Medical Association at Runanga. After a brief visit to London in 1922 where his father was studying for his FRCS, Pat was sent back to New Zealand to live with his grandparents in Hastings. The family moved to Christchurch in 1926, where Pat attended Fendalton School and Christ's College. In his own words, he 'drifted amiably' through school, never outstanding, except at swimming and rowing, and just scraping through in his least favoured subjects.

Pat Cotter lived the rest of his life in Christchurch, apart from his years at medical school and his army service in Fiji in 1945, and three years in London 1947–50. He was a well-respected general surgeon, working across a variety of procedures (hence the title, doing minor surgery from tonsils to toenails). Repair of hernias, removal of haemorrhoids and stripping of varicose veins were his bread and butter, along with removal of cysts and tumours, and appendicectomies. Pat was a modest and generous man, whose fees were adjusted to the means of the patient, so he never made a fortune from surgery. But he gained a reputation as a capable and caring surgeon who took an interest in his patients as people, and that could not be said of all surgeons in the 1950s and 1960s.

Pat was blessed with boundless energy and curiosity. For many years he was closely involved with the Royal Australasian College of Surgeons, helping to host its 1956 general meeting in Christchurch. He served as an examiner and committee member for the maximum terms allowed, and represented the RACS on trips to the UK and US. He campaigned tirelessly against smoking, especially on aircraft, and lobbied the New Zealand government about the dangers posed by alcohol-impaired drivers. He served 12 years as medical superintendent of the Mary Potter Hospice, and was a director of the Medical Assurance Society of New Zealand.

His interest in collecting and preserving medical archives and equipment probably started with his involvement on various committees of the Canterbury Medical Library. Founded in 1934, this collection included some of the books and journals of 19th century Christchurch medical men. Pat chaired the planning committee when the library was taken over by Otago University in 1971, and he remained on its standing committee until 1976.

When Pat retired from the Christchurch Hospital staff at the compulsory retirement age of 65, he already had a major retirement project in mind. In the early 1960s he had bought a section at Charteris Bay on Lyttelton Harbour and built a holiday home, from which he could indulge his passion for sailing. He started planting trees and shrubs on the steep slope above the bach and set up an investment company, Te Wharau Investments Ltd., to provide for his retirement. (At that time, as a part-time employee of the hospital board, he was ineligible to join the National Provident Fund. He was later able to buy back those lost years.) He also purchased several commercial properties in Christchurch and leased them to tenants.

In 1981, Pat with his wife Prue and son Paddy bought a small property at Pigeon Bay on Banks Peninsula with a view to farming trees. Named Seskin Farm, the property had a good rainfall, a lot of gorse and a small house. The latter was replaced in 1996. Pat approached tree-farming with his customary enthusiasm and learned about scientific agro-forestry techniques. He was a member of the NZ Farm Forestry Association for over thirty years, and was secretary and later chairman of the Central Canterbury branch.

While the pines and macrocarpa grew at Pigeon Bay, Pat still had spare time to pursue Ross Fairgray's initiative to rescue significant pieces of equipment as Christchurch Hospital replaced its old wards with new buildings. By 1997 Pat had decided to set up a charitable trust to further this work, and his friend and surgical colleague Rob Davidson was its first chairman in 1998. Pat's enthusiasm inspired a loyal team of volunteers, including Alice Silverson, Max Abernethy and Bram Cook.

In his 70s, Pat suffered the loss of sight in one eye from aggressive glaucoma and had to have the eye removed. Thereafter he wore an eye-patch on his glasses as he could not get used to an artificial eye. He took this affliction in his stride, and remained, as one friend put it, his usual 'chirpy self' until his death in 2012.

The author has succeeded in creating a series of contexts for Pat's life which add depth and interest to the biography. Readers get a glimpse of the Otago Medical School and its lecturers in the 1940s, and Christchurch Hospital after the war. Here is an insider's view of the Christchurch surgical scene from the 1950s to the 1970s. Pat's campaigns against smoking and drink-driving are set firmly in their contemporary contexts. The text is enhanced by numerous photos of Pat's friends and colleagues, and the buildings where he worked. The captions are informative and well-researched. An appendix adds detailed research on Pat's grandparents, whose lives illustrate New Zealand settler society in the late 19th and early 20th centuries.

Altogether this is a highly satisfactory biography, well-written, intelligent and illuminating. It deserves a much wider readership than merely Christchurch people interested in medical biography.

Competing interests:
Nil.

Author information:
Geoffrey Rice, University of Canterbury, Christchurch.
Corresponding author:
Dr Geoffrey Rice, University of Canterbury, Christchurch.
geoff.rice@canterbury.co.nz

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7268

Non-steroid anti-inflammatory drug use and increased risk of cardiac arrest: is misrepresentation of information more harmful than no information, *primum non nocere*

Felix Ram, Elissa McDonald

Due to the recent media coverage[1–2] in New Zealand of a Danish retrospective case-control study[3] and the risks of out-of-hospital cardiac arrest (OHCA) with the use of non-steroidal anti-inflammatory drugs (NSAIDs) and COX-2 selective inhibitors, we felt obliged to highlight some of the fundamental shortcomings of this study to help alleviate the fear of prescribing NSAIDs.

When reading the Sondergaard article it is important to note the fact that no doses of NSAIDs are reported in the study. However, references used to discuss study results referred to trials investigating high-dose treatment only (ie, 2,400mg ibuprofen), which is considerably higher than dosages used in daily practice, and which is not recommended in the medicine datasheet available on the Medsafe website,[4] with 1,200mg to 1,800mg being the maximum daily dose.

The authors have used odds ratios (OR) but interpreted the results as relative risks (RR). This is permissible if the event rate is relatively low (<10%) in both the case and control groups and when OR will approximate RR. However, Table 2 of the study shows very high event rates 21.8% (diclofenac), 51% (ibuprofen) and 14.2% (other NSAID). Furthermore, the event rate in the naproxen, celecoxib and rofecoxib are relatively low, 3.1%, 5.6% and 4.5%, respectively. Not only are inappropriate statistics used to analyse this data, but the large imbalance in the event rate between groups makes direct group comparison nonsensical and can provide misleading results favouring the lower event rate outcome, in this case naproxen, celecoxib and rofecoxib. Reasons for this very low event rate are that naproxen is rarely used in Denmark and coxibs are also rarely used, especially after 2006 when coxibs were withdrawn from the market as trials showed unequivocally that they were associated with increased risk of atherothrombotic vascular events.[5,6]

Furthermore, although the case event rates are reported, it is impossible from the data and additional online information supplied to track how the control event rate was calculated. This missing information has large implications on the findings reported as the risks reported are relative to the control population.

The authors have also failed to provide any power calculation as to the minimum number of patients required for cases and controls. As a result, one is unaware of the minimum number of patients that are

ISSN 1175-8716

required to provide sufficient statistical power to detect a difference if one exists. Therefore, the possibility of type 1 error (ie, false positive) cannot be ruled out, and thus the study likely incorrectly concluded that NSAIDs appear worse and or coxibs appear safer, when well conducted trials have convincingly demonstrated the dangers of prescribing coxibs.[5,6] Due to the lower methodological quality and inherent assumptions of retrospective observational case-control studies (compared to higher methodological quality trials) it is fundamental that case-control studies are able to demonstrate causality. The authors failed to demonstrate causality of association between NSAID and risk of OHCA. That being increasing and/or decreasing doses of NSAID and its impact on effect size (risk of OHCA) has not been demonstrated. Authors attempt to defend the robustness of their results by conducting sensitivity analysis based on case-control analysis at different time points with OR decreasing with time as one would have expected due to the decreasing event rate after the initial hospital discharge. Nevertheless, this sensitivity analysis is not a substitute for demonstrating causality.

We believe that this study by Sondergaard and co-investigators[3] has misrepresented information and data on the risk of NSAID's in favour of coxib's by providing incomplete and inappropriate data analysis with fundamental statistical and clinical shortcomings. The harm to the public from misinformation in this case is much greater than no information. Previously published well-conducted high-quality studies have clearly highlighted the dangers of coxibs for more than 10 years. Systematic review and meta-analysis of randomised trials[7] and another of observational studies[8] showed similar increases in cardiovascular risks with coxibs and diclofenac but not Ibuprofen nor naproxen. Therefore, and for valid reasons, both the FDA[9] and the European Medicines Agency's Committee for Medicinal Products for Human Use (CHMP)[10,11] had decided many years ago that coxibs (not NSAIDs) were contraindicated in patients with risk of coronary heart disease or stroke and to be used with caution in patients with risk factors for coronary heart disease.

We therefore recommend that prescribers continue to use NSAIDs as per the Medsafe medicine data sheet[4] (ie, lowest possible dose for the shortest duration) and only as a second line drug after paracetamol for those seeking pain relief. In order to do no harm, we must remember that there are no harmless drugs and that the safest prescription is often no prescription—*primum non nocere*. It is incorrect to state that all patients who seek pain relief require medication; unless it impacts on their lives. Therefore, a careful assessment of the impact of pain is important before any prescription for pain relief is considered.

Competing interests:
Nil.

Author information:
Felix SF Ram, Clinical Pharmacologist, College of Health, Massey University, Auckland; Elissa M McDonald, Lecturer, Faculty of Medical and Health Sciences, University of Auckland, Auckland.

Corresponding author:
Dr Felix SF Ram, Clinical Pharmacologist, College of Health, Massey University, Auckland.
fsfram@yahoo.co.uk

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7269

REFERENCES:

1. Nurofen, ibuprofen painkillers linked to cardiac arrest. New Zealand Herald. 2017; 9:05 PM Friday Mar 17. http://www.nzherald.co.nz/lifestyle/news/article.cfm?c_id=6&objectid=11820167 (accessed 4 April 2017).
2. OTC labels the key to safe use of NSAID painkillers. Scoop Independent News, New Zealand. 2017; 18 March 2017:9:11pm. http://www.scoop.co.nz/stories/GE1703/S00052/otc-labels-the-key-to-safe-use-of-nsaid-painkillers.htm (accessed 3 April 2017).
3. Sondergaard KB, Weeke P, Wissenberg M, et al. Non-steroidal anti-inflammatory drug use is associated with increased risk of out-of-hospital cardiac arrest: a nationwide case-time-control study. Eur Heart J Cardiovasc Pharmacother. 2017; 3(2):100–107.
4. Medsafe, Ministry of Health, Medicines Data Sheet. Brufen. 2016; 13 May. http://www.medsafe.govt.nz/profs/Datasheet/b/brufenretardtab.pdf (accessed March 28, 2017).
5. Bresalier RS, Sandler RS, Quan H, et al. Cardiovascular events associated with rofecoxib in a colorectal adenoma chemoprevention trial. New Engl J Med. 2005; 352:1092–102.
6. Solomon SD, McMurray JJ, Pfeffer MA, et al. Cardiovascular risk associated with celecoxib in a clinical trial for colorectal adenoma prevention. New Engl J Med. 2005; 352:1071–80.
7. Kearney PM, Baigent C, Godwin J, et al. Do selective cyclo-oxygenase-2 inhibitors and traditional non-steroidal anti-inflammatory drugs increase the risk of atherothrombosis? Meta-analysis of randomised trials. BMJ. 2006; 3:332(7553): 1302–8.
8. McGettigan P, Henry D. Cardiovascular risk and inhibition of cyclooxygenase: a systematic review of the observational studies of selective and nonselective inhibitors of cyclooxygenase 2. JAMA. 2006 Oct 4; 296(13):1633–44.
9. Public Health Advisory—FDA Announces Important Changes and Additional Warnings for COX-2 Selective and Non-Selective Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). 2005; 4th July. http://www.fda.gov/Drugs/DrugSafety/ucm150314.htm (accessed 3 April, 2017).
10. European Medicines Agency. Press release: European Medicines Agency review concludes positive benefit-risk balance for non-selective NSAIDs. 2006; 24th October. http://www.ema.europa.eu/docs/en_GB/document_library/Press_release/2009/12/WC500017362.pdf (accessed March 27, 2017).
11. European Medicines Agency. Press release: European Medicines Agency concludes action on COX-2 inhibitors. 2005; 27 June. http://www.ema.europa.eu/docs/en_GB/document_library/Press_release/2010/01/WC500059088.pdf (accessed March 27, 2017).

Treatment of subclinical hypothyroidism or hypothyroxinemia in pregnancy

Subclinical thyroid disease during pregnancy may be associated with adverse outcomes, including a lower-than-normal IQ in offspring. Some advocate that pregnant women with subclinical thyroid deficiency should be treated with levothyroxine during their pregnancy. This paper concerns two trials relevant to this issue.

A total of 677 women with subclinical hypothyroidism and 526 with hypothyroxinemia were randomly assigned to receive levothyroxine or placebo during their pregnancy. Children underwent annual developmental and behavioural testing for five years. The primary outcome was the IQ score at five years of age.

In both trials there were no significant differences noted in the IQ scores at five years of age between those whose mothers had or had not been treated with levothyroxine.

N Engl J Med 2017; 376:815–25

Living near major roads and the incidence of dementia, Parkinson's disease and multiple sclerosis

Concern is growing that exposures associated with traffic such as air pollution and noise might contribute to neurodegenerative pathology. Emerging evidence suggests that living near major roads might adversely affect cognition. However, little is known about its relationship with the incidence of dementia, Parkinson's disease and multiple sclerosis.

This report concerns two population-based studies carried out in Ontario, Canada. The multiple sclerosis cohort were aged 20–50 years and the dementia and Parkinson's cohort were aged 55–85 years. The eligible subjects were free of these neurological diseases at the inception of the study. After 11 years, the researchers noted the incidence of these neurological diseases and associated this with their proximity to major roadways.

In this large population-based cohort, living close to heavy traffic was associated with a higher incidence of dementia, but not with Parkinson's disease or multiple sclerosis.

***Lancet* 2017; 389:718–26**

Risk of co-treatment with opioids and benzodiazepines

This study reviews the trends in concurrent benzodiazepine/opioid prescribing among privately insured adults in the US and whether there is an association with opioid overdose events.

Between 2001 and 2013, concurrent prescribing of these two drugs increased from 9 to 17%. Co-prescription was associated with an increased risk of an opioid overdose event (odds ratio 2.14).

The researchers concluded that concurrent benzodiazepine/opioid prescribing nearly doubled over this period in this population of privately insured patients in the US and was associated with a significant increase in the risk of opioid overdose.

***BMJ* 2017; 356:j760**

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7270

Caesarean Section

June 1917

The following interesting case is extracted from the "Medical Essays of Edinburgh," Vol. V., and cited in Smellie's "Treatise on the Theory and Practice of Midwifery," published in 1784. The Caesarian operation was performed with forceps by a midwife, and described by Mr. Duncan Stewart, Surgeon in Dungannon, in the County of Tyrone, Ireland.

"The histories of the Caesarian operation being so few, I send you the following. Alice O'Neale, aged about 33 years, wife to a poor farmer near Charlemont, and mother to several children, in January, 1738, was taken in labour, but could not be delivered of her child by several women who attempted it. She remained in this condition twelve days; the child was thought to be dead after the third day. Mary Donelly, an illiterate woman, but eminent among the common people for extracting dead births, being then called, tried also to deliver her in the common way, and her attempts not succeeding, performed the Caesarian operation by cutting with a razor, first the containing parts of the abdomen, and then the uterus, at the aperture of which she took out the child and secundines. The upper part of the incision was an inch higher, and to one side of the navel, and was continued downwards, in the middle betwixt the right os ilium and the linea alba. She held the lips of the incision together with her hand till one went a mile and returned with silk and the common needles which tailors use. With these she joined the lips in the manner of the stitch employed ordinarily for the hare-lip; and dressed the wound with whites of eggs, as she told me some days after, when led by curiosity I visited the poor woman who had undergone the operation. The cure was completed with salves of the midwife's own compounding.

In about 27 days the patient was able to walk a mile on foot, and came to me in a farmer's house, where she showed me the wound covered with a cicatrix; but she complained of her belly hanging outwards on the right side, where I observed a tumour as large as a child's head; and she was distressed with a fluor albus, for which I gave her some medicines, and advised her to drink concoctions of the vulnerary plants, and to support the side of her belly with a bandage. The patient has enjoyed very good health ever since, manages her family affairs, and has frequently walked to market in this town, which is six miles distant from her own house."

Report of a case of the Caesarian operation performed by Mr. Smith, a surgeon in Edinburgh:—

"I was sent for to Mrs. Paterson, a drummer's wife in the Cannongate, June 28, 1737, about ten at night, who had been in labour for six days. She was one of the least women I ever saw, and prodigiously deformed.

I touched her and found something in the vagina so large that I at first took it for the head of the child; but soon found I was mistaken, for examining more attentively, I found, towards the os pubis, the os uteri thick, high, and a very little dilated, and through it I felt distinctly the child's head. What I first took for it proved to be the os coccygis of a very extraordinary size and shape, turned inwards, quite across the vagina, and reaching almost to the fore part of it ..... At the operation the following gentlemen were present:—Dr. Monro, Professor of Anatomy; Dr. John Lermont, Dr. James Dundas, Mr. Drummond, Mr. Osburn, Mr. Gibson, Mr. Douglas, surgeons. The instruments and dressings as follow:—1. A common scalpel. 2. A pair of crooked scissors. 3. Two needles threaded. 4. Four large needles threaded for the gastroraphia. 5. Scraped lint. 6. A large compress, napkin and scapulary. 7. Ink. 8. A cordial to be given during the operation.

The patient was laid on her back on a table covered with blankets with a pillow below her head. Her body being secured, I seated myself at her right side. I drew a line

with ink about six inches in length parallel to the linea alba, and four inches distant from it, in order to avoid cutting the rectus muscle. I then, with a convex scalpel, made an incision along the black line through the teguments and fat. In the middle of the section I gently cut through the muscles and peritoneum, so as to get in the forefinger of the left hand; upon which, with the crooked scissors I enlarged the wound upwards and downwards equal to the black line I had made on the skin. The epigastric artery was opened, which I immediately stitched. I then cut into the uterus and tore the membranes containing the child, but as the child was large I found the incision in the abdomen too small; I was obliged to enlarge it upwards to the short ribs, and downwards to the os pubis, the uterus in proportion. I then extracted the child without any violence, afterward the placenta and membranes. I put my hand again into the uterus and brought away some coagulated blood. The child was dead, but quite fresh. I reduced a little of the gut that came down, and made the gastroraphia at three stitches without any peg. After the first stitch the gut gave me no more trouble. I covered the wound with moist pledgets, applied a large compress, and over all the napkin and scapulary. The poor woman bore the operation with great courage. After she was put to bed she took a quieting draught with landanum, and a bottle of emulsion for ordinary drink. She did not lose above four or five ounces of blood during the operation. In the night she bled a little, but it stopped before I got to her; she had not slept, but otherwise she was tolerably well. Next day I visited her, and she told me she had had some slumber in the morning. About twelve o'clock she complained of sickness at her stomach with an inclination to vomit; her pulse was then very frequent and small. She gradually grew weaker and weaker, and died about four in the afternoon. There came not away above two teaspoonfuls of blood from the vagina; the uterus was at least one inch and a half thick."

Pliny, in his "Natural History," states that Caesar was so called from being taken by incision out of the womb of his mother, and that such persons were called Caesones. This statement, however, is regarded as extremely doubtful. Tradition ascribes to Numa Pompilius a decree that every pregnant woman who died should be opened, and in 1608 the Senate of Venice decreed heavy penalties for medical practitioners who failed to perform this operation upon women dying in advanced pregnancy, and in 1749 a similar law was made by the King of the Two Siciles. The classical case in literature, of course, is that in Macbeth:—

Macb.—I bear a charmed life, which must not yield
To one of woman born.

Macd.—Despair they charm:
And let the angel whom thou still has served
Tell thee, Macduff was from his mother's womb
Untimely ripped.

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7271

Proceedings of the Waikato Clinical Campus Biannual Research Seminar

Thursday, 6 April 2017

Clinical utility of hypo and hyperpigmentation of skin in diffuse cutaneous systemic sclerosis

Kamal K Solanki,[1,2] Cecil Hor,[3] Winston SJ Chang,[4] Christopher Frampton,[5] Douglas HN White.[1,2]

[1]Rheumatology Department, Waikato Hospital, Hamilton, New Zealand, [2]Waikato Clinical School, University of Auckland, New Zealand, [3]Western Hospital, Melbourne, Australia, [4]Ng Teng Fong Hospital, Jurong, Singapore, [5]University of Otago, Christchurch, New Zealand.

Objectives

Cutaneous involvement is an early manifestation of systemic sclerosis (SSc). Localised areas of "salt and pepper skin" [S&P]) may develop. We hypothesise that S&P skin occurs frequently in dcSSc, which can be used in its early diagnosis and may correlate with joint contractures.

Methods

Sixty-five patients were recruited for this study which was approved by the **Health and Disability Ethics Committee**. The demographic profiles of SSc were ascertained from hospital records. These patients fulfilled the 2013 ACR/EULAR classification criteria. Patients were examined for skin pigmentary changes, mRSS, telengiectasias, calcinosis, arthritis and joint contractures and pruritis.

Findings

Sixty-five patients (59 female) were recruited with median age of 62.87 years. Forty-four had limited cutaneous systemic sclerosis, 16 diffuse cutaneous systemic sclerosis (dcSSc), five had scleroderma overlap syndrome.

Multivariate stepwise logistic regression indicated that mRSS severity and the presence of contractures were independently ($p<0.05$) associated with dcSSc. The strong positive association between S&P and mRSS severity may explain the non-significance of S&P in this analysis. If mRSS severity is not included in the logistic regression analysis, the presence of contractures and S&P (odds ratio=15.1) show significant ($p<0.01$) independent associations with the dcSSc subtype.

S&P skin and pruritis were similar in patients with Scl-70 and anti-RNA polymerase antibodies. Anti-centromere antibodies were negatively associated with the S&P ($X^2=7.89$, $p=0.005$).

Conclusions

Our study demonstrates strong association of S&P skin with dcSSc (69%), increased risk of pruritis and contractures. Its presence can be used as another clinical tool to diagnose dcSSc in early stages. Observing for salt and pepper skin changes does not require much training.

Using pluripotent stem cell-derived organoids for determining the cellular basis of hearing loss

B Forrester-Gauntlett,[1,2] L Peters,[2] B Oback.[1]

[1]AgResearch, Ruakura Research Centre, Hamilton, New Zealand, [2]University of Waikato, School of Science, Hamilton, New Zealand.

Background

Mammalian auditory hair cells are very sensitive to damage from physical trauma, loud noises, infections and pharmaceutical drugs. Damage to the hair cells responsible for hearing is irreversible and will accumulate over time, resulting in age-related or noise-induced hearing loss. Susceptibility to damage and/or an impaired repair mechanism has been linked to genetic factors. One such gene is the grainyhead-like 2 (*GRHL2*) gene. Two family studies have identified mutations within *GRHL2* that cause autosomal dominant non-syndromic sensorineural deafness (DFNA28). In addition, multiple mutations within this gene have been highly significantly associated with progressive hearing loss in genome wide association studies. The exact cellular mechanisms by which the hearing is lost is not yet known.

Objectives

The aim of this study is to elucidate the function of the *GRHL2* gene, define its role in auditory sensory hair cell formation and maintenance, and to determine the cellular basis of DFNA28. This will be achieved by disrupting *GRHL2* in pluripotent mouse embryonic stem cells (ESCs) using clustered regularly interspaced short palindromic repeats-associated enzyme Cas9 (CRISPR/Cas9) technology. These cells will then be induced to differentiate in an organotypic, three dimensional (3D) *in vitro* model system. Thus, this model provides an alternative to studying human hearing loss where progress has been hindered due to the location, accessibility, size and delicate nature of the sensory hair cells within in the temporal bone. Genome editing allows to precisely introduce genetic changes associated with human hearing loss into cells or animals.

Methods

Gene editing of *GRHL2* was carried out using a commercial system, which consists of a pool of CRISPR/Cas9 guide RNAs (gRNAs) and homology-directed repair (HDR) plasmids targeting exons 2 and 3 within the *GRHL2* gene. While gRNAs direct the Cas9 endonuclease to introduce double stranded breaks in genomic DNA, the HDR template mediates insertion of puromycin resistance and fluorescent reporter genes at the target loci. Following transfection, clonal cell strains were established by puromycin and reporter gene selection. End-point PCR was used to identify insertion of the HDR template within the targeted exons. Sequencing was carried out on the targeted exons to determine non-homologous end joining events. qPCR and western blot were used to quantify the abundance of *GRHL2* mRNA and protein, respectively.

Findings

Wild-type and edited ESCs were cultured using an established 3D *in vitro* model system to create inner ear-like organoids (IEOs) containing sensory hair cells. Morphological differences were noted between wild-type and edited IEOs and are presently being characterised further.

Conclusions

In summary, CRISPR/Cas9 is an effective method for editing *GRHL2* in ESCs and the 3D *in vitro* model system is an efficient tool for differentiating ESCs towards an inner ear-like morphology.

A cross-cultural comparison of general hospital specialists' attitudes toward management of psychological/psychiatric problems

Inoka Wimalaratne,[1] Graham Mellsop,[2] David B Menkes.[2]

[1]Waikato District Health Board, Waikato Hospital, Hamilton, New Zealand, [2]University of Auckland, Auckland, New Zealand.

Background

Psychiatric comorbidities are common in physical illness and significantly affect healthcare outcomes. Attitudes of general hospital doctors toward psychiatry are important in this regard; they influence quality of care and are shaped by cultural factors operating at multiple levels relevant to clinical interactions. Few studies have examined these attitudes and factors in the general hospital setting.

Objectives

To identify differences in attitudes toward management of psychological/psychiatric problems among general hospital specialists in relation to practice setting, individual cultural identity and other variables (gender, age, seniority, specialty).

Methods

A cross-sectional study is underway in several countries, including New Zealand, China, Netherlands, Brazil, Russia, Israel and Sri Lanka. Data are being collected by anonymous, self-administered questionnaires to senior medical staff of various disciplines working in general hospital settings (secondary and tertiary level hospitals). A sample of 100 respondents is sought from each country. Descriptive statistics will be recorded for questions and univariate comparisons will be performed using chi-squared or Fisher's exact tests as appropriate.

Findings

Preliminary data are available from China and data collection is underway in other countries. The Chinese sample included 306 respondents, of whom half were males and a majority (59%) aged more than 30 years. Almost all respondents (99%) agreed that psychological factors play an important role in the course of physical illness; 97% thought dealing with patients' emotional problems was part of general hospital doctors' work and 86% agreed that general hospital doctors were responsible for emotional care of patients. However, just over half (52%) held the view that emotional care of patients by general hospital doctors was impractical under current conditions. The great majority (93%) agreed with routine assessment of patients' psychological factors, 94% welcomed more contact with psychiatric services and 99% more help in providing psychological and social care. Respondents' demographic characteristics or vocational status had only minimal influence on their attitudes. Female doctors were more likely to express concern about emotional care and psychological assessment of patients with chronic physical illness, while surgeons tended to confine themselves to physical assessment.

Conclusions

Preliminary results indicate widespread positive attitudes toward management of patients' psychological/psychiatric problems among non-psychiatric doctors in China. However, results also suggest an urgent need for time and access to psychiatric services and professional support for these doctors. When available, data from other countries will enable cross-cultural comparisons and formulation of an agenda to address unmet psychological need in general hospitals.

Sensitivity of staphylococcus strains to Manuka Cyclopower

Julian Ketel,[1] Lynne Chepulis,[1] Ray Cursons,[2] Linda Peters.[2]

[1]Department of Nursing and Health Studies, Toi Ohomai Institute of Technology, Tauranga & Rotorua, New Zealand, [2]Laboratory of Molecular Genetics, University of Waikato, Hamilton, New Zealand.

Background

Staphylococcus aureus can be a significant threat to human life and wellbeing in community and acute healthcare settings and it has developed resistance to antibiotics to the extent that some strains are almost pan-resistant. Therefore, research and development of antimicrobials that can help to prevent *S. aureus* colonisation and/or infection is essential.

Manuka honey is known to be particularly antibacterial, largely due to its methylglyoxal content, and the development of antimicrobial resistance in *S. aureus* to Manuka honey has not been reported. Manuka honey has been complexed with alpha-cyclodextrin to create Manuka Cyclopower™ (MCP), creating a powdered formulation of methylglyoxal active Manuka honey that, for example, could be added

to a cream base for use in the anterior nares.

Methods

A series of experiments were carried out to 1) determine the antibacterial effect of MCP against a strain of MRSA, and 2) to compare it to the source honey. Low levels (5–10% w/v) Manuka honey and MCP were incubated with MRSA for 18 hours.

Findings

When compared to the initial bacterial inoculum, 10% MCP was significantly ($P<0.01$) more bactericidal than the 10% Manuka honey, producing a 99.99% (log_4) reduction, whereas Manuka honey produced an 81.32% (log_2) reduction. Further, MCP displayed a bactericidal action whereas the honey appeared to be more bacteriostatic. Further research should be undertaken with a large number of *S. aureus* strains *in vitro* to assess whether MCP has any potential clinical value.

The efficacy and safety of antenatal glucocorticoids in late gestation (≥37 weeks) in women with diabetes in pregnancy

Carissa Murugesh,[1] Sarah Waymouth,[2] Manjula Ratnaweera,[3] Jade AU Tamatea, [1,3] Louise Wolmarans,[1,3] Ryan G Paul.[3]

[1]Waikato Clinical Campus, University of Auckland, New Zealand, [2]Obstetric Department, Waikato Hospital, Hamilton, New Zealand, [3]Waikato Regional Diabetes Service, New Zealand.

Background

All major international guidelines recommend that antenatal glucocorticoids are administered before 35 weeks gestation to reduce neonatal morbidity and mortality. However, guidelines differ on the use of antenatal glucocorticoids in late gestation (≥37 weeks) due to discrepant data on their efficacy. In particular, it is not known whether antenatal glucocorticoids are effective and/or further increase hypoglycaemia in babies born to mothers with diabetes in pregnancy (DIP).

Objectives

To determine whether antenatal glucocorticoids reduce the rates of admission to the Neonatal Intensive Care Unit (NICU) and/or increase hypoglycaemia in babies born to women with DIP.

Methods

Data was retrospectively collected for 40 women with DIP who were administered antenatal glucocorticoids and delivered ≥37 weeks gestation at Waikato Hospital between 2011 to 2016. For a control group, data was also collected on 103 women with DIP who did not receive antenatal glucocorticoids and were matched for gestation at delivery, mode of delivery, glycaemic control and birth weight of the baby. Neonatal hypoglycaemia was defined as a blood glucose ≤2.5mmol/L within the first 24 hours post-delivery.

Results

Antenatal glucocorticoids did not significantly reduce admissions to NICU (15% versus 27%, P=0.19), or increase rates of neonatal hypoglycaemia (58% versus 42%; P=0.13), when compared with matched controls. Despite not increasing the incidence, antenatal steroids increased the severity of neonatal hypoglycaemia (mean [± S.E.M.] blood glucose 2.40±0.11mmol/L versus 2.65±0.07mmol/L; $P<0.05$).

Conclusions

Antenatal glucocorticoids do not appear to be effective and may increase the severity of neonatal hypoglycaemia when administered in late gestation to women with DIP. Our study suggests that caution is required until randomised control trials prove both the efficacy and safety of antenatal glucocorticoids in late gestation in women with DIP.

Pain and pupillary light reflex parameters under general anaesthesia

S McCabe, A Gaskell, J Sleigh.

Objectives

Many patients experience post-operative pain despite intraoperative analgesia. Pupil size is affected by sympathetic drive and may indicate adequacy of analgesia. This study investigates the relationships between painful stimulation during anaesthesia and pupillary light reflex parameters and whether any of the pupillary light reflex parameters at the end of surgery are predictive of early postoperative pain in the post-anaesthesia care unit.

Methods

Patients scheduled to undergo surgery requiring general anaesthesia were consented. Preoperative pain expectation and anxiety were recorded on an 11-point visual scale. Intraoperative EEG, ECG, pupillometry readings, vital signs and drug administrations were recorded throughout the surgical procedure. Pain and nausea levels and opioid requirements were measured in PACU. Pearson correlation coefficient was used for the analysis.

Results

Patients who received glycopyrolate or atropine intraoperatively (excluding glycopyrolate used in reversing muscle relaxation) were excluded from the analysis.

Expected pain correlated with maximum pain in PACU with each point increase in expected pain correlating with an increase in maximum PACU pain of 0.446 ($p=0.0048$), this explained 16.7% of variation. Preoperative anxiety did not correlate significantly with post-operative pain.

Opioid concentrations correlated significantly with several pupillary light reflex parameters under general anaesthesia, although notably not with pupil size. Contraction percentage increased with increasing opioid concentrations, while constriction and dilation velocities decreased with increasing opioid concentrations.

Pupillary parameters did not consistently change at the time of noxious stimuli (intubation, formation of pneumoperitoneum or incision). The maximum and minimum pupil sizes at the final intraoperative reading correlated

with pain scores 15 minutes after admission to PACU, with each mm of increased diameter corresponding to an increased pain score of 1.32 (p=0.046) and 1.48 (p=0.048) respectively.

Conclusions

Pupillary light reflex parameters did not consistently change with noxious stimulation. There are many potential confounding factors, including the variable intensity of the stimuli, and the possibility of other painful stimuli or medications affecting pupillary reflexes. While absolute pupil sizes at the end of surgery did correlate with pain levels post-operatively they explained less than 10% of variation in reported pain levels at 15 minutes, and are thus in isolation unlikely to be of significant clinical utility in prompting additional analgesia at the end of surgery to reduce postoperative pain

Metastatic behaviour and outcomes of breast cancer subtypes

Melissa Edwards, Rachel Shirley, Jack Treloar, Jenni Scarlett, Ross Lawrenson, Ian Campbell, Marion Kuper-Hommel.

Background

Breast cancer patients that develop distant metastases can exhibit significant variation in the clinical course of the disease, such as the pattern of spread of metastases. This study aims to explore associations between breast cancer subtype and clinical course, including organ-specific metastases.

Methods

This research involves a retrospective observational study of data collected on 361 patients identified using the Waikato Breast Cancer Registry. Patients included were those diagnosed with early stage breast cancer between 2006–2015, who had developed metastatic disease. Tissue arrays and immunohistochemochemical staining for estrogen and progesterone receptors and HER2 were used to divide these breast cancers into the molecular subtypes of Luminal A (ER pos and PR pos, HER2 neg), Luminal B1 (ER+ or PR+, HER2 neg), Luminal B2 (ER pos and/ or PR pos, HER2 pos), HER2 enriched (ER neg & PR neg & HER2pos) and Basal-like (ER neg & PR neg & HER2 neg) for comparison.

Results

A total of 361 patients developed metastatic disease, and were subsequently included in the study. 44.3% of these were aged 50 or under at initial diagnosis, while 55.7% were over 50. 73.4% of patients were of New Zealand European ethnicity, 21.1% were of Māori ethnicity and 2.77% were of Pacific ethnicity. Of these patients, 36.3% had metastatic disease on their first presentation.

The luminal A subtype comprised 38.1% of these patients, while luminal B1 formed 22.4%, luminal B2 formed 7.2%, HER2 enriched formed 18.6%, and the basal-like subtype formed 13.6%.

Bone was the most common site of metastases in all subtypes except basal-like, where it was lung metastases.

In those of the Luminal A subtype that did not have metastatic disease on initial presentation, median time from first presentation to development of metastases was 30.3 months. The median overall survival time of this group after the development of metastases was 21.8 months. In this group, 71.5% of individuals were aged 50 or younger.

In those of the Luminal B1 subtype that did not have metastatic disease on initial presentation, median time from first presentation to development of metastases was 25.4 months. The median overall survival time of this group after the development of metastases was 9.6 months. In this group, 76.5% of individuals were aged older than 50.

In those of the Luminal B2 subtype that did not have metastatic disease on initial presentation, median time from first presentation to development of metastases was 32.7 months. The median overall survival time of this group after the development of metastases was 18.7 months. In this group, only 50% were of New Zealand European ethnicity.

In those of the HER2-enriched subtype that did not have metastatic disease on initial presentation, median time from first presentation to development of metastases was 24.7 months. The median overall survival time of this group after the development of metastases was 13.8 months.

In those of the Basal-like subtype that did not have metastatic disease on initial presentation, median time from first presentation to development of metastases was 22.5 months. The median overall survival time of this group after the development of metastases was 8.8 months. In this group, 87.8% of patients were older than 50.

Conclusion

Multiple aspects of the clinical course of the disease are noticeably influenced by the molecular subtype of breast cancer involved. The molecular subtype status of the tumours offer greater information on likely sites of metastases. The significant variation in overall survival times between subtypes, as well as in the timing of appearance of the first metastases, might also lend themselves to more individualised approaches to monitoring breast cancers and tumours that take subtype into account.

URL:
http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2017/vol-130-no-1456-2-june-2017/7272