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SUMMARIES

The wahakura: a qualitative study of the flax bassinet as a sleep location for New Zealand Māori infants
Sally Abel, Ariana Stockdale-Frost, Rangihaanu Rolls, David Tipene-Leach

The wahakura (flax bassinet) is being promoted as a means to minimise the risk of sudden unexpected death in infancy (SUDI) amongst Māori, especially when bedsharing, by providing a separate infant sleeping surface. This qualitative study interviewed Māori mothers and other key Māori community stakeholders to understand exactly what factors determine the apparent acceptability of the wahakura (flax bassinet). It found the wahakura had practical appeal because it was portable, enabled bedsharing and made breastfeeding easier. It also had considerable cultural and spiritual appeal because of its native flax composition and traditional origin and health professionals found it useful to engage Māori women antenatally. The study affirmed the acceptability of the wahakura in engaging Māori mothers and families in reducing SUDI risk.

Token monetary incentives improve mail survey response rates and participant retention: results from a large randomised prospective study of mid-age New Zealand women
Sara Boucher, Andrew Gray, Sook Ling Leong, Heidi Sharples, Caroline Horwath

The purpose of the study was to investigate the effect of a token $5 incentive on survey response and retention rates over three survey waves in a prospective study of mid-age New Zealand women. In the baseline study, a group of 400 women was randomly selected to receive the token monetary incentive. In the 2-year follow-up study of women who responded at baseline, we compared the effect of including $5 on response rates among 200 women who had received the token monetary incentive at baseline and 200 who had not received $5 with the baseline survey. In the 3-year follow-up survey, again, of women who responded at baseline, all women Māori, Pacific or Asian women received a NZ$5 note with the initial mail-out in order to optimise the response rate from these groups. Additionally, a random group of 300 women of other ethnicities (selected without regard to whether they received a token monetary incentive in an earlier survey) received NZ$5 with the initial questionnaire. In all three surveys, women assigned to receiving a NZ$5 token monetary incentive with the initial mail out were more likely to respond than those who did not receive NZ$5. Among New Zealand European women and other women not belonging to Asian, Māori or Pacific Islander ethnic groups, this effect diminished in the last survey wave. Our findings suggest that public health researchers should consider including token financial incentives with mailed surveys to increase participation, particularly in the baseline survey and the first follow-up survey.

Retrieval rates of inferior vena cava (IVC) filters: are we retrieving enough?
Rebecca Davies, James Stanley, Janaka Wickremesekera, Manar Khashram

Inferior vena cava filters are used when anticoagulation cannot be used for patients with a deep vein thrombosis who are at significant risk of going on to develop a pulmonary embolus. These filters should be removed when they are no longer needed, however internationally retrieval rates of these filters have been suboptimal. We have improved the rate of IVC filter retrieval in our institution by development of an IVC filter pathway. Rates of optional IVC filter retrieval in our experience are now higher than previously published figures.
CT pulmonary angiography and pulmonary embolism following 5809 primary joint arthroplasties
Charlotte Allen, Richard Seinge, Rod Maxwell, Dilraj Thind

Controversy surrounds prevention, detection and clinical relevance of pulmonary embolism (PE) following arthroplasty in orthopaedic patients. In this study we aimed to review the rates of computer tomography pulmonary angiography (CTPA), PE and fatal PE following total joint replacement. The overall PE rate was 112/5809 (1.93%): 38/3473 (1.1%) and 74/2336 (3.5%) following total hip arthroplasty (THA) and total knee arthroplasty (TKA), respectively. Two deaths from PE occurred, both after TKA, a procedural mortality rate of 0.086%; the overall mortality rate was 0.034%. The rate of CTPA requests increased for the initial 7 years as did the rate of PE, in the last 2 years both rates fell.

The measurement of New Zealand health care ((viewpoint article))
Richard Hamblin, Gillian Bohm, Catherine Gerard, Carl Shuker, Janice Wilson, Alan F Merry

The Health Quality and Safety Commission has constructed an architecture of measurement designed to check up on the health of the New Zealand health care system. It is crucial to measure the quality and safety of our health care because ‘we can only be sure to improve what we can actually measure.’ This architecture is comprised of three sets of measures that inter-relate like the pieces in a game of chess. The first set are known as QSIs, or quality and safety indicators, which capture the big picture in areas of concern in our health care, like safety, effectiveness, equity and the patient experience.
Issue conflation leads to dietary confusion

Boyd Swinburn

The recommendations for total fat, saturated fat and sugar in dietary guidelines seemed to be long settled, but suddenly the debate is flaring up again in New Zealand and internationally. Some, like Thornley et al., are arguing that the evidence suggests that major revisions are needed and others, like Jackson and Ni Mhurchu in this issue of the Journal, are arguing for retaining existing recommendations. If everyone is looking at the same set of studies and meta-analyses, why is there so much debate? One of the main reasons for the confusion is a conflation of issues, especially the conflation of dietary issues for weight loss, heart health, and sports performance. Separating these issues should help to show that the current dietary guidelines, while not perfect and immutable, are robust, clear and evidence-based.

Dietary guidelines move incrementally over time and each time they are reviewed, the evidence is extensively examined and analysed. The recent Australian Dietary Guidelines took about 5 years to revise, in part because of the extensive evidence reviews and population dietary modelling undertaken. There has been a move in recent years from nutrient-based recommendations to food-based and dietary pattern-based recommendations and the new Brazilian guidelines, which I believe are now the world’s gold standard, consider environmental sustainability as well. The reason for the shift has been an attempt within nutrition sciences to move away from what has been called ‘nutritionism’ which is a reductive understanding of nutrients as the key indicators of healthy food. People eat food, not nutrients, many different dietary patterns can be considered healthy and populations have food systems which have wide implications for culture, environments and climate change. Despite this move towards the bigger picture of food and dietary patterns, some nutrient-based recommendations and intake targets are still needed, especially for total fat, saturated fat and sugar. So how can we de-conflate the issue to bring a bit of clarity to the debate?

Let’s examine the notion that ‘a calorie is a calorie is a calorie’ (although we should now be talking about kilojoules, not calories). People often argue strongly for or against this notion and, in fact, both are right. For all metabolic processes, except one, the calories from different sources have different effects on the body in terms of lipoprotein metabolism, carbohydrate metabolism, immune modulation, cancer protection, neurotransmitter metabolic processes, except one, the calories from different sources have different effects on the body in terms of lipoprotein metabolism, carbohydrate metabolism, immune modulation, cancer protection, neurotransmitter effects and so on. This is an incredibly complex area which will keep nutrition researchers active for many decades to come. Saturated fat, however, already has several decades of research behind it. Indeed, at the risk of showing my age, I was one of many researchers undertaking detailed lipoprotein metabolism turnover studies in response to highly-controlled dietary manipulations over a quarter of century ago. The rock-solid, central planks of the saturated fat intake to heart disease relationship are that diets high in saturated fat increase LDL-cholesterol and that high LDL-cholesterol is a major risk factor for coronary heart disease. I agree with Jackson and Ni Mhurchu that it is damaging and unfaithful to the evidence to tell patients and populations that they can dismiss the current recommendations to limit their intake of saturated fat (including from coconut oil).

The exception mentioned above is, of course, energy balance. If the issue under discussion is weight control, then (apart from some minor variation around the efficiency of energy absorption) a calorie is a calorie. As the mixture of energy enters the blood stream from the gut as sugars from carbohydrates, fatty acids from fats, amino acids from protein, and alcohol, they are certainly metabolised by different pathways, but at weight maintenance, energy in must equal energy out. Period.

In a newly-released documentary called That Sugar Film, Damon Gameau undergoes a self-experiment of eating the equivalent of 40 teaspoons of sugar a day for 60 days. While he claimed that he was eating the same amount of energy and exercising as the same amount as he was prior to his sugar binge, he gained 8.5 kg. In reality, to achieve this weight gain over this short period of time he would have have eaten more than 1000 extra calories (or 4,200 kJ) a day for 60 days. That Sugar Film is a powerful demonstration of how a high sugar diet and rapid weight gain can create all sorts of metabolic havoc (i.e. a calorie is not a calorie). But Mr Gameau is not that powerful that he can break the first law of thermodynamics (i.e. a calorie is a calorie) – he ate much more energy than he thought he did.

The critics of the dietary guidelines say ‘Look what happened when we followed the low-fat dietary advice – we all got fatter’. This is usually a lead up to a promotion for a low-carb or paleo or Atkin’s or other high fat diet. What actually happened during the rapid rise in obesity over the last 20 years was like a case of Chinese
whispers. A series of well-controlled, covert dietary manipulation studies showed that a diet with a high percentage of fat (and thus low percentage of carbohydrate) is usually energy-dense and, because people tend to eat to a volume of food, the ad-libitum, higher fat diets resulted in more weight gain (or less weight loss) than high carbohydrate diets.\(^7,8\) But ‘reduce the percentage of fat from your diet’ is not a great message and it readily transmuted: when media got hold of it, the ‘percentage’ part was lost and it was often flipped into high carbohydrate diets help to lose weight; when the industry got hold of it, they reformulated – often by removing fat and adding sugar; when the marketers got hold of it, they made a packet out of low-fat diet books and; when the dieters got hold of it, they felt they could eat these low fat (high sugar) products with impunity. It appears that total fat intake of populations did not decrease in response to the low-fat messages and in some countries actually increased, while sugar intakes have generally increased over the decades.\(^9,10\)

So, the translation from the metabolic and epidemiological studies to the reality of population trends of diet and disease is anything but straightforward. This brings us back to diets and what should be recommended. Do diets work or not work? This question is usually asked in terms of weight loss and the unfortunate answer is that almost all diets work (in the short term when compliance is high) and almost all diets don’t work (in the long term when compliance is low).

So if your aim is to lose weight and keep it off, then you will need to find a diet (in other words, a set of eating rules or guidelines) that you can stick to for the next however-many years you want to live. You would be smart to keep it low in sugar to get rid of empty calories and keep it low in saturated fat for your heart’s sake – and the standard, but boring, dietary guidelines suggest just this. You should also make it low in red meat for your planet’s sake, but that is another story.

**Competing interests:** Nil.

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Sudden unexpected death in infancy (SUDI) in New Zealand: discussion over the last 5 years and where to from here?

Suzanne Pitama, Cameron Lacey, Tania Huria

The incidence rates and risk factors of SUDI (inclusive of SIDS) have over the years been explored and discussed within the *New Zealand Medical Journal*. Moreover, the acknowledgement of Māori health disparities within SUDI has been the focus of many articles over the past 5 years.

In 2010, Tipene-Leach, Hutchison, Tangiora, Rea, White, Stewart and Mitchell\(^1\) presented an article on SIDS-related knowledge and infant care practices among Māori mothers. The authors utilised a cohort of Māori mothers in the Counties Manukau District Health Board area (south of Auckland) and through a survey—which had been completed previously in 2005 with largely a NZ European sample—explored SIDS-related knowledge and infant care practices. They found their Māori participants had higher rates of maternal smoking, ceased breastfeeding earlier than the NZ European cohort and were more likely to be a mother who practised bedsharing with her baby. These findings lead them to challenge the then SIDS-health promotion strategy and its relevance to a population highly effected by SIDS. They argued that in order for equitable health outcomes for Māori there needed to be a tailored approach to Māori (and those working with Māori) and recommended the inclusion of Māori medium and messages in future health promotion and health education material.

Baker and Uggs in 2011\(^2\) discussed in an editorial the use of SUDI as “an umbrella term used to describe a heterogeneous group of infants under age one who die without warning signs or distress sufficient to alert parents and caregivers” (pg 9). They advocated that in order to reduce SUDI incidents more health information was needed to be delivered within the antenatal environment. The authors pointed out their concern over perceived low health literacy levels in Māori families and those of low socioeconomic families. They specifically identified that health messages needed to account for the multiple stressors that Māori families were more likely to be exposed to. They also noted that “simple provision of information is a poor mechanism for change; efforts are needed to support engagement with innovative and culturally appropriate behaviour modification approaches as well as addressing the determinants of deprivation” (pg 11).

In 2012, Mitchell and Blair\(^3\) in their viewpoint article discussed their concerns about how SIDs prevention could be better in New Zealand, noting New Zealand’s extremely high rates of SIDS compared to other developed countries. They identified the design and development of flax-woven *wahakura* (‘waha’ to carry, ‘kura’ precious little object) and ‘pēpi-pods’ (a plastic wahakura) that were being utilised in response to provide safe sleeping spaces for babies. However, noted that no research had been undertaken to determine whether such devices assisted in the reduction of deaths.

Later, in 2013 Able and Tipene-Leach\(^4\) in a further viewpoint article documented the development of the wahakura, discussing its emergence in 2006 in Gisborne, and described that it usually was 72×34cm and woven from *harakeke* (flax). It was given to mothers with a thick mattress and a set of rules that outlined SUDI health promotion guidelines. The wahakura had emerged from Māori health workers in the field of SUDI who wanted Māori parents to keep babies safe when bedsharing, in a way that aligned with cultural beliefs and values. They highlighted a project evaluation which was able to map the future pathway for wahakura and how they could be sustained within future practice. This resulted in two pathways, firstly a study where participants were randomised to either a wahakura or bassinet and then the safety and benefits of each was explored (yet to be published). Secondly the use of a cheaper alternative developed by Nicola McDonald, the pēpi-pod was described. They concluded that with the use of wahakura and/or pēpi-pods a counter-narrative emerged, that
bedsharing was acceptable when the baby had their own safe sleeping space that was defined by the wahakura/pēpi-pod.

In 2015, Elder provided an editorial on the need to continue to improve New Zealand’s response to SUDI. Elder reiterated recommendations of how to reduce risk of SUDI, and identified that traditional bedsharing practice was usually in loci of a low sleep surface (often the ground or on mattresses) and with each individual having their own bed covering, which was in contrast to contemporary bedsharing environments. Elder did not identify how this might be navigated today within a health promotion or health education forum.

Elder’s editorial introduced the article from Hutchison, Thompson and Mitchell that reported on infant care practices related to SUDI from a 2013 survey. This survey randomly selected 400 women who had infants between 6 weeks and 4 months old, in Auckland to participate in a postal questionnaire, of which they compared their findings to a similar survey conducted in 2005.

Hutchinson, Thompson and Mitchell (2015) documented that there was an overall increase in maternal knowledge of SUDI risk factors between the two cohorts, in that mothers were less likely to position their infants in the supine position and room share, there was also a decrease in smoking and bedsharing. They concluded that an increase in maternal knowledge may be the reason for falling rates of SUDI. It was interesting to note in Hutchison et al (2015) article that only 13 (out of 172) respondents identified as Māori, and that their findings reflected mainly a NZ European sample and was not representative of the overall New Zealand population, and was not able to discuss specific issues for Māori SUDI rates.

As outlined, previous articles have reiterated the known risk factors of SUDI, the growing trend of the reduction of SUDI incidents within non-Māori communities and the need for more tailored health promotion and health education for Māori. The articles have identified the need for increased Māori whanau (extended family) awareness of SUDI, and the development of appropriate SUDI interventions that are deemed ‘acceptable’ by Māori whanau, hapu and iwi (tribal entities). It is this concept of exploring an ‘acceptable’ SUDI intervention that is presented within this edition of the New Zealand Medical Journal.

Abel, Stockdale-Frost, Rolls and Tipene-Leach document their ongoing work in the field of SUDI prevention within Māori communities. They utilise qualitative methods to explore experiences of Māori mothers who have utilised the wahakura and community stakeholders who had a working knowledge of the wahakura production or use. Their article provides clear evidence on the acceptability of this SUDI intervention which has ‘cultural currency.’ This article provides a template for the role of medical science in supporting community driven Māori health initiatives.

The partnership between the researchers and the community to utilise research methods to document evidence-based practice within Māori health is an exemplar for health research. In that, it has taken an area of health inequity, implemented a culturally relevant intervention, measured the intervention and applied it to ‘usual’ clinical practice. It stands as a model that Māori health inequities should drive research agendas and that when done well have the ability to change health outcomes (including acceptability).

The culturally-significant and appropriate wahakura is a health intervention example that should encourage health researchers and practitioners to work in partnership to develop evidenced-based interventions that address Māori health inequities.
Competing interests: Nil.

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References


The wahakura: a qualitative study of the flax bassinet as a sleep location for New Zealand Māori infants
Sally Abel, Ariana Stockdale-Frost, Rangihaanu Rolls, David Tipene-Leach

Abstract

Aims The wahakura (flax bassinet) is presently being distributed as a safe infant sleeping device amongst New Zealand Māori, where sudden unexpected deaths in infancy (SUDI) rates are high. It is promoted as mitigating bedsharing risk by providing a separate infant sleeping surface. This study aimed to understand exactly what factors determine the apparent acceptability of the wahakura as an infant sleeping device to Māori mothers and other key Māori community stakeholders.

Methods The qualitative study used face-to-face, semi-structured interviews, following Māori cultural protocols, to explore the experiences and views of 12 Māori mothers and 10 key informants who had wahakura experience. We employed purposeful sampling of participants and thematic analysis of data.

Results The practical appeal of the wahakura related to its portability, the enabling of bedsharing and easier breastfeeding. Considerable cultural and spiritual appeal was related to its native flax composition and traditional origin. Health professionals found it useful to engage Māori women antenatally.

Conclusions The study affirmed the acceptance of the wahakura as a culturally initiated endeavour, meaningfully engaging Māori mothers and families in SUDI risk mitigation. It has the potential to capitalise on the benefits of bedsharing to enhance infant wellbeing while also safeguarding them from harm.

The wahakura, a simple woven flax bassinet-like structure capable of being used in the parental bed, is an innovative contributor to strategies aimed at reducing sudden unexpected death in infancy (SUDI) in the Māori community, where 62% of such deaths in New Zealand occur. This is a rate 4–5 times that of non-Māori, non-Pacific infants.¹

The wahakura enables a separate sleeping surface in the bedsharing environment² potentially reducing the 43% of SUDI occurring during bedsharing.³ It is promoted in conjunction with a set of simple ‘safe sleeping rules’ that are based on New Zealand Ministry of Health recommendations.³

The promotion of the back sleeping position saw dramatic reductions in infant mortality in Western nations throughout the 1990s. These reductions, however, disguised widening social and ethnic disparities, particularly amongst indigenous populations, as mortality became more prevalent in families where poverty, poor education, young and single motherhood and maternal smoking in pregnancy are prevalent.⁴,⁵

In New Zealand, bedsharing Māori infants whose mothers smoked in pregnancy are most at risk.⁶,⁷ Strong anti-bedsharing messages promulgated by health professionals and coroners⁸ have been less than effective amongst many Māori families, arguably because bedsharing is both a valued cultural practice and a pragmatic response in a resource-poor and relatively mobile population.⁹ Similarly, smoking is prevalent in deprived communities and decreasing smoking amongst pregnant Māori women has been extremely difficult to effect.¹⁰

The wahakura (Figure 1), a modern day reclamation of the traditional pōrakaraka,¹¹ has been promoted and distributed in Māori communities around New Zealand through a number of health providers since 2007.¹² Whilst it has been assigned “face validity” as a safe sleep device,¹³ a 3-year randomised control trial using a standard bassinet as the control¹⁴ is now underway to systematically
assess its safety. This study, the Kahungunu Infant Safe Sleep (KISS) study, has recruited 200 mainly Māori mothers from Hawke’s Bay midwifery practices that provide maternity care in deprived areas and will report shortly on its findings.

If the wahakura is deemed safe and is more widely promoted, it will be useful to understand exactly what factors determine its acceptability to Māori mothers and other key Māori community stakeholders. The qualitative study reported on here aimed to do this by exploring mothers’ and key informants’ experiences and views of the wahakura as a sleep location for Māori infants.

Figure 1. Wahakura (Photo credit: Kath Allen)

Methods

This exploratory qualitative study was undertaken in Hawke’s Bay and Tairāwhiti using face-to-face, semi-structured interviews. In keeping with Māori-focussed research it was designed and conducted by, with and for Māori and sought positive and improved outcomes for participants and their wider communities. Māori tikanga (custom) was observed throughout, particularly during the conduct of interviews and feedback of findings. The study reference group was the Rongoā Rōpu a traditional Māori medicine group coordinated by the tribal authority Ngāti Kahungunu Iwi Incorporated. Ethics approval was received from the New Zealand Health & Disability Multi-Region Ethics Committee in May 2012.

The 22 study participants comprised 12 mothers recruited from the KISS study and 10 key informants who had been involved with wahakura production or with families using them. Inclusion criteria for mothers were that they: had been randomly assigned a wahakura; were mothers of Māori infants; had completed the KISS study; and had consented to involvement in further research. We liaised with the KISS study research nurse to identify all participants who met our criteria.

Twenty-five women were eligible at our recruitment time. Although this group was relatively homogenous, we used a form of maximum variation sampling to obtain a mix of first-time and experienced mothers and a spread of mothers’ ages, at least half to be smokers. We determined that 12 women would be sufficient to reach saturation, the number after which no new information would emerge. We attempted to contact 19 of the 25 mothers before we had successfully recruited the required 12. The contact details for five were out of date, one had moved and another agreed to participate then declined without a reason.

Key informant participants from Hawke’s Bay and Tairāwhiti were selected purposefully for their knowledge and expertise about various aspects of wahakura production or use. They were identified through our research team’s networks and invited to participate. All those approached agreed.
Interviews occurred between September 2012 and March 2013. Mothers were interviewed at home by the second author, an experienced Māori interviewer. The other authors shared the key informant interviews which took place at home or work. All interviews but two were conducted in English interspersed with te reo Māori, as is now common. Two elders were interviewed completely in te reo Māori. All interviews were audio-recorded with permission.

Mothers were asked about their general impressions of the wahakura, how they used it, whether and how it assisted breastfeeding and (where relevant) how using a wahakura differed from not using one with previous children. Key informants’ questions varied according to their expertise but included their general impressions of the wahakura as an infant sleep location, their knowledge of historical precursors of the wahakura (if relevant), what feedback they had had from whānau (extended family) about it, their observations of how it is used and their views about the wahakura and safe sleep messages.

Interview audio-recordings were transcribed by research team members and translated where necessary by the interviewer. The data were analysed using thematic analysis.

17 Coding was undertaken by the interviewer and at least one other research team member. The two Māori language key informant interviews were coded and categorised in the original language with salient portions translated for further team discussion. All research team members contributed to an agreed interpretation of the entire dataset. Preliminary findings were presented to our reference group, the Rongoā Rōpu, for their comment on cultural interpretation in February 2013 and their feedback was incorporated into the analysis of findings.

**Results**

As anticipated, 12 mother participants was a sufficient number for data saturation. All 12 identified as Māori. Four (aged 19–25 years) were first-time mothers and eight (aged 19–39 years) had other children. Infants ranged in age from 8 to 14 months at the time of the interview. Four mothers were solo parenting.

Six had smoked throughout their pregnancy. All mothers had used their assigned wahakura and use ranged from 1 to 11 months, with most using for 3 to 6 months. Almost all discontinued because their infant outgrew it. Within the themes identified there were no obvious differences between the talk of those living with the baby’s father and those not, or between smokers and non-smokers. More experienced mothers (M2), however, tended to talk longer and were more descriptive in their responses than young first time mothers (M1).

Amongst the 10 key informants there were five health workers providing care to wahakura users, four weavers and four community members/elders involved in some way with wahakura use in Māori communities. Three had expertise in two of these areas. All but one was Māori.

In addition to stories about historical precursors (to be reported elsewhere), three main themes emerged about the wahakura from the interviews: its practical value; its cultural and spiritual value; and its value as an infant health promotion tool. Verbatim quotes are used to illustrate the points made.

**The wahakura’s practical value**—The modern day wahakura was valued for the many practical advantages it provided. Families found they used them very flexibly, in a variety of places and ways, adapting them to their household routines and needs at the time. But its portability was by far the most commonly mentioned practical attribute. Compared to a bassinet, the wahakura was light, could be easily carried anywhere and utilised within and outside the house. It could be easily packed into a car and taken to a range of places, including the marae (traditional meeting place) and the homes of whānau.

> It was convenient, easy access to carry around and he [baby] loved it... I took him to my grandmother’s and she would look after him. It was easy for her being an elderly lady to pick it up, cart it around. (M2-5)

Another highly valued aspect was that it provided reassurance and confidence for those wanting to bedshare. It appeared to enable the benefits of infant closeness without worry about the prevailing
message not to bedshare. The proximity meant the infant could be easily checked, and although one mother found the wahakura sides somewhat “floppy”, most felt reassured by the demarcation they provided.

So I did feel safe... there was a guard between me and him when we were sleeping on the bed together. So it was reassuring in that way. (M2-1)

Several participants mentioned that having the infant close enhanced breastfeeding as it meant the mother did not have to get out of bed at night to feed and could easily settle the infant between feeds. This also improved sleep quality.

She’s almost 1. All my other kids I only breastfed for about 4 or 5 months because I couldn’t handle it. Well I was getting up every 3 to 4 hours, going back and forth from the cot and putting them back in. It just made me tired... I got more sleep with that wahakura. (M2-3)

Several key informants liked that the wahakura became the infant’s usual sleeping space, regardless of caregiver or location. They felt it created a protected space within busy homes and provided a consistent sleeping space for infants with several caregivers or those in transient families.

A lot of our babies and mums are transient. They move from house to house, from home to home... So I try to say especially to the younger ones “if you get used to using this wahakura right from the beginning then its use will become normal to you and to others”. (Health professional, KI-06)

Some minor criticisms did arise. These included some wahakura being too small for a 3-month-old baby, others taking up too much bed space, worries about loose strands of flax and the aforementioned “floppy” sides.

The wahakura’s cultural and spiritual value—The cultural value of the wahakura was a strong theme in both the mother and key informant interviews. Some mothers liked that the wahakura was “natural”, seemed “healthy” and had a “Māori look”.

Other mothers and most key informants saw deeper cultural attributes. Being made from harakeke (native flax), the essential material for the important cultural art form of raranga (weaving), the wahakura was a specifically Māori item and “part of our culture”.

Because it’s a flax Māori feel, you know, so they feel right from the start that it’s part of them that it’s a part of their whānau. So they’re really proud when they say that they have a wahakura. (Health professional, KI-05)

Older key informants considered harakeke and therefore the wahakura to have tapu (sacred) and rongoā (healing) qualities which enhanced infant wellbeing at all levels. The harakeke was perceived to emanate “warmth” that the baby was nurtured by. They referred to the wahakura as a “living thing”, meaning that it had an innate vitality and spiritual value.

It’s something Māori. Most of the mothers now know that the harakeke is a healing plant and that also helps. (Weaver, KI-02)

The wahakura was considered not just a sleeping space but a taonga (treasure) of significance to the whānau, “something your own blood, your baby, has slept in.” For some it also provided a link with their tīpuna (ancestors).

This is what they had back in the day... Far out, I’m living my whānau history. (M2-3)

Key informants who worked with pregnant women to make their own wahakura considered it a vehicle for young Māori mothers alienated from their culture and tribal roots to reconnect with ‘being Māori’. Working with the flax, often for the first time, facilitated a sense of ‘doing something Māori’.

The wahakura as a vehicle for infant health promotion—Health professional key informants found the wahakura a useful vessel for effectively imparting safe sleep messages. Because it was considered
a Māori item, they found it facilitated engagement with the young Māori mothers and enabled a culturally conducive atmosphere to discuss important safety messages.

It made it a lot easier to have those conversations about smoking in pregnancy. Because where they had formerly been switching off and rolling their eyeballs or heading to the door, once you place a wahakura in the room there was a positive focus. They wanted to touch it, wanted to know about it, wanted to know if they could have one for their whānau. Immediately the wairua (spirit) of the relationship changed to a positive, open, receptive dialogue. (Health professional, KI-07)

Health professionals assisting pregnant women to make their own wahakura found this particularly effective for imparting safe sleep messages. The time spent making the item meant they were a captive and receptive audience and examples were cited where mothers gave up smoking during this process. This was largely achieved because it was seamlessly integrated with ‘doing’ and talking about ‘being Māori’.

I’ve always believed that the wahakura is an opportunity to introduce not only safe sleeping but also to introduce a cultural content into the antenatal care. It allows the women to talk about being Māori, to talk about their whānau. (Health professional, KI-06)

Discussion

Participants found the wahakura acceptable because of its practical and cultural/spiritual value and health professionals valued its ability to engage Māori mothers. Its portability, versatility, convenience and the sense of security it provided both inside and outside the home, along with its support for breastfeeding, were highly valued practical attributes.

New Zealand users of the Pēpi-pod®, another well regarded portable ‘safe sleep device’, valued these same practical attributes of their device. Similarly, low socioeconomic African American families in Oregon USA who were provided with small, portable and transportable cribs enthusiastically adopted them, valuing their portability and flexibility.

Using such devices in the parental bed appears to give mothers the purported advantages of bedsharing, particularly ease of breastfeeding, bonding closeness and better maternal sleep, without the guilt aroused by prevalent anti-bedsharing messages.

Debates in the literature about the merits and risks of infant bedsharing highlight, on the one hand, the above mentioned benefits and, on the other hand, the increased risk of SUDI amongst vulnerable infants. Ball and Volpe pose this as a conflict between two important public health agendas: bedsharing ‘promoting wellbeing’ and not bedsharing ‘safeguarding from harm’. Where risk to the infant is high it is particularly important to work skilfully with these conflicting agendas.

Most SIDS prevention campaigns in western nations have, however, tended to give universal warnings against parents sleeping with their infants, with scant acknowledgement of the benefits of the practice, the culturally embedded nature of bedsharing amongst some populations or the social and cultural diversity of populations they are trying to reach.

Infant sleeping practices are both a biological and cultural phenomenon and changing these in the interest of infant safety requires considerable care, involving a “nuanced approach” that is culturally meaningful and appealing. There is increasing evidence that effective health promotion strategies for indigenous and other ethnic minorities need to be developed, tailored and ‘owned’ by those they are intended to benefit. They need to engage with the deeper cultural, social and economic influences on behaviour, replacing a deficit model depicting indigenous peoples as the ‘problem’, with one that builds on the strengths of indigenous knowledge and practice.

Recreating a traditional practice and employing a valued traditional art form appear central to the wahakura’s acceptability and its cultural and spiritual value. Participants liked that it was woven from...
flax and had a “Māori look”. It was also considered an avenue of cultural reclamation given the tradition of sleeping infants in flax bassinet-like items has been largely invisible in recent decades.

*Raranga*, the weaving of flax items, is a highly valued traditional art form that has survived colonisation and has taken on iconic value. The act of weaving *harakeke* is imbued with spiritual and sacred values as a cultural practice.\(^{27}\) That the *wahakura* draws and builds on a valued past tradition appears to make it a useful health promoting item and there is potential to further develop this function.

This ascription of cultural and spiritual value was not evident in talk about the aforementioned New Zealand Pepli-pod® or Oregon crib. On the other hand, Native American modern day users of traditional Native American cradleboards, firm surfaces to which infants were secured for carrying and sleeping, talked about the cultural and spiritual value of these indigenous items and felt they reconnected them to “the ways of our mothers and grandmothers.”\(^{28}\) Reclamation of traditional knowledge and practices associated with the cradleboard was used by a Washington State SIDS prevention intervention, which successfully engaged Native mothers in learning about traditional infant care wisdom and practice as a vehicle for SIDS prevention message dissemination.\(^{29}\)

A limitation of this study was that our mother participants did not include any who had chosen not to use their assigned *wahakura* or who had used it for less than a month. These mothers may have been more critical. Also mothers were selected from a regional group with similar demographic profiles, possibly contributing to the consistency in their talk, and a similar study elsewhere may be useful.

Finally, key informants chosen were by necessity involved in some way with the wahakura and therefore were possibly less critical.

In conclusion, provided they are deemed safe, portable infant sleeping devices have the potential to capitalise on the benefits of bedsharing to enhance infant wellbeing while also safeguarding them from harm. The *wahakura* and the Native American cradleboard are two such devices that have the added value of cultural currency. Utilising and adapting indigenous infant sleeping methods in this manner may also be possible in other indigenous and marginalised communities with high SUDI rates, for example the coolamon (a traditional wooden sleeping space) amongst Aboriginal Australians.

In addition to better managing the tension between promoting ‘wellbeing’ and ‘safeguarding’ from harm in regard to bedsharing, these initiatives represent a shift in health promotional thinking from an ‘indigenous as problematic’ to an ‘indigenous as solution building’ paradigm.

**Competing interests:** Nil.

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References


Token monetary incentives improve mail survey response rates and participant retention: results from a large randomised prospective study of mid-age New Zealand women

Sara Boucher, Andrew Gray, Sook Ling Leong, Heidi Sharples, Caroline Horwath

Abstract

Aim To examine if a small token monetary incentive (NZ$5) increases mail survey response rates and participant retention of 40–50 year old New Zealand women.

Method In 2009, 2500 women were randomly selected from the New Zealand electoral rolls for a prospective study investigating factors related to the prevention of weight gain. At baseline, 400 women were randomly assigned to receive NZ$5 with the initial survey mail-out in addition to nonmonetary gifts to encourage participation (pen, tea bag, entry in lottery draw) received by all women. At 2 years, 400 women (200 received NZ$5 at baseline and 200 had not) were randomly assigned to receive the same token monetary incentive. At 3 years, all women identifying as an ethnic minority (n=234) and 300 randomly selected women of other ethnicities received the token monetary incentive with the initial mail out.

Results The baseline response rate for women who received NZ$5 was significantly higher than for women who did not (76% vs 64%, p<0.001). At 2 years, retention rate for all women who received NZ$5 was significantly higher than for women who did not (88% vs 80%, p<0.001). At 3 years, among those women not identifying as an ethnic minority, the retention rate for those who received NZ$5 was significantly higher than for those who did not (84% vs 77%, p=0.014).

Conclusion Inclusion of a small token monetary incentive significantly increases mail survey response rates and participant retention in mid-age New Zealand women.

Postal surveys are an economical way to collect health-related data from individuals who are spread out geographically. High response rates are desirable in order for survey results to be generalisable to the target population. Furthermore, high response rates in cross-sectional studies reduce potential biases in study results as well as increase statistical power. Longitudinal studies benefit from high recruitment and subsequent retention rates for the same reasons.

Response rates to postal surveys can be maximised by adhering to certain procedures, such as those described in Dillman’s Tailored Design Method. A substantial body of research demonstrates that inclusion of a “token” monetary incentive is also effective in increasing response rates in cross-sectional postal surveys. This is partially explained by social exchange theory, which suggests that interactions between individuals generate obligations.

Therefore, a small monetary gift sent in advance of receiving a completed questionnaire invokes a sense of reciprocity, increasing the likelihood of survey response. This token financial incentive is distinguishable from an economic exchange where the participant is paid for time spent completing the questionnaire. An economic exchange, often sent to the participant after the completed questionnaire is received, is less likely to improve response rates because participants tend to consider whether the financial incentive is worth the effort to complete the questionnaire.

Research suggests token monetary incentives are associated with an increase in response rates; and, as the value of the incentive increases so does the response rate. Internationally, a wide range of...
monetary incentive values from NZ$0.50 to US$50 (NZ$61, approximately) have been included with mail surveys of the general population. Yet, it may not always be financially feasible within study budgets to include a large monetary incentive for each participant. However, token incentives may still result in larger sample sizes.

A 2005 meta-analysis by Edwards, Cooper, Roberts and Frost found that for incentives above US$0.50 the effects on response rates were statistically significant up to US$5. Similarly, a $5 incentive resulted in a higher response rate than a $2 incentive (74.3% vs 67.4%, p<0.033) in a postal survey of 1800 health care plan enrolees’ digestive health status. Likewise, in New Zealand, Brennan found that token monetary incentives (as small as 50 cent or $1 coins) were effective at achieving response rates above 60%.

Internationally, longitudinal surveys have experienced varying rates of attrition. For instance, over the course of five study waves in the European Community Household Panel, the retention rate ranged from 57% in Ireland to 82% in Portugal. Retaining participants in the sample of a longitudinal study is crucial for examining potential causal relationships between variables and outcomes.

Despite an abundance of research on the use of token monetary gifts with cross-sectional surveys, few studies have investigated retention strategies in population-based longitudinal studies. A systematic review investigating the effectiveness of retention strategies in prospective population-based cohort studies found incentives were associated with an increase in retention rates, which improved with higher values (up to $100). However, the influence of incentives on response rates across the sample varied by age, education, and socioeconomic status despite receiving the same monetary incentive.

In longitudinal studies, the effectiveness of token monetary incentives in establishing sufficiently high baseline response rates and subsequent retention rates among mail survey participants is unclear, particularly in a New Zealand context. Furthermore, there is a dearth of research on the effectiveness of token monetary incentives on the retention of hard to reach populations (e.g. specific ethnic and socioeconomic groups).

Therefore, the purpose of the present study was to investigate the effect of a token $5 incentive on survey response and retention rates in a large prospective study of factors associated with the prevention of weight gain among mid-age New Zealand women (aged 40–50 at baseline and 43–53 at the most recent follow-up).

We hypothesized that women randomly assigned to receive a token monetary incentive (NZ$5) with the initial survey mail-out in addition to the small gifts to encourage participation (pen, tea bag, entry in lottery draw) received by all women would have an appreciably higher response rate than women who only received small gifts with their questionnaire.

Methods

The University of Otago Human Ethics Committee approved all aspects of the study. Additionally, the research proposal was approved by Ngāi Tahu Research Consultation Committee, an academic committee set up to ensure that research involving Māori people is consistent with the needs and aspirations of the Ngāi Tahu iwi (South Island Māori).

Questionnaires—Each of the baseline, 2-year and 3-year follow-up surveys included a mailed questionnaire examining factors potentially influencing eating behaviour and weight along with self-reported anthropometry and demographics. The questionnaires comprised 21, 8, and 13 pages of questions, respectively, and were estimated to take up to 40 minutes to complete. Prior to each survey, the questionnaire was pretested to improve the layout, appearance, instructions, clarity, and ease of completion among a sample of 30–40 Dunedin, New Zealand women in the target age group (for example, 40–50 years of age for pre-testing the baseline study).
Participants—Eligible respondents were women between the ages of 40–50 at baseline who were able to read and understand English. The cohort was recruited in 2009 from a nationwide sample of New Zealand women aged 40–50 years randomly selected from the general electoral rolls and the Māori electoral rolls.

The New Zealand electoral rolls contain up-to-date mailing details from approximately 97% of the estimated eligible population of people aged 40–49 living in New Zealand. While the electoral rolls do not indicate the sex of voters, provided titles and a database of female names were used to identify the sampling frame. Respondents were excluded if they stated that they were male, pregnant, or breastfeeding at the time of the survey, or if there was reason to question the validity of their responses (e.g. geometric patterns in responses).

Design and procedures for baseline and follow-up surveys—All survey procedures were based on a modification of Dillman’s tailored design method. Potential participants were not sent a preliminary letter about the study; the first contact was when they were mailed a questionnaire with a personally addressed and signed cover letter.

This letter informed participants they would be entered into a lottery draw if their completed questionnaire was returned within the first 2 weeks of the initial mailing. The initial package also included a list of frequently asked questions (for example, how the participant was selected and how she could opt out of the study), and a postage-paid return envelope.

A thank you/reminder postcard was sent to all women approximately 1 week after the first mailing, followed by a replacement questionnaire and a postage-paid return envelope to non-respondents approximately 3 weeks after the first mailing. A final reminder postcard was sent to non-respondents approximately 4 weeks after the first mailing. No alternative modalities were used to contact the women.

Women who participated in the baseline survey and consented to participate in the longitudinal study were contacted for 2-year and 3-year follow-up surveys that followed similar procedures. Participants in all surveys were informed in the cover letter that by completing and returning the questionnaire, this would be taken as their consent to take part in the study.

To formally withdraw from the study potential participants were instructed in the cover letter to return the questionnaire without answering questions in the supplied envelope. These women were then deleted from the database of participant contact information.

Token monetary and nonmonetary incentives—In 2009, a pilot survey was conducted among 100 women aged 40–50 years randomly selected from the New Zealand electoral rolls (including Māori rolls). The pilot study, which included a complimentary pen with the initial mail out, resulted in a 56% response rate. The survey design for the baseline and subsequent surveys was refined to include additional incentives in order to improve the response and retention rates for baseline and follow-up surveys. Therefore, an individually wrapped teabag and a complimentary pen were included in the initial mail-out.

Inclusion of the pen and teabag had the added benefit of making the package bulkier, drawing special attention to its content and reducing the likelihood that the package would be ignored or discarded. Furthermore, all women who returned a completed questionnaire within the first 2 weeks of the initial mailing were entered into a draw to win one of three NZ$200 cash prizes or 10 NZ$100 cash prizes. Women who returned a completed questionnaire in response to the second mailing were entered into a draw to win one of four NZ$100 cash prizes.

To test the effects of a token monetary incentive on response and retention rates in a New Zealand setting and to maximise the response and retention rates for the study within the constraints of the survey budget, a random sub-sample of women received with the initial mail-out a token NZ$5 incentive in addition to the lottery draws, teabag and pen.

In the baseline study, a sub-sample of 400 women was randomly selected to receive the token monetary incentive. In the 2-year follow-up study of women who responded at baseline, we compared the effect of including $5 on response rates among 200 women who had received the token monetary incentive at baseline and 200 who had not received $5 with the baseline survey.

In the 3-year follow-up survey, again, of women who responded at baseline, all women (n=234) identifying as being of Māori, Pacific or Asian ethnicity received a NZ$5 note with the initial mail-out in order to optimise the response rate and minimise response bias due to lower than representative participation from these groups.
Additionally, a random sub-sample of 300 women of other ethnicities (selected without regard to whether they received a token monetary incentive in an earlier survey) received NZS5 with the initial questionnaire. As the effect of the token monetary incentive was confounded with ethnicity in the 3-year follow-up survey, only women from non-minority ethnicities were included in the analysis of this wave of the study. Figure 1 provides a flowchart showing the study design.

Figure 1. Participants recruited and retained for a mail survey in New Zealand
The baseline study had 80% power to detect an improvement in response rate of 8% between the teabag, pen and lottery only group (n=2100) and the teabag, pen and lottery plus NZ$5 group (n=400). At 2 years, 400 women were randomly assigned to the lottery plus NZ$5 group, providing approximately equivalent power for this wave.

Formal statistical power calculations were not performed for the 3-year survey where giving the token incentive to all women who self-identified as being part of an ethnic minority group, along with a sample from women self-identifying as other ethnicities, was used to try to maximise the representativeness of respondents in that wave, with the total number receiving the incentive (n=534) being slightly larger than earlier waves. A more complete description of methods and results from the study have been reported elsewhere.17-19

Statistical analysis—The overall response rate for each survey was calculated as the percentage of returned questionnaires with analysable data of all eligible potential participants. Returned questionnaires not considered analysable (due to nonsensical responses) were not included in the numerator when calculating this rate but remained in the denominator, and responses from participants who were not eligible for inclusion (for example, women who were pregnant) were excluded from both the numerator and denominator.

Differences between incentive groups in responding to the initial and follow-up questionnaires were examined using logistic regression, both before and after adjusting for other potential effects on response rates. Interactions were used to explore any effect modification of the token monetary incentive by ethnicity (Māori descent for the baseline survey or self-reported ethnicity for follow-up surveys), socioeconomic status (NZ Deprivation Index20 for baseline and New Zealand Socioeconomic Index21 for follow-up), and education (follow-up only).

Multiple ethnicities could be provided by participants, and ethnicity was prioritized in the following order: Māori, Pacific, Asian, Other, and European. Ethnicity was collapsed to three levels (Māori, New Zealand European, and Asian, Pacific Islander and Other ethnicity) to test the interaction between the token monetary incentive and ethnicity because there were not enough participants in the five categories for analysis.

Analyses at baseline and 2-year follow-up are also shown stratified into Māori and non-Māori. For the 3-year follow-up survey mailing, the effect of the token monetary incentive on retention rates was only analysed for women who self-identified themselves as an ethnicity other than Māori, Asian, or Pacific Islander. All statistical tests were two-sided and significance was determined by p<0.05. All analyses were performed using Stata 11.2.22

Results

Response rate—In the baseline study, 47 questionnaires were undeliverable and 29 were excluded from analysis because they did not meet inclusion criteria (not in the age range, male, pregnant, or breastfeeding), there was reason to doubt the reliability of the answers (geometric patterns were made by circling answers, the respondent simultaneously answered opposite ends of a scale, the questionnaire was answered on behalf of someone else, or the respondent indicated a poor understanding of English) or the potential respondent was deceased. One respondent was excluded from analysis because it was impossible to determine whether or not she was assigned to the monetary incentive group after the identification number had been removed from the questionnaire prior to its return.

Therefore, 1597 of 1627 returned questionnaires were available for analysis. The final response rate for those where their incentive status was known was 66% (1597/(2500-47-29-1)). A summary of the baseline survey results was sent to the 1,435 respondents who consented to participate in the longitudinal study. As a result of this mailing, 16 women were withdrawn from the study (14 non-deliveries and 2 declined to participate).

At the 2-year follow-up survey, 36 questionnaires were undeliverable and four women were deceased. Five women did not meet inclusion criteria because they were pregnant. One respondent was excluded from survey analysis because she indicated that she had been drinking alcohol while completing the questionnaire and thus there was reason to doubt the validity of her answers. Therefore, the retention
rate for the 2-year follow-up survey was 82% \((1125/(1419-36-4-6))\). Prior to the 3-year follow-up survey, all women from the original cohort who had been retained in the study were mailed a summary of the 2-year survey results. Following the summary mailing, 21 women were withdrawn from the study (19 non-deliveries and two declined to participate).

In the 3-year follow-up survey, there were 26 non-deliveries and four women declined to participate. Four pregnant women were excluded from the analysis. Four questionnaires sent to women who were to receive an token monetary incentive were returned as undeliverable; however, we were able to phone these women and send a replacement questionnaire to the new mailing address, but did not include NZ$5 with the questionnaire (two of these women were Māori) as they had already intended to complete the questionnaire upon receipt.

The retention rate for the 3-year follow-up survey was 78% \([1025/(1348-26-4)]\). Figure 1 depicts participant flow through the three nationwide surveys.

**Sample characteristics**—Table 1 depicts the demographics from women who responded to each survey. The mean (±SD) age of respondents to the baseline, 2-year follow-up and 3-year follow-up surveys were 45.5±3.2 years, 47.6±3.2 years, and 48.6±3.2 years, respectively.

At baseline, respondents were similar to the general New Zealand population; however, over time the women who remained in our sample included a higher proportion of university-educated women and women self-identified as New Zealand European and other non-Asian, non- Māori, and non-Pacific Islander ethnicities.

**Table 1 Demographic characteristics of New Zealand respondents compared with national data.**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline</th>
<th>2-year follow-up</th>
<th>3-year follow-up</th>
<th>National data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Highest education level attained</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary and some secondary school</td>
<td>488</td>
<td>30.8</td>
<td>325</td>
<td>29.0</td>
</tr>
<tr>
<td>Completed secondary school</td>
<td>153</td>
<td>9.7</td>
<td>105</td>
<td>9.4</td>
</tr>
<tr>
<td>Technical/grade school or polytechnic</td>
<td>437</td>
<td>27.6</td>
<td>312</td>
<td>27.9</td>
</tr>
<tr>
<td>University</td>
<td>508</td>
<td>32.0</td>
<td>378</td>
<td>33.8</td>
</tr>
<tr>
<td>Prioritised ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>85</td>
<td>5.3</td>
<td>50</td>
<td>4.4</td>
</tr>
<tr>
<td>New Zealand European and others</td>
<td>1283</td>
<td>80.3</td>
<td>939</td>
<td>83.5</td>
</tr>
<tr>
<td>Māori</td>
<td>181</td>
<td>11.3</td>
<td>109</td>
<td>9.7</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>48</td>
<td>3.0</td>
<td>27</td>
<td>2.4</td>
</tr>
<tr>
<td>Socioeconomic status (NZSEI) category</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10–29</td>
<td>234</td>
<td>14.7</td>
<td>143</td>
<td>12.8</td>
</tr>
<tr>
<td>30–59</td>
<td>1065</td>
<td>66.7</td>
<td>743</td>
<td>66.2</td>
</tr>
<tr>
<td>60–90</td>
<td>298</td>
<td>18.7</td>
<td>236</td>
<td>21.0</td>
</tr>
</tbody>
</table>

*Percentages may not add to 100% due to rounding.*

*Population estimates for education level and prioritized ethnicity in mid-age women from the 2006 New Zealand Census; and total population NZSEI distribution from the 1999 New Zealand Census.*

*Multiple ethnicities could be provided by participants, and ethnicity was prioritised in the following order: Māori, Pacific, Asian, other and European.*

*NZSEI, New Zealand Socioeconomic Index 1996.*

**Results of NZ$5 randomisation**—In all three surveys, women assigned to receiving a NZ$5 token monetary incentive with the initial mail out were significantly more likely to respond than those who did not receive NZ$5 (unadjusted OR 1.77, 95%CI 1.38–2.27, \(p<0.001\); OR 1.86, 95%CI 1.32–2.62, \(p<0.001\); OR 1.56, 95%CI 1.10–2.22, \(p=0.014\) respectively).
Table 2. Mid-age New Zealand women’s response to a mailed survey based on inclusion or exclusion of a token monetary incentive

<table>
<thead>
<tr>
<th>Variables</th>
<th>Overall</th>
<th>Māori</th>
<th>Non-Māori</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Potential</td>
<td>Eligible</td>
<td>%</td>
</tr>
<tr>
<td>Baseline Incentive No incentive</td>
<td>2424&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1597</td>
<td>65.9</td>
</tr>
<tr>
<td>Incentive</td>
<td>389</td>
<td>295</td>
<td>75.8</td>
</tr>
<tr>
<td>No incentive</td>
<td>2035</td>
<td>1302</td>
<td>64.0</td>
</tr>
<tr>
<td>Two–year survey Incentive No incentive</td>
<td>1373</td>
<td>1125</td>
<td>81.9</td>
</tr>
<tr>
<td>Incentive</td>
<td>388</td>
<td>341</td>
<td>87.9</td>
</tr>
<tr>
<td>No incentive</td>
<td>985</td>
<td>784</td>
<td>79.6</td>
</tr>
<tr>
<td>Three–year survey&lt;sup&gt;d&lt;/sup&gt; Incentive No incentive</td>
<td>1318</td>
<td>1025</td>
<td>77.8</td>
</tr>
<tr>
<td>Incentive</td>
<td>296</td>
<td>249</td>
<td>84.1</td>
</tr>
<tr>
<td>No incentive</td>
<td>787</td>
<td>608</td>
<td>77.3</td>
</tr>
</tbody>
</table>

<sup>a</sup>OR = Odds Ratio; 95%CI = 95% Confidence Interval.

<sup>b</sup>The baseline model includes NZDEP2006 and Māori descent indicator; the 2-year follow-up survey model includes NZSEI, ethnicity, and education; and, the three-year follow-up survey model includes NZSEI and education.

<sup>c</sup>One questionnaire was returned with the identification number removed; thus, there is one extra "potential" responder.

<sup>d</sup>Only women who self-identified as New Zealand European or "other" at baseline.
Adjusted results were similar (Table 2). For women identifying as Māori, an especially important group for public health research in New Zealand, the response rate for those receiving a token monetary incentive was 71.7% (38/53) at baseline, 78.7% (37/47) at 2 years, and 71.0% (98/138) at 3 years.

The response rate for non-Māori women receiving the token monetary incentive was 76.5% (257/336) at baseline, 89.4% (303/339) at 2 years, and 80.6% (320/397) at 3 years. For the baseline survey, there was a significant effect of NZDep2006 score on response rate with response rates decreasing with greater deprivation (OR 0.91/decile, 95%CI 0.88–0.94, p < 0.001), but there was no statistically significant evidence of an effect of Māori descent on response rate (OR 0.80, 95%CI 0.62–1.02, p=0.075), although the confidence interval is wide.

There was also no evidence of an interaction between the monetary incentive and NZDep2006 (p=0.547) or Māori descent (p=0.426). For the 2-year sample, there were no significant effects of NZSEI score (p=0.438), ethnicity (which had been collapsed to three levels: Māori, New Zealand European, and Asian, Pacific Islander and Other ethnicity for this particular analysis) (p=0.464) or education status (p=0.124) on response rate.

For the 3-year sample, when looking at the subsample of New Zealand European and other women, there was no effect of education (p=0.727) nor NZSEI (p=0.548) on retention. Nor was there evidence of an interaction between the incentive and NZSEI (p=1.000) or education (p=0.695). Table 2 shows the main effects of the incentive at each time point, overall and stratified by Māori and non-Māori for baseline and 2-year follow-up.

Not shown in Table 2 is an analysis of the subsample of New Zealand European and other women not belonging to an Asian, Māori or Pacific Islander ethnic group. This analysis suggests that there is a diminishing effect of the token monetary incentive on retention rates from the 2-year follow-up survey (OR 1.90, 95%CI 1.28-2.83, p=0.002) to the 3-year follow-up survey (reported above).

**Discussion**

The 56% response rate to our pilot survey and 66% response rate to our baseline survey are higher than the response rates in similar mail surveys conducted in Australia and New Zealand. For example, a mailed survey on weight perceptions, weight concerns and weight control behaviours that utilised the Australian electoral roll as a sampling frame achieved a response rate of 42% from an original sample of 2500.24

Similarly, a mailed survey conducted among 1,200 men in New Zealand achieved a 45% response rate.25 In 1992, three New Zealand studies that utilised 50 cent and $1 monetary gifts to improve response rates of mail surveys among the general public achieved response rates of 59–68% in the monetary incentive groups versus 50-56% in the control (no monetary incentive) groups.8

Our results suggest that inclusion of a token NZ$5 incentive with the initial mail out significantly increases response rate and retention rates beyond those observed with the use of small non-monetary gifts and a lottery draw. This is consistent with social exchange theory6 and the novelty effect of including a token monetary incentive; however, among New Zealand European women and other women not belonging to Asian, Māori or Pacific Islander ethnic groups, this effect diminished in the 3-year follow-up. This could potentially be explained by a decline in the novelty value of repeated token monetary incentives.

Some researchers have suggested increasing the value of the monetary incentive in follow-up survey waves to improve retention rates.26 Also, it is possible that financial resources for mail surveys may be better spent on token monetary incentives with the baseline survey and first follow-up survey rather than equally distributed over multiple surveys.
In our study, there is a suggestion of possibly diminishing effects over time (ORs 1.86, 1.91, 1.59). However, all of the confidence intervals included all estimates and this pattern may be due to chance. While there was no evidence of differences in response rates by ethnicity, the wide confidence interval for women of Māori ethnicity when examining baseline response rates included values that would be of considerable importance, and meaningful effects cannot be ruled out here.

There was no evidence that the effect of the NZ$5 incentive differed by socioeconomic status or educational level. Therefore, this study suggests that targeting a token monetary incentive for low socioeconomic status or low education status women might not be beneficial.

When deciding whether or not to include a small monetary token of appreciation, researchers need to consider the financial costs associated with using incentives alongside any effects on response rates and sample representativeness. For this particular study, we estimated the cost per response for each survey wave by incentive group (i.e., for each wave/incentive group combination, the total costs for printing, postage, incentives and labour for initial mailings, reminder/thank you postcards, and replacement questionnaires were divided by the number of respondents in that incentive group).

The differences in cost per response received were below $5 but increased over the three survey waves. The mean costs per response for women who received $5 in the baseline, 2-year follow-up and 3-year follow-up surveys were $15.47, $12.60, and $13.41, respectively, and the mean costs per response for women who did not receive a small monetary gift were $11.52, $8.20, and $8.61, respectively.

Therefore, the differences in cost were $3.95, $4.40, and $4.80. This increased cost is below $5 due to the higher response rate with the incentive and fewer replacement materials being sent to women in the incentivised group. The weighing up of the additional financial costs of including an incentive against the possibly lower response rate without an incentive will depend on the unique circumstances of each study.

The strengths of this study include the use of a large sample size from a nationally representative sampling frame, good response and retention rates and reasonable representativeness of the baseline sample in terms of prioritized ethnicity and socioeconomic status. The over-70% response and retention rates achieved for Māori women were particularly encouraging.

The main limitation is that our study was not designed primarily to test the effect of token monetary incentives. Thus, we could not thoroughly investigate factors that may have contributed to women being non-respondents nor did we collect data to enable us to analyse the speed of response based on the inclusion or exclusion of NZ$5. A stronger design would include selecting a larger random sample at baseline only, offering that sample subsequent token monetary incentives at the two-year follow-up and three-year follow-up and then examining the final response rate for this group versus the group never offered a token $5 incentive.

It should be noted that our results apply to mid-aged women in New Zealand, and a token monetary incentive may be more or less effective with a sample of men or women of different age groups or in different countries in a similar prospective study. Finally, we have not examined the effects of patterns of token monetary incentives over time, in part due to smaller numbers in these groups when all three waves are considered. However, it seems plausible that the effects of earlier monetary incentives were largely or completely washed out at each wave.

In conclusion, token monetary incentives are useful for improving response and retention rates in mail surveys, thus enhancing the generalisability of study findings. Our findings suggest that public health researchers should consider including token financial incentives with mailed surveys to increase participation, particularly in the baseline survey and the first follow-up survey. In addition,
researchers may wish to consult with individuals who are representative of hard-to-reach populations for appropriate token incentive suggestions.

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**References**


Retrieval rates of inferior vena cava (IVC) filters: are we retrieving enough?

Rebecca Davies, James Stanley, Janaka Wickremesekera, Manar Khashram

Abstract

Aims The aim of this study was to document retrieval rates of IVC filters in a single tertiary centre, before and after implementation of an IVC filter pathway, and to identify factors that may affect retrieval rates.

Methods This was a two phase study. In Phase 1, rates of IVC filter retrieval were collected retrospectively from June 2010 to June 2012. During Phase 2 an IVC filter pathway was developed and prospective data was collected from July 2012 to June 2014. Univariate analysis and Kaplan-Meier estimates were performed to determine the rate of IVC filter retrieval and to analyse factors contributing to retrieval rates.

Results 95 patients (39 Phase 1; 56 Phase 2) had an IVC filter inserted over a 4 year period. In Phase 1, of those eligible to have their filter removed, the 12-month retrieval rate was 63%, this improved to 100% in Phase 2. Following implementation of the IVC filter pathway (Phase 2) no patients were lost to follow-up.

Conclusions We have improved the rate of IVC filter retrieval in our institution by development of an IVC filter pathway. Rates of optional IVC filter retrieval in our experience are now higher than previously published figures.
from 12–45% (mean 34%). To improve the rate of IVC filter retrieval several institutes have implemented databases and clinics to follow up patients who have an IVC filter placed.\textsuperscript{7–9}

In July 2012, the Departments of Vascular Surgery and Interventional Radiology at Wellington Hospital in conjunction with the Venous Thromboembolism Clinic developed a clinical pathway for patients who had an IVC filter placed in order to streamline timely retrievals.

The primary aim of this study was to document the retrieval rates of optional IVC filters at a tertiary centre, two years prior to developing an IVC filter clinical pathway (Phase 1) and two years following its implementation (Phase 2). The secondary aim was to analyse factors which may have influenced retrieval rates in Phase 1.

**Methods**

All IVC filters inserted by vascular surgeons or interventional radiologists during a consecutive 4-year period (1 June 2010 and 30 June 2014) in Wellington Hospital were identified via the clinical coding registry and confirmed by the picture archiving computer system (PACS). The New Zealand Health and Disability Ethics Committee’s (HDEC) review process advised that ethical approval was not required. This audit was registered and approved by Capital and Coast District Health Board.

In Phase 1, IVC filters inserted between the 1 June 2010 and 30 June 2012 were identified and studied retrospectively. During this phase multiple factors were investigated to ascertain if these contributed to retrieval rates. Factors studied were: acute versus elective procedures, medical compared to surgical referrals, vascular surgeons compared to interventional radiologists performing the IVC filter placement, written instructions for removal in the clinical notes or not, whether the patient had been referred from outside the Wellington catchment area or not, and normal working hours compared to after-hours procedures.

On the basis of the outcomes of Phase 1, an IVC filter pathway (Figure 1) intended to ensure strict follow-up of patients with IVC filters placed was then implemented in July 2012 and data was collected prospectively on all patients who underwent IVC filter placement from the 1 July 2012–30 June 2014 (Phase 2). Filter retrievals in Phase 2 were documented up until 30 August 2014.

**Figure 1. IVC filter referral, placement and retrieval pathway. In the left column team members involved**
Clinical and radiology records were reviewed to identify indications for IVC filter placement, procedural information and follow-up. Patients who had been referred for IVC filter placement from outside the Wellington catchment area, but within New Zealand were followed up on an individual basis to determine if the filter had been retrieved elsewhere. Filters placed from patients visiting New Zealand from overseas were excluded from analysis.

Device description—All IVC filters inserted in our institution during the study period were optional filters. The two types of filters used were the Celect Vena Cava Filter (Cook Medical, Bloomington, Indiana) or the G2 filter (Bard Peripheral Vascular, Tempe, Arizona). The choice of filter was at the discretion of the intervening physician performing the procedure.

IVC filter placement—Placement of IVC filters was under direct fluoroscopic guidance by either the right or left femoral vein approach. The caval filter was typically placed infra-renal and position prior to deployment was confirmed with a venogram.

IVC filter retrieval—When clinically appropriate (i.e. contraindication for anticoagulation had expired or the caval filter was no longer required) patients were referred for IVC filter retrieval. Retrieval was performed typically via cannulation of the right internal jugular vein. Under fluoroscopic guidance the filter was snared and removed.

IVC filter pathway (Phase 2)—In July 2012, an IVC filter pathway was implemented at our institution (figure 1). All patients with IVC filters placed were identified in a monthly report generated by the clinical coding unit and transferred to a dedicated vena caval filter database. This database was maintained by the nurses in the pre-existing venous thromboembolism (VTE) clinic.

Any patient who had an IVC filter in situ for greater than 6 weeks was then discussed with the VTE consultant and the patient was either followed up in clinic or via phone consultation, depending on the complexity of the case. The patient was then booked for retrieval, or if the filter was still clinically required the patient was booked for review when deemed clinically appropriate. The filter was declared permanent if the indication was likely to continue long-term or if the perceived risks of retrieval were greater than the filter remaining in situ.

Statistical analysis—Univariate statistical analysis was produced in R 15.1 statistical package (R Institute, Vienna). Kaplan-Meier estimates (plots and 12-month retrieval estimates) were used to document accurate retrieval rates over the study period.

Patients that died or had their filter declared as a permanent device due to clinical circumstances, were censored at the applicable time during analysis. Phase 1 patients were censored at the end of that phase if they had not yet had their filter removed (to avoid any influence of the system changes made for Phase 2); Phase 2 patients were censored at the end of the study period if they had not had their filter removed. Statistical significance was set at a p value <0.05.

Results

95 patients had an IVC filter placed over the 4-year period. During Phase 1, 39 patients had an IVC filter placed; median (range) age was 67 years (31–87) and 16 were male. Patient characteristics and indication for filter placement are shown in Table 1.
Table 1. Summary of patient characteristics

<table>
<thead>
<tr>
<th>Demographic/clinical characteristics</th>
<th>Phase 1 (n=39)</th>
<th>Phase 2 (n=56)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), Median (range)</td>
<td>n, percentage</td>
<td>n, (percentage)</td>
</tr>
<tr>
<td>67 (31–89)</td>
<td>67 (31–89)</td>
<td>62 (18–93)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16 (41%)</td>
<td>34 (60%)</td>
</tr>
<tr>
<td>Female</td>
<td>23 (59%)</td>
<td>23 (40%)</td>
</tr>
<tr>
<td>Indication for IVC filter placement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prophylaxis (total)</td>
<td>6 (15%)</td>
<td>7 (12.5%)</td>
</tr>
<tr>
<td>Trauma + previous DVT/PE</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Surgery (malignant) + previous DVT/PE</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Surgery (non-malignant) + previous DVT/PE</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Bleeding + anticoagulation reversed + previous PE/DVT</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Major trauma</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Therapeutic (total)</td>
<td>33 (85%)</td>
<td>49 (87.5%)</td>
</tr>
<tr>
<td>PE/DVT + active bleed (non-trauma or trauma)</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>Recurrent/extension DVT/PE on anticoagulation</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>PE/DVT + surgery (malignant or non-malignant)</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>PE/DVT + contraindication to anticoagulation or high risk for bleed</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Massive PE</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

DVT = deep vein thrombosis, PE = pulmonary embolus

**Phase 1**—Of the 39 patients who had an IVC filter placement in Phase 1, 15 underwent IVC filter retrieval, of which 14 were successful. Median (range) time from insertion to removal for this group was 97 (15–293) days.

Retrospective follow up analysis revealed that of the 24 patients that did not have their filter removed; five had their filter declared as a permanent device (and hence were not eligible to have their filters removed and were censored at the beginning of analysis), nine had died, two were booked for retrieval in the future, and eight patients were lost to follow up.

Of those who were eligible to have their filter removed, the Kaplan-Meier estimate of the 12-month retrieval rate was 63% (Figure 2). The two patients who had their filter booked for retrieval after the end of the study period did subsequently go on to have a successful retrieval procedure.

The eight patients that were lost to follow-up were subsequently contacted to determine if filter retrieval had been performed at another institution and if not their notes were reviewed and if appropriate, IVC filter retrieval was recommended.

Patients referred by a surgical specialty for insertion of an IVC filter had a significantly higher retrieval rate compared to those referred by a medical specialty (p=0.004) (Figure 3).

The 12-month Kaplan-Meier estimates of retrieval rates for those referred by a surgical specialty were 78% (95%CI 41–92) and 40% for those referred by a medical specialty (95%CI 0–67). IVC filters that were placed in an elective setting were significantly more likely to be removed compared to those placed acutely (p=0.04) (Figure 4): respective 12-month retrieval rates were 85% (95%CI 11–98) and 55% (95%CI 19–75).

The instruction that the filter is retrievable from the vascular surgeon or radiologist performing the IVC filter placement appeared to improve the rate of retrieval, although this difference was not significant (p=0.07) (Figure 5).
Figure 2. Kaplan-Meier curve showing time to filter retrieval for Phase One (n=34) and Phase Two (n=50) patients

Figure 3. Kaplan-Meier curve showing retrieval rates of filters in medical vs. surgical patients
There was no statistically significant difference between IVC filter retrieval rates of patients referred from the Wellington region compared to referrals from outside the region (p=0.6); insertion by a vascular surgeon compared to an interventional radiologist (p=0.6); or the timing of the procedure (p=0.5) (Table 2).

**Phase 2**—Of the 56 patients who had an IVC filter placed in Phase 2, 29 underwent IVC filter retrieval. Of those who did not have their filter retrieved 12 died, two had a planned retrieval procedure within the following month, three had their filter retrieval requested but not yet scheduled for retrieval at the end of the study period, three patients still had an ongoing temporary indication for filter placement and seven patients had their device declared as permanent. The Kaplan-Meier estimate of the 12-month retrieval rate of those eligible to have their filter retrieved was 100%.
Table 2. Comparisons of retrieval rates at 6 and 12 months for each variable studied in phase 1

<table>
<thead>
<tr>
<th>Variables studied</th>
<th>Retrieval rate (%) at 6 months (95% CI)</th>
<th>Retrieval rate (%) at 12 months (95% CI)</th>
<th>P-value*#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local DHB (n = 25) vs. Other DHB (n = 9)</td>
<td>46 (17–64)</td>
<td>65 (25–84)</td>
<td>0.6</td>
</tr>
<tr>
<td>Acute (n=25) vs. Elective placement (n=9)</td>
<td>24 (3–40)</td>
<td>55 (19–75)</td>
<td>0.04*</td>
</tr>
<tr>
<td>Interventional radiologist (n=15) vs. Surgeon (n=19) performing procedure</td>
<td>54 (11–77)</td>
<td>64 (25–83)</td>
<td>0.6</td>
</tr>
<tr>
<td>Normal hours (n=26) vs. After hours (n=8)</td>
<td>56 (26–74)</td>
<td>56 (26–74)</td>
<td>0.5</td>
</tr>
<tr>
<td>Plan for retrieval by interventionist (n=19) vs. No plan (n=15)</td>
<td>62 (27–80)</td>
<td>69 (34–86)</td>
<td>0.07</td>
</tr>
<tr>
<td>Medical (n=15) vs. Surgical referrals (n=19)</td>
<td>10 (0–27)</td>
<td>40 (0–67)</td>
<td>0.004*</td>
</tr>
</tbody>
</table>

*From log-rank test comparing Kaplan-Meier curve functions by group; # Statistical significance p-value ≤ 0.05; DHB = district health board.

There was some evidence for a difference in rates of IVC filter retrieval between Phases 1 and 2 (log-rank test p=0.056 Figure 2). Median time to retrieval in Phase 1 was 7.4 months (95%CI 4.5, upper bound non-estimable), and in Phase 2 the median time was 4.1 months (95%CI 3.4, 6.9).

As the age and gender distributions were different for these two phases, a stratified analysis compared time to retrieval between phases while controlling for age group (<35, 35–54, 55–74, 75+ years) and gender, where the statistical evidence for any difference between phase was weaker (log-rank test $\chi^2$ (1 df)=1.1, p=0.30). Stratified Kaplan-Meier estimates by age group (figure not shown) suggested that Phase 2 retrieval times were not shorter in the largest age group (55–74) with some evidence for faster times to retrieval in the other age groups (<35, 35–54, 75+).

Discussion

We have demonstrated that by introducing an IVC filter pathway, it is possible for an increase in IVC filter retrieval rates to be achieved; moreover the pathway ensured that patients were not lost to follow-up and facilitated timely removal of IVC filters. Prior to establishing this pathway the Kaplan-Meier estimate of the 12-month rate of filter retrieval was 63% and although this rate was higher than previously documented figures (12–59%), it remained suboptimal. Following implementation of the pathway the Kaplan-Meier estimate of the 12-month rate of retrieval increased to 100%.

A recent large study that evaluated factors predicting challenging or failed retrievals found that prolonged dwell time of IVC filters significantly increased the chance that retrieval would be difficult or fail. Specifically filters left in place for greater than 90 days had a significantly higher risk of failed retrieval. Prolonged dwell time increased the chance of long-term complications associated with IVC filter placement and recommendations have been made previously for randomised control trials to assess the safety of retrievable IVC filters.

There have been several proposed methods of improving the rate of IVC filter retrievals. Previously databases or registries have been used to ensure timely follow up of patients, as well as dedicated IVC filter retrieval clinics. Lynch et al., found that tracking patients via a prospectively collected database designed for patient follow-up, significantly improved the rate of IVC filter retrieval from 24% to 59%. A similar study found that IVC filter retrieval rates could be significantly improved from 16%
to 32% via implementation of an IVC filter registry. Another prospective study found that there was a significant improvement in retrieval rates of IVC filters when a dedicated clinic was instituted. This clinic was co-ordinated by a clinical nurse, who maintained the filter database and patients were only seen in the outpatient clinic if the procedure was predicted to be complicated.

Prior to implementation of the IVC filter pathway in our institution, responsibility for the patient follow up and planning for IVC filter retrieval was left to the discretion of the referring clinician. This was because the indication for filter placement and therefore timing of retrieval was often related to the patient’s primary diagnosis. However, this responsibility for filter retrieval was not always clear and some patients were left with filters in situ, even when retrieval was indicated.

The multidisciplinary pathway now used in our institution incorporates several of the methods of follow-up previously described in the literature above. Figure 1 demonstrates the pathway; the major components of this were a database (which tracked all filters placed and retrieved), and review of individual cases by a specialist VTE physician. This method improved decision-making and ensured that timely follow up and filter retrieval occurred for all patients who underwent IVC filter placement.

During Phase 1 we investigated factors that may have contributed to rates of IVC filter retrieval. We found a statistically significant difference in IVC filter retrieval rates between those patients referred from a medical specialty compared to those referred by a surgical specialty (40% vs. 78% respectively, p<0.05). The lower rate of filter retrieval in medical patients may be related to the nature of their illness, however many of these patients did not appear to have formal review of whether or not filter retrieval was appropriate.

There was a statistically significant difference between patients who had their IVC filter placed in an acute setting compared to those placed electively (55% vs. 85% respectively, p<0.05) and although not statistically significant, the written instruction that the filter is retrievable from the vascular surgeon or radiologist performing the filter placement appeared to improve the rate of IVC filter retrieval. The other variables analysed did not impact upon retrieval rates of IVC filters. Given the above findings the need for a clearly documented plan for retrieval or review for consideration of filter retrieval, regardless of the patient’s primary medical or surgical problem, was thought to be necessary.

Failed retrievals commonly occur because of the filter tilting or embedding in the IVC wall, the risk of which increases with prolonged dwell time. Our overall rate of failed retrievals was 3.2%, which is similar to figures previously published. During the study period there was one patient in Phase 1 where the IVC filter retrieval was unsuccessful, with two independent attempts by different interventionalists. Filter retrieval was first attempted 308 days following placement and was unable to be retrieved because the filter “legs” were embedded in the IVC wall; a known complication of retrievable filters. During the second attempt (day 346), the filter hook was unable to be snared as it opposed the IVC wall. In Phase 2 there were two failed retrievals – the first was in a patient whose abdominal tumour was causing extrinsic compression to the IVC causing the hook of the filter to embed in the IVC wall and was therefore not able to be snared and retrieved. The second patient was from outside the Wellington region and subsequent retrieval was arranged in the patient’s home centre. At the time of retrieval the hook of the IVC filter was found to be projecting into a small venous tributary making retrieval difficult and risky – the filter retrieval was abandoned and the filter was declared permanent.

Review of the IVC filter pathway and database demonstrates that it is a feasible and effective modality for follow-up. Most patients could be followed up via phone consultation, especially those who were from outside the catchment area, whereas more complex cases, were reviewed in clinic.
Limitations of this study include the retrospective nature of the data collection and the relatively small patient cohort. Thus it is possible that some of the comparisons made for the Phase 1 data were underpowered for detecting important differences. A further limitation is that there may be an over- or under-estimation of the effect size and type II error when comparing the differences between the two phases, even allowing for sufficient statistical power. The ‘lost to follow-up’ group may have included patients with undocumented reasons for keeping the IVC filter in situ. The single centre design of the study is also a limiting factor however this information was important for identifying areas specific to our hospital where our the IVC filter insertion service can be improved.

**Recommendations**

Given the increasing use of IVC filters for prevention of PE when anticoagulation cannot be used, we strongly recommend implementation of an IVC filter pathway to ensure that timely retrieval of all optional IVC filters occurs. In New Zealand, it is important that retrieval messages are relayed to all the involved teams when patients are transferred between provincial and tertiary hospitals.

The IVC filter pathway that has been set up in Wellington Hospital includes a database that is managed by the VTE clinic nurses and a clinic appointment with a VTE specialist, dedicated to planning IVC filter retrieval in complex patients.

**Conclusions**

Rates of optional IVC filter retrieval in our experience were similar to previously published figures. We have demonstrated that retrieval of IVC filters can be limited by suboptimal rates of follow-up in the outpatient setting. Although a statistical improvement was not seen following the IVC filter pathway implementation, complete follow up of all patients has been observed.

**Competing interests:** Nil.

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**References**


CT pulmonary angiography and pulmonary embolism following 5809 primary joint arthroplasties
Charlotte Allen, Richard Seinge, Rod Maxwell, Dilraj Thind

Abstract

Aim Controversy surrounds prevention, detection and clinical relevance of pulmonary embolism (PE) following arthroplasty in orthopaedic patients. We aimed to review the rates of computer tomography pulmonary angiography (CTPA), PE and fatal PE following total joint replacement.

Method Mixed retrospective/prospective review of CTPA requests and PE incidence amongst patients undergoing primary knee and hip arthroplasty.

Results The overall PE rate was 112/5809 (1.93%): 38/3473 (1.1%) and 74/2336 (3.5%) following total hip arthroplasty (THA) and total knee arthroplasty (TKA), respectively. Two deaths from PE occurred, both after TKA, a procedural mortality rate of 0.086%; the overall mortality rate was 0.034%. The rate of CTPA requests increased for the initial 7 years as did the rate of PE, in the last 2 years both rates fell.

Conclusion The findings are discussed in context of published data and with reference to studies suggesting the high sensitivity of CTPA may over diagnose clinically significant PE following arthroplasty if ordered without a robust method of determining the pre-test probability.

Prevention, detection and clinical relevance of venous thromboembolic events (VTEs) following arthroplasty are controversial. The detection rate varies widely from clinical trials to observational series.\(^1\)\(^-\)\(^3\) Scoring systems to quantify pre-test probability are not sufficiently discriminatory in the postoperative period. This, in combination with the high sensitivity of the gold standard PE detection method, CT pulmonary angiography (CTPA), may result in over diagnosis of pulmonary embolism.\(^4\)\(^-\)\(^7\)

Overdiagnosis of clinically relevant PE in the perioperative period exposes patients to the risk of morbidity and mortality from anticoagulation treatment.\(^2\)\(^,\)\(^8\)\(^-\)\(^10\) but inadequately treated VTEs can also result in short and long-term morbidity and mortality. Preventative management for VTE is widely debated not only because of concerns with efficacy of various prophylactic strategies but also their risk to benefit ratio.\(^1\)\(^-\)\(^3\),\(^10\)\(^-\)\(^12\) The cost of various anticoagulation regimes is also considerable.\(^4\)\(^-\)\(^7\),\(^11\) The controversy is regularly reported in the press, and a range of international organisations have created guidelines recommending widespread prescription of anticoagulants.\(^2\)\(^,\)\(^8\)\(^-\)\(^14\),\(^17\)

In 2006, at a public elective orthopaedic unit 7 km from the main city hospital, a 6-month retrospective audit of PE incidence following primary elective hip and knee arthroplasty was initiated. This occurred after three pulmonary emboli were diagnosed within a 10-day period. The audit was subsequently extended retrospectively to 2004 and data collection commenced prospectively to the present.

The aim of this paper is to describe the request rate of CTPAs, the rates of PE and PE-related mortality following primary hip and knee arthroplasty at an elective public orthopaedic unit from 2004 to 2013, and to compare this to published series.

Method

Patient selection—All patients in New Zealand are identified with a unique National Health Index (NHI) number which can be used to search national and local databases. Patients coded as having a primary elective
hip or knee arthroplasty were included, retrospectively from 2004–2006 and prospectively from 2006–2013 (years run from 1 July to 30 June).

To identify patients who had a PE the medical records of all patients coded as having a CTPA within ninety days of surgery were reviewed to determine the indication of the CTPA and findings i.e. PE or no PE. In addition the medical record of patients with a code of PE in their discharge summary were examined to discover patients who may have been diagnosed as having a PE without a CTPA—e.g. with a ventilation perfusion scan. If death occurred within 90 days of surgery the medical record was examined to determine if death was related to a PE.

The recorded causes of death (from the death certificate) of any of the study population who had died up to April 2013 were provided by the Ministry of Health (with Local Ethics Committee approval). These records were examined to determine if any death was recorded as being from PE.

Data collected included date and type of procedure, sex, age, American Association of Anesthiologists score (ASA), anaesthesia type, symptoms resulting in CTPA request, date of CTPA, result of CTPA and date of death.

**Patient management**—The patient’s surgical and anaesthetic management was not controlled however all surgeons employ a tourniquet for knee arthroplasty. Some aspects of care were guided by local guidelines—e.g. prophylactic antibiotic use and VTE prophylaxis. The VTE guideline has changed, as described below, over the period of the data collection.

Early mobilisation (day one) occurs unless medically contra-indicated. Approximately two-thirds of patients receive spinal anaesthesia (Table 1), thromboembolism-deterrent stockings are not employed. In 2004 chemical VTE prophylaxis consisted of aspirin 150 mg once daily commencing on the first postoperative night for 6 weeks postoperatively unless contraindicated. In 2007 postoperative mechanical prophylaxis, foot pumps, were employed for arthroplasty patients until full mobilisation or a minimum of 72 hours postoperatively. In March 2010, due to a formulation change, the aspirin dose was changed to 100 mg; simultaneously the initial dose advanced to the night before surgery, the 6-week postoperative course remained unchanged.

Prophylactic dose Enoxaparin from the first postoperative night (in hospital only) is reserved for patients identified as higher risk of VTE (bilateral surgery, previous VTE, body mass index >30 and predicted poor postoperative mobilisation, bed rest or poor mobility preoperatively, impaired cardiac function [e.g. ejection fraction <40%], known malignancy). Aspirin is then commenced from discharge for 6 weeks. An individualised regime is occasionally prescribed when the surgeon and anaesthetist deem this appropriate.

CTPA scans are in the main public hospital, 7 km from the elective orthopaedic unit. The CTPA protocols were performed on a GE VCT 64-slice CT until July 2012 when the Siemens Somatom Definition Flash 128-slice dual-tube scanner was installed. CTPAs are reported by consultant radiologists.

**Statistical analysis**—Data were into entered into Excel (Microsoft, Redmond, WA, USA). This was also used for the main analysis. Stata, version 12 (StataCorp, College Station, TX, USA) was also used for part of the analysis. Data were described using proportions and percentages where appropriate. Possible linear association between quantitative variables was assessed using scatterplots and Pearson’s correlation coefficient. Subsequent linear regression was used to quantify this relationship, if applicable.

**Results**

There were 5809 eligible patients in the study period, 2336 (40.2%) knee and 3473 (59.8%) hip arthroplasties (Table 1).
Table 1. Demographic data

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>ASA 1</th>
<th>41.7%</th>
<th>Female</th>
<th>ASA 2</th>
<th>55.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA†</td>
<td>32.5%</td>
<td>ASA 3</td>
<td>34.4%</td>
<td>SAB†</td>
<td>64.8%</td>
<td>ASA 4</td>
</tr>
<tr>
<td>Epidural†</td>
<td>0.06%</td>
<td></td>
<td></td>
<td>Regional limb block†</td>
<td>2.67%</td>
<td></td>
</tr>
</tbody>
</table>

†Anaesthesia type – percentages based on available data (89.8% patients, some patients had more than one modality).

291 patients had a CTPA (5.2%) of which 106 (36.4%) were positive, two other patients had indeterminate CTPA report and were anticoagulated. In addition two patients (one in 2010–11 and one in 2012–13) had a PE detected by a V/Q scan. Two deaths attributed to PE occurred in the study period. Both occurred after total knee arthroplasty (TKA), one 3 days the other 65 days postoperatively, neither patient had a CTPA.

The medical record review revealed one other death associated with PE 4 days after a hip arthroplasty but PE was not recorded on the death certificate. In this case the CTPA demonstrated a single subsegmental embolism with some right heart strain, reported as unlikely to be secondary to the embolus. This patient had known chronic obstructive lung disease which was the recorded cause of death.

The overall PE rate in the study population, including those diagnosed by V/Q scan and those treated for PE with a negative CTPA, was 112/5809 (1.93%). The overall PE mortality rate was 0.034%, 0.086% following TKR and 0% following THR.

The CTPA request rate by year varied over the period between 3.3% and 6.6% (Figure 1) and the positive CTPA rate varied from 19% to 60% (Figure 2).

Figure 1. CTPA request rate after hip and knee arthroplasty
There appears to be a linear correlation for the association between CTPA requests and positive PE detection ($r=0.74$) (Figure 3). The regression coefficient between CTPA request and PE detection is 0.78 (95% CI, 0.22–1.35) with evidence against the null hypothesis of no linear association between the two ($P=0.013$, t-test). From the data collected every 1% increase in CTPA requests results in a 0.78% increase in reported PE.

The overall PE rate varied between 0.9% (2004–05) and 4.0% (2010–11) with the rate following TKR consistently higher than that following THR (Figure 4).
The majority, 64%, of CTPAs were performed on days 1 (10.4%), 2 (19.6%), 3 (22.6%) and 3 (11.3%) postoperatively, this pattern was consistent between THR and TKR. The mean rate of positive and negative CTPAs was 37% and 63% respectively; however the negative rate declined from 83% (day 1) to 64% (day 2) before levelling off to 58% and 50% (days 3 and 4 respectively) (Figure 5).
Of the 106 positive CTPAs 84 (79%) had filling defects proximal to, or at the segmental level and of these 84 patients 33 (39%) were reported as having right heart strain—i.e. 33 of the total 106 (31%). 22 patients (21%) had subsegmental defects.

Discussion

DVT and PE are known complications of arthroplasty occurring in up to 10% of cases\(^{11,14}\) and can result in significant morbidity however mortality is usually low.\(^{1,3,18}\) We have recorded a relatively high PE rate however, fitting with other studies, the mortality rate from PE is reassuringly low.

In New Zealand, the Perioperative Mortality Review Committee reported the 30-day mortality rate from PE following elective admissions (all specialties) associated with general or regional procedures between 2006 and 2010; the overall rate was 0.008%. Over the same period the comparable rate after acute admission (all specialties) was six times higher, 0.05%.\(^{19}\)

Hip and knee arthroplasties (including revisions) were reported to be the most common elective procedures resulting in death from PE, with respective mortality rates of 0.01% and 0.06%. Whilst elective lower limb arthroplasty is quoted as a high risk procedure for VTE the mortality rate from PE is very low and has decreased over the last 4 decades.\(^{20,21}\)

Many studies have reported on different methods of VTE prophylaxis post elective surgery. No one method has been shown to be consistently superior at preventing mortality from PE.\(^{11,12,19–21}\) Patients in the described population routinely receive chemo thromboembolism prophylaxis with aspirin, which has a favourable risk benefit profile.\(^{3,12,15,22}\) in addition to mechanical prophylaxis with foot pumps from 2007.

It has been calculated, from a similar series of 4253 primary arthroplasties (fatal PE frequency 0.07%) that to demonstrate efficacy of different chemo prophylactic VTE regimes 67,000 patients per study arm would be required.\(^{3}\) This series of patients were also managed using predominately spinal anaesthesia, early mobilisation and aspirin as VTE chemo prophylaxis. Surrogate outcomes, such as DVT rates, are often employed to demonstrate VTE prophylaxis efficacy as these occur in higher numbers.

The low disease prevalence and the high sensitivity of modern CTPA increases the risk of detection of non-clinically relevant PEs if CTPAs are requested without a robust pre-test probability determination. Currently in the surgical population there is no method of separating clinically relevant and non-relevant PEs, all patients are anticoagulated exposing them to potential harmful side effects.\(^{23,24}\)

Diagnosis of PE generally relies on one of a number of scoring systems designed to triage patients’ likelihood of having a pulmonary embolism (PE) or deep vein thrombosis (DVT) by providing a pre-test probability to determine the need for investigation.\(^{25,26}\) However, although these scoring systems are applicable in the community setting, they are insensitive when applied to most postoperative orthopaedic patients.\(^{27}\)

The majority of postoperative arthroplasty patients would score 4.5–6 using the Wells scoring system (clinical suspicion – 3, immobilisation or surgery previous 4 weeks – 1.5, and heart rate >100/min – 1.5 points, respectively).\(^{25}\) This score associated with a positive d-dimer (present in post arthroplasty patients) would predict a high likelihood of PE indicating the need for further investigation, commonly CTPA. A study investigating the efficacy of scoring systems in orthopaedic trauma patients\(^{27}\) has been undertaken but to our knowledge there have been no studies in patients undergoing arthroplasty.
With no reliable scoring system the clinician must rely on non-specific symptoms, signs and investigations to decide which patients warrant a CTPA. Wiener et al’s paper reviews the use of CTPA in over diagnosis of pulmonary embolism and discusses ways in which the issue could be addressed; however, unfortunately the lack of suitable pre-test probability scoring systems for surgical patients is not mentioned. Wiener also argues that although more PEs are being detected with CTPA the mortality rate from PE is falling suggesting that now smaller more distal PEs are being detected but these are of dubious significance.

More recent studies demonstrate the potential problem of inadequate pre-test probability in this patient population. In the first, 48 asymptomatic patients undergoing primary hip and knee arthroplasty with enoxaparin cover, underwent a CTPA 24–36 hours postoperatively. Five percent of the hip and 41% of the knee arthroplasty patients had a positive CTPA. All 12 patients with a positive study CTPA were discharged from hospital uneventfully without anticoagulation treatment. In the second study by Cha et al, a CTPA were performed on 363 patients undergoing major orthopaedic surgery receiving no chemo thromboprophylaxis, between 5–14 days postoperatively. 12.3% of knee arthroplasty and 4.3% of hip arthroplasty patients were diagnosed as having PE. The overall PE rate for the study population was 6.6% with only 1.1% patients symptomatic.

Both these studies and ours demonstrate the potential problem of performing CTPA without defining the pre-test probability particularly as studies suggest that small sub segmental clots may not need anticoagulation treatment even in the orthopaedic population. A study by Berman et al reveals how asymptomatic PE may occur. Transoesophageal echocardiography demonstrated showers of echogenic material in all patients after tourniquet deflation during knee arthroplasty; 5% patients subsequently developed clinically relevant PE.

There are significant patient and health provider costs associated with over diagnosis and over treatment of PE. Patient costs include anxiety and inconvenience, risks from radiation and contrast exposure and subsequent anticoagulant morbidity. Health providers must fund the CTPA, additional hospital stay and the costs associated with anticoagulation and monitoring.

Anticoagulation in the early postoperative period carries significant risks of haemorrhage with associated morbidity, anticoagulants are a leading cause of drug related mortality (approximate 5 % risk of a major bleed and fatal bleed 0.1%). Increasing concern has resulted in studies investigating the adverse events associated with chemo thromboembolism prophylaxis. A limitation of this study was that we were unable to quantify the morbidity from anticoagulation in this patient population but are aware of several anecdotal reports with in this population of morbidity secondary to anticoagulation.

Taking into account these facts, it is not surprising that there is considerable scepticism among Australasian Orthopaedic Surgeons about the efficacy and appropriateness of VTE prophylaxis guidelines.

We note an initial rise in CTPA requests and secondary increase in reported PE rate and hypothesise it could be due to increased awareness from an initial run of three Pes in ten days and then the commencement of the audit. Awareness of the potential problem of ordering CTPAs in this population without adequate pre-test probability has increased in the last 2 years and we speculate this may have accounted for the fall in CTPA request rate and consequent reported PE incidence observed in 2011–12 and 2012–13.

This study has some limitations. Some of the data was obtained retrospectively. Clinical management was not controlled although relatively consistent due to hospital protocol. If patients have a PE after discharge and attend a hospital out of the catchment area of the public hospital would be missed, however deaths would be captured. Reporting of CT scans varied over the study period with no...
standard method for reporting size or distribution of filling defects making it difficult to assess the likely clinical relevance in this retrospective study.

This study adds to the controversies described and echoes the findings of other studies that question the clinical relevance of all CTPA diagnosed PEs in the postoperative period and how PE can be more reliably assessed in this population.\textsuperscript{4–6}

We believe that work is required to compile a suitable pre-test probability scoring system for CTPA investigation of possible PE in the post-arthroplasty population in order to help determine clinically relevant PE. In addition the risk to benefit ratio of anticoagulation treatment verses no intervention for minor or subsegmental PE detected by CTPA in this population requires studying.

**Competing interests:** Nil.

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The measurement of New Zealand health care

Richard Hamblin, Gillian Bohm, Catherine Gerard, Carl Shuker, Janice Wilson, Alan F Merry

Abstract
The effective and economical measurement of the quality and safety of health and disability services in New Zealand is of signal importance. The Health Quality and Safety Commission has overseen the introduction of an architecture of interacting measures. These include quality and safety indicators, or QSI, which are whole-system measures; quality and safety markers, or QSM, which are targeted measures of quality and safety interventions comprising process and outcome measures in sets; and the New Zealand Atlas of Healthcare Variation, which illustrates the differences in the health care received in different regions and by different groups of patients within New Zealand.

Why measure, why publish?
It is essential for the Health Quality and Safety Commission (the Commission) to demonstrate both the fact of change and its effects. This imperative is recognised internationally and was famously expressed in 2008: ‘We can only be sure to improve what we can actually measure.’ Additionally, in an age less deferential to health care professionals, the risk of reduced trust is countered by increased transparency. Further, increasing evidence suggests that appropriate publication of data may, by itself, drive improvement. However, the effective and economical measurement of the quality of health and disability services is not easy.

In response to the Ministerial Review Group report (‘the Horn report’), Section 59B was added to the 2000 New Zealand Public Health and Disability Act on 9 November 2010. This new legislation called for the formation of the Commission, and amongst other responsibilities gave the Commission a new duty, ‘to determine quality and safety indicators . . . for use in measuring the quality and safety of health and disability support services.’

In the last 3 years the Commission has overseen the introduction of an architecture of interacting measures to meet this requirement. The interrelationship between these measures is complex and mutually supporting, akin to that of the pieces in a game of chess—on their own, individual measures, and even sets of measures, provide limited information: it is the overall picture that matters. Thus our measurement architecture is designed to present a dynamic and comprehensible picture of the quality and safety of our fluid, multilayered system.

There are diverse approaches to the measurement of quality and safety internationally. Each context has specific constraints, demands, and opportunities. The architecture described here incorporates valid and reliable measures pertinent and useful to the New Zealand (NZ) system. We have drawn upon the system’s unique strengths—such as centralised, robust data collections and the single-payer system.

Other jurisdictions have measurement frameworks that reflect local conditions. For example, the NHS in England, which in the 2000s adopted an approach of quasi-markets with regulation and central targets, combined process measures with performance thresholds with a complex aggregation of outcome data used as a “risk spotting” tool to trigger regulatory intervention. Scotland, in contrast, emphasised collaboration and quality improvement and so adopted an “information for improvement” approach.
Meanwhile, in the Netherlands, the Health Care Performance Report is designed to allow the Health Minister to give an account for the performance of the Dutch Health System, in line with the 2008 Tallinn Charter of which the Netherlands is a signatory. The point is that context matters. While there are lessons to be learned, jurisdictions cannot just take each other’s frameworks and apply them. Each measurement architecture must start with the specific, local political, economic, systemic, and cultural circumstances, and build from there.

Here we describe three sets of measures that serve different purposes. Quality and safety indicators (QSIs) are whole-system measures designed to capture a broad and deep insight into the health of NZ health care over time. Quality and safety markers, or QSMs, are a targeted subset of measures to assess the use and effectiveness of the Commission’s evidence-based interventions.

The New Zealand Atlas of Healthcare Variation captures differences in the health care received in different regions and by different groups of patients within the country, and informs the debate on optimal approaches to the delivery of health care services.

In this paper we provide an overview of these three sets of measures and explain their rationale.

**Quality and safety indicators (QSIs)—capturing the big picture**

The current set of QSIs were selected with wide sector and consumer consultation underpinned by an expert advisory group. Trying to measure everything would risk achieving nothing. Instead, we have aimed for a focussed, achievable set of meaningful measures that are valid, reliable, feasible, and economical to collect.

The QSIs address the six aims in the Institutes of Medicine’s seminal quality manifesto *Crossing the Quality Chasm* (2001): safety, patient experience, effectiveness, equity, access, and efficiency (see figure 1). Improvement over time in a QSI represents progress toward making our health system better, safer, fairer, more effective, more inclusive, or more efficient, and in improving patients’ experience of our services.

Thus the QSI architecture measures progress toward the NZ Triple Aim: the simultaneous pursuit of three dimensions:  

- Improved quality, safety and experience of care
- Improved health and equity for all populations
- Best value for public health system resources

Improving the quality of our system and making it safer is a journey. Although targets and thresholds may well serve as signposts along the way, the Triple Aim is ongoing and sets no target to hit or threshold to meet.
The QSI set includes broad system level indicators, like amenable mortality, DALYs (disability adjusted life years) lost to adverse health care events, measures of patient experience (the Commission has designed a new 20-item experience survey that began running in all district health boards (DHBs) quarterly in August 2014), and measures of primary health care access. These indicators of what we have achieved are put into context by including information on health care spend to provide some assessment of value. (For further detailed information on the QSI set see the Commission’s website http://www.hqsc.govt.nz/our-programmes/health-quality-evaluation/.)

**Illustrative quality and safety indicators**

**Amenable mortality**—this is a whole-of-system indicator that measures the number of deaths that could potentially be avoided given timely access to health care, by matching an updated list of condition-intervention pairs to ‘premature’ deaths—i.e., conditions for which recognised interventions known to reduce mortality by over 30% are matched to deaths of under-75s from those conditions. This QSI is one of the best measures we have to show the effect of healthcare on mortality, while minimizing the influence of broader causes such as poverty, inequality and infrastructure. It is more powerful than life expectancy, and though the indicator is a classic ‘can opener’ (it raises questions without clear answers), it provides useful international comparison and information about changes in
health care mortality over time. Amenable mortality is inexpensive to construct and has obvious relevance. Despite limitations of timeliness due to delays on reporting of mortality by cause, when paired with healthcare spend (see below) it provides a useful measure of how health expenditure is providing value for money.

We have greater confidence in amenable mortality than in hospital standardised mortality ratios (HSMRs). HSMRs compare hospitals by comparing the number of people who die in them, ‘correcting the figures . . . for factors outside the hospitals’ control—severity of disease, age, sex, route of admission (emergency or elective) and comorbidities’. Their attraction is in relative ease, convenience and cheapness of construction, and apparently clear meaning, importance and moral weight. However, controversy over the measure has polarised clinicians and statisticians in the UK.

There are misgivings over the adequacy of attempts to adjust the indicator for case mix and for bias arising from institutional coding practices and lack of depth in coding. Thus there is considerable doubt over the ability of HSMRs to provide truly meaningful information. In the UK, reservations over these issues have led to mistrust by clinicians of judgments formed on the basis of HSMR ratings. Though not suitable to be a single definitive or summary measure of quality, or to rank hospitals, or calculate so called ‘avoidable’ deaths, we will nevertheless include a refined version of the measure (the version used encompasses all deaths in and out of hospital within 30 days from admission, for example). The intention is the HSMR be understood and interpreted in its proper and most rewarding capacity — to track changes in trends over time as one within a suite of indicators that support a quality improvement framework.

Spend: health care cost per capita/GDP (using purchasing power parity dollars to allow international comparisons)—in absolute terms NZ’s current health care cost per capita is comparatively low, just above the OECD average. Only some recession-hit countries, former Soviet Bloc countries recently acceded to the European Union, and a few low- and middle-income economies in the OECD list spend less per head on health care.

Given the health outcomes achieved in NZ this points to a very efficient system. However, as a proportion of GDP, our health care expenditure is relatively high at 10.3%, and has risen faster than the OECD average every year since 1999. Money spent on healthcare is unavailable for other determinants of health—addressing, for example, two of the three factors Asher has called the ‘triple jeopardy’ for the health of NZ children: poverty, poor access to primary care, and cold, damp, overcrowded housing.

Thus, while our health care is relatively inexpensive, NZ is less able than many countries to easily increase what it spends. International experience shows that more expenditure does not necessarily result in better outcomes but, equally, low spend does not necessarily equal greater efficiency.

Occupied acute bed days for people aged 75 and over who had two or more emergency admissions in a financial year per 1000 population—this contributory indicator is demonstrated in England and Scotland and is constructed from routine National Minimum Dataset (hospital events) data. It measures the effectiveness of the integration of primary, acute, and community-based care. Poorly integrated care results in people, notably older people, not receiving the care they need when they need it, and where they need it—in the community. Consequently, they may fall through the gaps until the most urgent, intensive and expensive care—an acute admission to hospital—follows. UK estimates suggest that England-wide elimination of wasteful variation in this measure could release as much as NZ$4bn (£2bn: equivalent to 2.5% of the NHS budget) back into the NHS. Further, once admitted, this group is most at risk of in-hospital falls and hospital-acquired infections—major focus areas for the Commission—so the potential savings in financial and human terms are considerable.
The good news: NZ has relatively low levels of occupied bed days for this indicator, compared, for example, with England: NZ average for 2010/11: 1260 (minimum: 823; maximum: 1657), v England average for 2010/11: 2020 (min: 854; max: 5550).19 Nevertheless, there is still more variation between regions than there should be. If the entire country achieved the rate seen in the best areas, the potential savings are conservatively estimated at NZ$20 million.19,20

Immunisations—This QSI measures the number of 2-year-old NZ children who have received the complete set of age-appropriate vaccinations on the National Immunisation Schedule: measles, mumps, rubella, diphtheria, tetanus, whooping cough, polio, hepatitis B, pneumococcus and Haemophilus. Combining two aims, this indicator sheds light on the effectiveness of public health programmes and the level of access to primary care services. Thanks to the National Immunisation Register and national initiatives, immunisation rates in NZ have risen markedly in the last several years, from 67% in 2007, to around 80% in 2009 (still well below the 2009 Australian rate of 92.2%), to the current rate in December 2013 of about 92% (Australia’s 2014 rate is 92.6%).21–23

The immunisations QSI demonstrates how equity is not a measure that sits apart from other indicators of health in the country. QSIs are stratified to show variations between different socioeconomic and ethnic groups. In 2007 the national immunisation rate for Māori children was just 63%.24 Pleasingly, in December 2013, that had increased to 91%. Disparities in immunisation coverage have reduced to the point where there is now little if any socioeconomic and ethnic variation across the country (see Figure 2).

Figure 2. Immunisations at 24 months of age, by deprivation quintile and ethnic group, 12 months to December 2013


Primary health care access—this measure is still in development. New Zealand has relatively high rates of prompt access to GPs (second equal behind Switzerland, the UK and France). However, the proportion of patients reporting difficulties accessing out-of-hours primary care is 46% (this is disconcertingly high, though the median for the 11 OECD countries compared is 52%).
The difference between below-average and above-average income groups reporting difficulty accessing out of hours care is 22 percentage points. This is the largest income gap in the Commonwealth Fund’s comparison chart. Further, 23% of those on below-average income who had a medical problem did not visit a doctor because of the cost. This is second only to the US at 39%, more than double the median, and compares very poorly with Australia at 14%, Canada at 7%, and the UK at 1%.  

This is only one indicator of equity, but one that has changed little since 2001. Other researchers have found financial barriers to needed primary care exist for a substantial subgroup of New Zealanders, and it is not satisfactory to have an agency like the Commonwealth Fund saying (with at least some justification): ‘The United States and New Zealand are last and second-to-last, respectively, on the equity domain’.  

**QSMs—specific measures for specific interventions**  
The Commission’s programmes include evidence-based interventions to assist New Zealand’s DHBs to address specific forms of preventable patient harm. For each of these interventions the Commission has devised a set of quality and safety markers (QSMs) to measure their implementation and impact. There are currently five sets of QSMs comprising 23 individual measures.  

Implementing QSMs has numerous challenges. The markers must engage clinicians, minimise perverse incentives, and minimise misinterpretation—those who gather, interpret and act on the data must be in no doubt as to their purpose and value. QSMs derive their shape from Avedis Donabedian’s 1966 model of the organisation of health care provision: structure; process; outcome.  

When an evidence-based improvement practice (that is, a process) is introduced, measuring its uptake provides straightforward information: case mix is irrelevant and more is unequivocally better. However, measuring process alone runs the risk of generating gaming behaviour to meet thresholds for uptake, and also of failure to recognise nonetheless important improvement that might miss the target level.  

On the other hand, outcomes are typically difficult and expensive to measure and even when easily measurable are subject to confounding (notably by differences in case mix) and to questions of causality.  

QSMs therefore combine one or more process measures (and/or occasionally a structural measure) with a relevant outcome measure. The aim is not to measure overall outcome, but rather to choose one element that can provide an indication of the effectiveness of the intervention. In this way QSMs measure the success or otherwise of the introduction of the intervention to improve process, and then show the associated reduction of the selected aspect of harm, or improvement in the selected element of quality of health care.  

An easily measurable outcome is chosen that would be expected to move (more or less) in parallel with the overall outcome we are trying to improve. For example, rates of fractured neck of femur, though only one category of harm from falls, provide a highly illustrative outcome with large enough numbers that can be measured relatively easily.  

Not all institutions can ensure they are filled with Hood and Bevan’s saints or honest triers—those who will either voluntarily draw attention to shortcomings or at least not attempt to disguise them. Use of a measure of outcome in combination with a measure of process connects the measurement of practice to what our health care is actually trying to achieve—better outcomes. This disincentivises gaming and shows what is really happening with the actual problem—there would be little point in misreporting levels of a process measure when the measure of the outcome we’re trying to influence suggests nothing has yet improved. Another feature of the QSMs is that they are reported against the
baseline of each institution. This allows the emphasis to be on improvement rather than on the absolute rate.

Aggregated, QSMs monitor progress in our quality improvement projects and give a picture at a national level of progress toward our core goal: care that is safer, better and more affordable (see Figure 3).

**Figure 3. How outcome contextualises process**

<table>
<thead>
<tr>
<th>Process</th>
<th>Outcome</th>
<th>Outcome measures</th>
<th>Process measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
<td>The desired result—target is met for process and improvement is shown in outcome.</td>
<td>&quot;Hitting the target and missing the point&quot;: process has improved but there is no sign of the desired outcome arising.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The intervention seems to be working, but are there confounders?</td>
<td>More thought needed to understand what is happening.</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Outcome improved but not process—this could represent regression to the mean for the outcome measure but should prompt the question: is something else happening?</td>
<td>No improvement in process or outcome. More work needed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More work needed.</td>
<td>(No excuse not to change.)</td>
</tr>
</tbody>
</table>

**Illustrative quality and safety marker**

The central line associated bacteraemia (CLAB) QSM—One process measure is the percentage of intravenous catheter insertions in hospital where the recommended insertion bundle of best practices is used. The other process measure is the percentage of insertions where the line maintenance bundle of best practices is used correctly. The outcome measures are the number of CLAB cases reported against central venous line days, and the associated costs. DHBs voluntarily collect process and outcome data and report them centrally monthly. The QSM measures national adoption over time of recognised processes, and then demonstrates benefit over time in terms of reduced harm and dollars saved (see Figure 4).
Figure 4. Public reporting of process and outcome measures for central line associated bacteraemia (CLAB) intervention

![Figure 4](http://www.hqsc.govt.nz/our-programmes/health-quality-evaluation/projects/quality-and-safety-markers/qsms-january-march-2014/)


**Harvesting not collecting**

The burden and cost of data collection is a key criterion for QSI and QSM selection because, in the words of Bevan and Hamblin, ‘Using resources for performance management, rather than delivery, of health care can only be justified if the former has an influence on the latter.’ New Zealand has rich, unified, routine data sources and the ability to link datasets, thanks to a single payer system, the Ministry of Health and in some substantial part to work in the mid-2000s of the Commission’s predecessors: EpiQual (the National Health Epidemiology and Quality Assurance Advisory Committee) and QIC (Quality Improvement Committee). This reduces the burden of collection. Where possible, QSM measures are selected so data can be harvested from these routine, extant sources rather than collected de novo. Out of 23 measures only 3 required specific collection—two process measures for falls and the process measure for surgical checklist use.

**Publication**

A growing body of evidence supports the view that thoughtful, careful and consultative publication of performance measures is both in the interests of transparency and has powerful effects on performance improvement. There are compelling arguments to focus on performance at relatively aggregated levels rather than at the level of individual practitioners. The Commission also takes considerable care to consult with providers before publishing data (to allow them to question or verify their reliability) and to provide interpretative and contextual information with the published measures and indicators.
The New Zealand Atlas of Healthcare Variation

Regional variation in the provision of health care has been measured in the US since 1996 when Professor John E ‘Jack’ Wennberg published the first iteration of the seminal Dartmouth Atlas of Health Care. By 2011 the BMJ felt able to write, ‘It is not wholly fanciful to compare the Dartmouth Atlas of Health Care with On the Origin of Species . . . Darwin’s book showed our descent from apes. The atlas exploded the belief that medicine is based firmly on science.’

The New Zealand Atlas of Healthcare Variation, first published in 2012, is one of few in the world (the Dartmouth atlas has expanded dramatically, the NHS atlas was published in 2010, and Germany, Spain, Australia and several Scandinavian countries have atlases). It shows variation by region in health care provision in a number of important domains. (Currently 15: asthma, ambulatory sensitive hospitalisations (limited release), cardiovascular disease, demography, diabetes, falls, gout, maternity, mental health key performance indicators, opioids, polypharmacy in older people, suicide (limited release), surgery—grommets and tonsillectomy in children, trauma, and well child.)

If medicine is not based firmly on science, then on what? Wennberg showed that much US health care is, in fact, driven by supply, and that the provision of some kinds of care varies up to ten-fold by area for no reason related to demography, resource or case mix. Wennberg described three categories of care: effective care, when an unequivocal choice of treatment is provided; preference sensitive care, where two or more equivalent, effective treatments are chosen from by physician and patient together; and supply sensitive care, where, rather than need, infrastructure and capacity determines how much treatment is provided. The Dartmouth Atlas has consistently demonstrated this relationship in the US—in regions where there are more intensive care unit beds, more patients will be cared for in the ICU; more specialists result in more visits to specialists; and the more computed tomography (CT) scanners available, the more CT scans patients receive.

Variation can be warranted, when it reflects differences between patients—in the mix of conditions with which they present, in their values and preferences and needs. Unwarranted variation does not reflect such differences, but instead reflects other drivers. The one thing that is obvious—once differences in case mix and the values and preferences of patients have been eliminated, the extremes of a ten-fold variation in the rate of providing a service cannot both be correct.

New Zealand’s own Atlas of Healthcare Variation shows, for example, the numbers of medical and surgical bed days occupied by people with diabetes varies up to three-fold for no clear reason. In one DHB in 2013, a quarter of total medical and surgical bed days was devoted to people with diabetes (25.2%); in another the figure was 8.1%. The national population prevalence of diabetes is 5.6%. Can this variation be explained by differences in patient preference or need? If not, what is an appropriate rate of bed occupancy for diabetes sufferers in a DHB with a given prevalence?

Atlas data and the questions they raise are fascinating for many reasons, but in the end, reducing unwarranted variation in favour of a greater national consensus on the appropriate management of common conditions will lead to better, more evidence-based care, provided more consistently at better value for money. The diabetes data are derived from considerable numbers of patients and thus differences represent considerable costs. Further, the number of people with diabetes in New Zealand is expected to double in the next 20 years—what can be done now to reduce variation, minimise waste, and maximise well-targeted care for this group in the future?

The New Zealand Atlas has unique strengths in that it uses, in the main, national data collections such as National Minimum Dataset figures from the Ministry of Health, and, for example, the Pharmaceutical Collection for polypharmacy and antipsychotic use. The information is presented in a browser in a dashboard comprised of an interactive map of New Zealand, with bar chart and results.
table, accompanying statistical analysis and methodology, double map displays to explore correlations between measures (with automatic regression analysis), and feedback from DHBs (see Figure 5).

Figure 5. Example domain of NZ Atlas of Healthcare Variation (Diabetes, proportion of medical-surgical bed days single map)


Another example of significant variation the Atlas shows us is the rate of antipsychotic use in people aged 65 years and over. The mean here for quarter 4 in 2011 is 24 per 1000. However, in one part of the country, 32 out of 1000 older people received this medication, and in another, 18—a variation of nearly two-fold unexplained by difference in disease rates. Even at low dose, atypical antipsychotics can have significant side effects, there is uncertainty over their efficacy, and evidence of a potential for abuse.49,50 Why is this variation occurring? What role do patient expectations and community experience play? Does use of these medicines need reviewing in some regions? Thus the Atlas presents questions it is incumbent upon health care professionals and providers to answer.51

If you build it, they will come

It is perhaps because of the combination of the gravity of the issue of variation they show, with no explanation for its occurrence or defined objective for improvement, that atlases are sometimes ignored and have gathered their discontents. They are not performance measurement but quality improvement tools, and responding to the information they provide is optional. Appleby et al52, Mulley53 and Schang et al54 have discussed the lack or failure of NHS provider action in addressing issues of variation that the UK atlas raises. How do we make the information useful rather than interesting? How do we make the leap from learning to practice?

In the unique, small, and intimate context of New Zealand health care, achievable, targeted interventions can affect practice and patterns of care across whole districts, even the whole country. Atlases challenge the healthcare community to address important questions and perhaps provide
objectives for improvement through the development of consensus. Awareness of variation fluctuates dramatically around the country both conceptually and in relation to its occurrence between regions.

Our first task, therefore, is to raise awareness of the Atlas and improve the sector’s understanding of different types of variation. The Commission has produced a set of targeted resources to help physicians and primary health organisations (PHOs) unpack the wealth of information the Atlas provides, and start sorting through its implications for their own particular regions. One of these resources is *Variation and improving services: case studies and key questions*, a report produced by Sapere Research Group, which works through analyses of variation in polypharmacy and in grommet operations and what can be done at the PHO level to address variation in these areas. The Commission has also produced literature reviews, and guides to analysis and interpretation of the variation the Atlas shows in order to address the widely differing contexts of different PHOs.\(^{55-57}\)

A recent addition to the Atlas, and a worldwide innovation in variation work in the process of roll-out, is Find My Patients, developed under the auspices of the Atlas steering group, headed by Nigel Millar, chief medical officer at Canterbury DHB. On the Atlas page for a given domain appears a button marked “Find My Patients”, which explains to the user how to access pre-defined queries in their patient management system (PMS). In this way the user can move from looking at an atlas describing variation nationally to running a query that generates a list of their patients who may contribute to that variation and benefit from review.

In New Zealand, for example, on average, 2 in 5 people with gout regularly received the first-choice, long-term urate-lowering therapy, allopurinol. Regular allopurinol use was in fact inversely related to indicators of poorly controlled gout—nonsteroidal anti-inflammatory drug use, colchicine use, and hospital admission. Although gout affects up to one-third of Māori and Pacific males over 65 years, variation between ethnic groups shows Pacific peoples receive the least allopurinol.\(^{58}\)

GP s who see from the Atlas that their district is less likely to provide a given treatment for gout can click Find My Patients to run a query in their PMS identifying specific patients in their practice who might be contributing to this variation and who may profit from review of their treatment. So, patients who may benefit from a treatment can be offered it, simple failure in the delivery of optimal care is addressed, and national variation can conform more closely to patient need and preference.

Find My Patients is fully functional in approximately 90% of New Zealand GP PMS, including MedTech (Evolution and 32) and MyPractice. It is being actively promoted via PHOs.

**Conclusion**

Just as in the game of chess, it is the relative positioning and interrelationship between measures that defines the overall position. We have described a three-tier system of measurement, based upon international state of the art exemplars, that is tailored to the unique constraints and opportunities of the New Zealand context.

QSI s address national outcomes or processes that are internationally comparable, clearly important and well understood. The country’s performance can be monitored and improved over time. QSMs are smaller, more focussed measures, used to monitor and drive improvement in targeted programmes and projects over defined periods of time. Together, these measures form an overarching architecture that provides a dynamic, practical and affordable picture of the quality and safety of healthcare in New Zealand. The Atlas demonstrates variation in the provision of health care services over the country, and poses questions about the ideal rates of key health care services.
Replacing idiosyncratic, provider-driven variation with variation that reflects differences between patients, such that people receive treatments that are effective and address their real needs and preferences, is perhaps the single most important requisite to the provision of effective and affordable health care.

**Competing interests:** Nil.

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Reversible hypertensive encephalomyelopathy—the spinal variant of the posterior reversible encephalopathy syndrome

Teddy Y Wu, Diana Y Wei, Anthony Jordan, Chris Kenedi, Andrew D Smith, Dean H Kilfoyle

Abstract
Posterior reversible encephalopathy syndrome (PRES) is characterised clinically by encephalopathy, headache, visual disturbance and/or focal neurological symptoms. Bilateral cerebral oedema on T2 MRI sequences within the posterior cerebral white matter is the radiological hallmark, although involvement of the frontal lobe, basal ganglia and brainstem can occur. PRES with spinal cord involvement has been rarely reported and is under-recognised due to lack of myelopathic features in nearly half of the reported cases. We report a patient with PRES with spinal cord involvement and review the literature.

Case report
A previously well 35-year-old man presented with a 3-week history of global headache, confusion and blurred vision. His systolic blood pressure fluctuated between 135 to 236 mmHg, spending most of the time above 200 mmHg. On examination he was alert but disorientated to date. He had grade-4 hypertensive retinopathy and visual acuity of 6/60 bilaterally without other abnormal neurological findings including absence of brainstem or long tract signs. Electrocardiogram demonstrated left ventricular hypertrophy.

Extensive evaluation for secondary hypertension demonstrated a single area of isolated right renal cortical scarring with increased renin secretion from the right kidney (960 mU/L versus 605 mU/L from left renal vein and 586 mU/L from peripheral blood). The renal pole scarring was thought to be the cause of the renin secretion and hypertension.¹

Magnetic resonance imaging (MRI) of brain and cervical spine demonstrated an extensive bilateral T2 hyperintensity in the splenium, cerebellar peduncles, pons and medulla extending the length of the imaged spinal cord with contrast enhancement (Figure 1a, 1b). In addition, minor asymmetric signal change was present in the right occipital region and left corona radiata (not shown).

Following control of his blood pressure, his mental status and vision improved and he was discharged home 9 days later. Follow up MRI brain and spine at 4 months demonstrated near complete resolution of abnormalities (Figure 1c, 1d). He had persistently impaired vision in the left eye (6/24) but an otherwise normal neurological examination.
Figure 1. Axial FLAIR brain MRI (1a) at presentation showing diffuse high signal within brainstem structures; Sagittal T2 of cervical spine (1b) demonstrating longitudinally extensive high signal change within the imaged region with cord expansion. Follow-up MRI 4 months after presentation; axial FLAIR brain (1c) and sagittal T2 spine (1d) sequences demonstrating near complete resolution of the high signal changes observed on initial imaging.

Discussion

Posterior reversible encephalopathy syndrome (PRES) is characterised clinically by encephalopathy, headache, visual disturbance and/or focal neurological symptoms.² Bilateral cerebral oedema on T2 MRI sequences within the posterior cerebral white matter is the radiological hallmark, although involvement of the frontal lobe, basal ganglia and brainstem can occur.²

We present a patient with spinal variant of PRES, which has been reported in 8 previous cases summarised recently by de Havenon et al³ and the term PRES-SCI (spinal cord involvement) was proposed. All reported cases including our patient have significant hypertension, in contrast to 70% to 80% of PRES patients in general.
Strikingly, only 5 of 9 (56%) cases of PRES-SCI had relevant clinical myelopathic findings in concordance with the clinic-radiological dissociation observed in hemispheric PRES. Seven reported patients (78%) had full resolution of clinical symptoms.

Our patient also had prominent brainstem involvement on imaging, consistent with reported cases (8 of 9) of PRES-SCI. It is our view that that PRES-SCI is part of the spectrum of PRES with brainstem involvement, although the incidence is likely under-estimated given nearly half of the reported patients had no myelopathic findings and no clinical indication for spinal imaging.

The differential diagnosis for mild delirium in a hypertensive patient is wide but the causes for extensive spinal cord abnormality on imaging has a narrower differential diagnosis (Box 1). The striking dissociation between clinical and radiological severity in this patient, a common feature of hemispheric PRES, led us to consider this diagnosis.

Box 1. Differential diagnosis for longitudinally extensive high signal changes within spinal cord

<table>
<thead>
<tr>
<th>Inflammatory</th>
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<tbody>
<tr>
<td>Neuromyelitis optica spectrum disorder</td>
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<tr>
<td>Idiopathic transverse myelitis</td>
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<tr>
<td>Sarcoidosis</td>
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<tr>
<td>Acute disseminated encephalomyelitis</td>
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<tr>
<td>Paraneoplastic myelitis</td>
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<td>Connective tissue associated myelitis</td>
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<tr>
<th>Vascular</th>
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<tr>
<td>Congestive myelopathy secondary to spinal dural arteriovenous fistula</td>
</tr>
<tr>
<td>Arterial ischaemia</td>
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</table>

<table>
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<tr>
<th>Other</th>
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<tbody>
<tr>
<td>Subacute combined degeneration of the cord</td>
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<td>Copper deficiency</td>
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<tr>
<td>Nitric oxide toxicity</td>
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<td>Intrinsic cord tumour</td>
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Hypertension induced blood-brain barrier dysfunction and autoregulatory failure similar to reperfusion injury following carotid revascularisation are the presumptive mechanisms for PRES. A breakdown of the vascular autoregulatory mechanism in the spinal cord is likely responsible for spinal cord involvement in this condition. Based on prior reports and the clinical course of our patient, management and prognosis of PRES-SCI is similar to that of “typical” PRES.

Competing interests: Nil.

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Acknowledgement: We thank Dr David Semple (Auckland DHB) for his expert commentary and assistance in the management of hypertension in this patient.

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Primary Raynaud’s phenomenon
Taso Beyong, Tony Ete, Synrang Batngen Warjri, Bhupen Barman

A 22-year-old female, non-smoker, presented with chief complaint of sudden onset pain and discoloration of the extremities of all fingers of both the hands. She had past history of similar attacks, usually in the winter season and precipitated by exposure to cold.

There was no history of intake of medications such as beta-blockers and ergotamines. Furthermore, the patient had no history of working with any vibrating tools or machinery.

On examination there was tenderness and blanching and clear demarcation of the discolorations of the fingers (Figure 1).

Figure 1. Extremities of fingers showing Raynaud’s phenomenon on exposure to cold

The tenderness subsided and the skin colour returned to normal on keeping them warm for an hour. There were no other signs and symptoms suggestive of connective tissue disorders, peripheral vascular disease and blood dyscrasias.

On further evaluation, ESR was within the normal limit. CRP, RA factor and ANA were negative. Chest X-ray was normal with no evidence of cervical rib. In the absence of any other underlying
illness, such episodic presentation of sudden onset is characteristic of primary Raynaud’s phenomenon.

The patient was discharged with reassurance and advised to keep the extremities warm. Nail fold capillaroscopy is a non-invasive and safe tool to morphologically study the microcirculation. It has a role in differential diagnosis of patients with Raynaud’s phenomenon and also has a role in predicting the clinical complications in connective tissue diseases.

Primary Raynaud’s phenomenon is usually treated with lifestyle modifications and drugs such as calcium channel blockers and topical nitroglycerine (1% or 2%).^1,2

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References


LETTER

Chewing the saturated fat: we still shouldn’t

Rod Jackson, Cliona Ni Mhurchu

In their NZMJ editorial Advice to reduce total and saturated fat, Te Morenga and colleagues draw on the totality of the evidence to support current national and international guidelines to ‘reduce the intake of saturated fatty acids and to replace this with healthier fats from sustainably managed fish, plant oils, nuts and seeds.’ They also emphasise that ‘saturated fat should not be replaced with refined carbohydrates.’ However they are cautious in their comments on reducing total fat, acknowledging that the evidence of harm is less convincing than for saturated fat.

The editorial’s advice on saturated fat is criticised by Thornley and colleagues in their letter entitled Chewing the saturated fat: should we or shouldn’t we? They argue that there is no causal association between saturated fat intake and coronary heart disease (CHD) and advise the public to ‘chew the saturated fat.’

Thornley et al focus their argument on the apparently inconsistent findings from some meta-analyses of long-term dietary cohort studies and randomised trials, rather than considering the overall consistency of the totality of evidence, which comes from a wide range of sources using a wide range of study designs.

Their main argument is that most cohort studies, randomised trials and meta-analyses of these studies do not show a statistically significant association between saturated fat and total mortality. However this observation reflects the inherent weaknesses of these types of studies to accurately characterise participants’ dietary patterns, as well as the low statistical power of these studies to detect an effect on total mortality, rather than providing sufficient evidence to support their argument. In addition, having criticised Te Morenga et al. of subjectively choosing evidence to suit their hypothesis, they misuse Bradford-Hill’s ‘causal criteria’ to argue that their review of the evidence is more objective.

Thornley and colleagues criticise Te Morenga et al for refuting one meta-analysis by Chowdhury but supporting another by Jacobsen. However Te Morenga provides a detailed justification for their choice, giving a critique of the Chowdhury paper and a description of the specific advantages of Jacobsen’s individual participant meta-analysis. Numerous randomised controlled trials (RCTs) have demonstrated that replacing saturated fatty acids (SFAs) with polyunsaturated fatty acids (PUFAs) has a beneficial effect on lipid sub-fractions whereas replacing SFAs with carbohydrate does not. Using individual participant data, Jacobsen’s meta-analysis was able to investigate the effect of replacing SFAs with PUFAs on CHD risk and showed the expected protective association with CHD; the Chowdhury meta-analysis was unable to do this.

Thornley and colleagues argue that the Chowdhury meta-analysis is superior because it includes RCTs, but they do not mention the Mozaffarian meta-analysis of 8 RCTs also described in Te Morenga’s editorial that shows the same association in RCTs that Jacobsen reported in cohort studies. Te Morenga et al explain why the results of Chowdhury’s meta-analysis of RCTs differs from those in the Mozaffarian meta-analysis, which led to a widening of the confidence interval but otherwise no meaningful change in the findings.

Thornley and colleagues then propose that it is more objective to assess the evidence using Bradford Hill’s causal criteria. Bradford Hill never intended his series of ‘aspects to consider before deciding whether an association is likely to be causal’ to be used as criteria for proving causality and there is a considerable literature cautioning this interpretation of Bradford Hill’s paper. Thornley states that the SFA-CHD association falls down on the first ‘criterion’ of causation—strength of association—despite Bradford Hill cautioning in his paper on ‘Association or causation’ that ‘We must not be too ready to dismiss a cause and effect hypothesis merely on the grounds that the observed association appears to be slight. There are many occasions in medicine when this is in truth so.’
There are good reasons for the weak associations observed between SFAs and CHD in cohort studies and RCTs. Firstly, it is extremely difficult to accurately assess and quantify the composition of an individual’s diet, particularly a nutrient as ubiquitous as saturated fat, so our ability to classify participants in cohort studies into high and low saturated fat exposure categories is poor. Secondly, in neither cohort studies nor randomised trials are participants able to maintain their baseline or randomised diets during the many years of follow-up required to generate sufficient outcome events, resulting in substantial dilution of any differences in nutrient intake between comparison groups. These two extremely common errors in dietary epidemiology (measurement and contamination errors) will weaken any real association, particularly for common nutrients.

Contamination is a particularly serious problem in long-term randomised controlled dietary trials that require participants to be highly motivated. Participants are generally health conscious volunteers who may find it difficult to maintain a high saturated fat intake given that it is so widely accepted as unhealthy. Conversely, adhering to strict diets that are far outside the social norm for an extended period of time proves problematic for many trial volunteers.3

The Multiple Risk Factor Intervention Trial (MRFIT) conducted in 12,866 US men followed for an average of 7 years in the 1970s is one of the most famous examples of the weaknesses inherent in lifestyle-related trials.11 Those in the MRFIT intervention group made positive changes to their diet, but so did the control group, resulting in a non-significant reduction in CHD.

In the more recent Women’s Health Initiative (WHI) Dietary Modification Trial of 48,835 US women, those randomised to the active intervention low fat diet made only modest changes that fell well short of expected dietary goals, resulting in little difference in the ratio of saturated to polyunsaturated fat intake between the randomised groups. This was reflected in the minimal net reduction in LDL cholesterol in the intervention group of about 0.1 mmol/L at 3 years. Post-hoc power calculations indicated that the study had only a 40% power to detect a 14% reduction in CVD over the 8.1 years of follow-up.3

Given these major flaws in long-term randomised trials and cohort studies of diet, it is perhaps surprising that any of these studies or meta-analyses of these studies show a statistically significant association between SFA intake and CHD. Yet the Hooper Cochrane meta-analysis of dietary trials,12 that Thornley argues is less prone to bias than the meta-analyses discussed by Te Morenga, reports “that reducing saturated fat by reducing and/or modifying dietary fat reduced the risk of cardiovascular events by 14% (RR 0.86, 95% CI 0.77 to 0.96).”

Thornley et al only mention that the Cochrane report found no association with total mortality, yet in the body of the report, Hooper et al. state that ‘it is not surprising at all that while we saw reductions in cardiovascular events we did not see similar reductions in mortality—fortunately most cardiovascular events are not fatal, and many deaths are not cardiovascular in origin, so if modifying fat intake reduces cardiovascular events the effect on cardiovascular mortality and all-cause mortality will be much less clear.’12

Thornley et al conclude by stating that ‘In the absence of a strong indication of harm, we believe the public should be left to chew the saturated fat…’ As articulated by Rose, when recommending mass public measures that involve adding rather than removing a factor (e.g. saturated fat), “the required level of evidence, both of benefit and (particularly) of safety, must be far more stringent.”13

Even if Thornley’s statement that there is an ‘absence of a strong indication of harm’ was correct, we do not consider this a sufficiently stringent level of evidence on which to advise the public that they should not be concerned about how much saturated fat they consume. However, in our opinion, Thornley and colleagues’ minority view does not hold up to scientific scrutiny. While it is reasonable to debate the validity of the SFA-CHD association in a scientific forum, we consider their advice to the public to be premature given the noted flaws in their argument.
The totality of the evidence still strongly supports the view that SFA intake is causally associated with CHD and we are concerned that their advice to the public could lead to a reversal of the major declines in coronary disease mortality experienced in New Zealand and other high-income countries since the late 1960s.\(^{14}\)

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**References**


LETTER

HPV immunisation research

Karen Page

Dear Sir

Research is currently being undertaken at the Centre for Public Health Research, Massey University that may be of some interest to your readers, on HPV immunisation. The uptake rate for this vaccination, which protects against cervical cancer and some other cancers and conditions, is poor, at under 60%, compared to around 90% for most other childhood vaccinations. Overseas research has shown that health professionals are drivers of HPV vaccination consent.

Health professionals are invited to participate in a survey investigating knowledge, attitudes and issues around the human papillomavirus (HPV) vaccination. Attitudes towards male vaccination will also be explored. Surveys are anonymous, take 5–10 minutes and can be accessed at https://www.surveymonkey.com/s/M2KKRL8healthprofessionals or request a hard copy by calling 04 979 3106.

For further information, please go to http://publichealth.massey.ac.nz/home/research/recruiting-projects/hpv-human-papillomavirus-vaccination-study/ or contact k.page@massey.ac.nz

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Menstrual dysfunction and hysterectomy rates in women up to 10 years post-tubal ligation in Counties Manukau District Heath Board

Stephanie S B Sii

Tubal ligation is a commonly sought after method of contraception in both developing and developed countries. It is a permanent, low-cost and effective method and suitable for those who have completed their families.

Over the years, it is observed that women present with an increased incidence of menstrual disturbance post-tubal ligation.\(^1\) This is commonly known as post-tubal ligation syndrome (PTLS) which comprises of the physiologic and clinic changes taking place after tubal ligation, reported by women as dysmenorrhoea, pre-menstrual distress, prolonged and heavier periods.\(^2\)\(^-\)\(^4\)

This study aims to evaluate the prevalence of menstrual dysfunction and hysterectomy rates up to 10 years after tubal ligation in women in Counties Manukau District Health Board. 213 women who underwent tubal ligation in year 2004 were followed up over 10 years in a retrospective observational study looking at the prevalence of menstrual dysfunction in these women after tubal ligation. Their clinical records were evaluated for subsequent presentation with menstrual disturbance, including visits to the emergency department or gynaecology clinic. Comparison is made to the menstrual symptoms documented prior to tubal ligation and after.

In the 213 women included in this study, 25 women (11.7%) represented with menstrual problems between 2005 and 2014. Of these women, 17 women presented to the gynaecology clinic with heavy menstrual bleeding, two with peri-menopausal bleeding, one with irregular periods, three with dysmenorrhoea and two with symptomatic anaemia requiring blood transfusion.

In regards to treatment, 14 of these women received medical management, four received Mirena insertions, one underwent transcervical resection of fibroid and endometrial ablation, one underwent bilateral salpingectomy and removal of filshie clips, and six underwent hysterectomy.

The patient data was gathered from clinical notes and concerto. The limitation in this study is that there was incomplete documentation on these women’s menstrual symptoms prior to them having a tubal ligation, which limits comparison of their menstrual periods before and after having a tubal ligation. Moreover, their subsequent presentations with menstrual disturbance may not have been recorded if they only presented to their general practitioner for treatment instead of the gynaecology clinic or emergency department. Some of the women may be also lost to follow-up if they moved to a different city.

There are some factors which may have affected these women’s menstrual symptoms independent of having a tubal ligation. The cessation of use of hormonal contraception post-tubal ligation may have contributed to the increased numbers of women presenting with menstrual disturbance. Other factors like increasing age, obesity, parity, interval since sterilisation and bleeding disorders may also have effect on menstrual disturbance.\(^3\)

The Collaborative Review of Sterilisation (CREST), a large multi-centre prospective study reports that their study participants experienced higher levels of menstrual pain, heavy menstrual flow and irregular periods 5 years after tubal ligation.\(^5\) On the contrary, several other studies have showed no difference in the prevalence of menstrual disturbance and hysterectomy rates between women who have and have not had a tubal ligation.\(^3\)
To date, there is no proven causal link between women who underwent tubal ligation and the risk of subsequent menstrual disturbances.\(^3\) However, it is observed that menstrual irregularities, menstrual pain and prolonged periods increase with advancing age.\(^1,3\)

In Counties Manukau, the women population have a higher incidence of obesity, high parity, recurrent unplanned pregnancies, and maternity morbidity and mortality rates compared nationally. Early discussion about contraception and offering tubal ligation as a contraceptive measure are important but should be undertaken with sensitivity and care. It is noted among 250 women included in our study, 27 women had a tubal ligation below the age of 30, which is a significant proportion.

The Levonorgestrel Intrauterine Delivery System (Mirena IUS) is reversible, long-acting and provides contraception up to 5 years. The additional benefit of the IUS is that it is used as a treatment for heavy menstrual periods with iron deficiency anaemia and is subsidised in New Zealand for this purpose.\(^6\) It can be offered as a suitable contraceptive method for women who seek contraception and experience dysfunctional menstrual bleeding.

In conclusion, menstrual dysfunction is more prevalent with increasing age. Sterilisation at a younger age may have more effect on menstrual disturbances than older age. In younger women, the Mirena Intrauterine system (IUS) should be considered in women prior to offering a tubal ligation.

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**References**


LETTER

The New Zealand Register of Exercise Professionals (NZ REPs)

Nigel Harris, Lance Dalleck, Matthew Wood, Stephen Gacsal

The New Zealand Register of Exercise Professionals (NZ REPs) is an independent registration body with over 2400 registered exercise professionals in New Zealand, representing over 60% of the sector nationally. Registration for exercise professionals is now in place internationally in over 30 countries, providing an independent verification process that exercise professionals and facilities meet the standards required to provide safe and effective exercise advice and serves a range of stakeholders including the public, allied health professionals, and employers.

A new New Zealand industry standard pre-exercise screening form and guide has been developed by NZ REPs and released to industry at the start of this year.

There are four key sections to the pre-screen.

- The first section is for structured exercise participation risk stratification and is based on internationally accepted, evidence-based models (for example, the American College of Sports Medicine’s pre-participation screening1). The section covers standard risk stratification criteria such as known existing cardiovascular, pulmonary and metabolic conditions. It also allows for exercise professionals that choose to conduct some simple screening tests in an appropriate setting. The options include blood glucose and lipid profile using point-of-care devices or from laboratory results.

  The pre-exercise screening guide accompanying the form itself is very clear on the scope of practice. It states clearly that the tests are not diagnostic and any results beyond accepted normative values should prompt referral to a GP. Our hope is that such screening may help to identify individuals otherwise unaware of impending metabolic dysregulation. There are also many individuals engaging the services of NZ REPs who have existing diagnoses from their GP and have either been referred to exercise in general, via “Green Prescription”, or are independently seeking to commence remedial exercise. Accordingly, the guide also includes a template ‘Health Professional Referral Letter’ to expedite a closer working relationship between allied health professionals and the exercise industry by facilitating a clearer, mutual understanding of key exercise indications and contraindications.

- The second section captures conditions not included within standard risk stratification criteria but clearly of importance for consideration in the exercise prescription process. Musculoskeletal conditions, diagnosed medical conditions other than those identified in the previous risk stratification section, and medications prescribed are included. At the very least, identification of important conditions and medications will encourage closer enquiry and consultation with allied health professionals such as the referring GP on important exercise related implications.

- The third section is a template on which to capture key exercise prescription information to inform subsequent prescription. Aspects such as exercise participation history, goals and availability for attendance all inform more effective and efficient bespoke exercise prescription.

- The final section is titled ‘Monitoring Progression’ and serves as a repository for exercise assessment responses and results including aerobic capacity, body composition, strength, and movement competency. The assessment-prescription connect is an important aspect for
Exercise professionals to consider in order to underpin exercise prescription choices and objectively quantify progression towards stated targets.

Exercise is medicine,2–4 and we hope that the NZ REPs pre-exercise screening process will encourage medical practitioners with an inclination to indicate the benefits of exercise for their patients. Where GPs acknowledge the plethora of evidence on the potency of exercise, such a mutual understanding will surely enhance patient outcomes through more detailed and informed exercise prescription to complement medical advice. Resistance training, for example, is widely acknowledged for its preventative and remedial value,3 but is arguably a modality that requires some specific expertise in progressive structured, somewhat supervised4 prescription for safe, effective outcomes.

With the expertise and experience of medical practitioners and the understanding of prescribing and monitoring exercise programmes incorporating specific understanding of fundamental pathophysiology, indications and contraindications directly from a GP referral, we believe such outcomes will be enhanced.

A link to the guide may be found at www.reps.org.nz/prescreenguide

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References


LETTER

Incidence of motor neurone disease in Hawke’s Bay and Gisborne/East Coast

Philip C H Baker

The observational study reported by Dayel et al\(^1\) suggests that motor neurone disease (MND) may be more common in the greater Wellington region than expected, although the authors acknowledge that their annual prevalence of 8.5 per 100,000 cannot be directly compared to reported point prevalence studies, which give an average prevalence of about 4 per 100,000.

A previous study from Canterbury described an increasing incidence of MND from 1.6 to 3.3 over the 22 years ending 2006.\(^2\) For many years I have also had the impression that I have looked after more patients with MND than expected for my population base of almost 200,000 and so since mid-2009 I have prospectively collected data on all patients with this condition who reside in Hawke’s Bay or Gisborne/East Coast region.

Between 1/1/10 and 31/12/14 there were 25 new cases of definite MND. As the sole Neurologist in this area until August 2013 I personally saw all these patients apart from one seen in 2014 by my new colleague. The average annual incidence was 2.5 per 100,000. This is higher than reported from overseas (1.89 in a 2001 review\(^3\) and 2.08 reported in 2013 from a meta-analysis of 37 recent studies.\(^4\))

None of my patients had a known family history of MND but no genetic studies were done. Thirteen of my patients (52%) had a predominantly bulbar onset, which is significantly higher than in other studies from New Zealand or overseas. Seven had mixed lower and upper motor neurone signs at diagnosis (definite amyotrophic lateral sclerosis) and five had only lower motor neurone signs. All patients progressed to definite ALS.

To determine point prevalence of MND I counted all known patients at the beginning of the study and then recalculated the figure each time a new patient was diagnosed or died. Between mid-2009 and mid-2012 prevalence varied between 5 and 10, and rapid changes could be explained in part by the high mortality rate, especially in patients with bulbar onset, where median time from diagnosis to death was only 12 months.

Overall the average point prevalence was just under 4 per 100,000 which is the same as reported in overseas studies. The annual prevalence calculation used in the Wellington study is likely to overestimate how common motor neurone disease is in that region. To demonstrate this I have looked at my figures for the year 2011.

In January 2011 there were 10 patients with MND living in my region and another 6 patients were diagnosed that year which would give an annual prevalence of 16 or 8 per 100,000 which is quite different than the average point prevalence for the whole study. However my data provide more evidence that there may be a small increased incidence of MND in New Zealand than expected.

The second part of the paper by Viyal et al discusses aspects of management of patients. There are good American\(^5\) and European guidelines which emphasise proactive management of nutritional needs, including PEG tube feeding, respiratory failure and palliative care. In my experience it is possible to follow these guidelines in a general Neurology clinic in a regional centre and management can be audited.\(^6\)
Close liaison is required between the Neurologist and a large team of others including the Neurology nurse, therapists and other medical specialities.

I agree with the editorial by E. Scotter stating that both regional and nationwide studies of motor neurone disease in New Zealand are needed.

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References


Wells score, D-dimer testing and computer tomographic pulmonary angiography appropriateness in the Auckland Hospital Adult Emergency Department

Greg P Tarr, Lucy Modahl, Peter Jones

Pulmonary embolism (PE) may be safely ruled out in some patients by using the validated Wells score and selective measurement of D-dimer. However, clinical non-adherence appears to be common, and up to one-third of CTPA studies may be avoidable.

The Auckland Hospital Emergency Department has a guideline recommending the evidence-based use of Wells score and D-dimer. This recommends stratifying patients into low (≤4) and high pre-test (>4) probability groups using the Wells score. Those with a low score go on to D-dimer testing, and those with either high Wells score or positive D-dimer are recommended to undergo CTPA.

Patients undergoing D-dimer testing and CTPA studies in the Auckland Hospital Emergency Department from August 2011 to August 2013 were randomly selected. Data were obtained from clinical documentation and formal radiology reports, including D-dimer and information sufficient to calculate Wells score.

D-dimer levels ≥500 micrograms per litre were considered positive. For age-adjusted levels, D-dimer greater than patient age times 10 was considered positive.

If Wells score was not documented, two assumptions were made—the conservative assumption required PE as the sole listed differential, or a gestalt statement of PE being high risk to classify “PE is as or more likely”. The liberal assumption required PE to be listed in the differential, or a gestalt assumption of moderate/high risk.

Statistical analysis was performed with GraphPad Quick Calcs (GraphPad Software 2014). Results were presented as mean (95% confidence intervals), or number (percentage). This audit did not require formal ethical approval.

30 patients from each of the CTPA and D-dimer pool were selected. Most patients were middle aged, female, and New Zealand European. Most patients did not have a documented pre-test probability (Table 1). D-dimer tests were frequently used inappropriately (Table 2). However, the appropriateness of D-dimer non-use depended on assumptions for Wells score calculation.

CTPA were ordered by inpatient teams for seven patients, who were not included in analysis of CTPA appropriateness, leaving a total of 53 patients (Table 2). The majority of CTPA studies were in accordance with the guideline. A small proportion of CTPA completed were potentially overused, depending on assumptions. No potentially avoidable CTPA study demonstrated a PE. There were no instances of potential under investigation (0%; 95% CI 0 to 13.5%).

The application of an age-adjusted D-dimer cut-off point would have altered the interpretation of D-dimer testing in two individuals from positive to negative tests (3.6%; 95% CI 0.3 to 13.0%), one of whom had a low Wells score. The need for one CTPA (2% of all performed; 95% CI 0 to 13.2%) may have been clinically excluded by using an age-adjusted D-dimer value.

We found that pre-test probability was documented infrequently and D-dimers often overused in patients undergoing investigations in the Emergency Department. This is similar to other published...
findings in New Zealand, in medical inpatients\textsuperscript{6} and general inpatients.\textsuperscript{7} We extended these findings, observing that a substantial proportion of D-dimer tests appeared to be overused.

Table 1. Documented and calculated pre-test probability scores

<table>
<thead>
<tr>
<th>Variables</th>
<th>D-dimer n=30</th>
<th>CTPA n=30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documented Wells, n (%)</td>
<td>5 (16.7%)</td>
<td>4 (13.3%)</td>
</tr>
<tr>
<td>Documented PERC score, n (%)</td>
<td>3 (10.0%)</td>
<td>2 (6.7%)</td>
</tr>
<tr>
<td>Documented Gestalt, n (%)</td>
<td>3 (10.0%)</td>
<td>9 (30.0%)</td>
</tr>
<tr>
<td>Low risk, n (%)</td>
<td>2 (6.7%)</td>
<td>1 (3.3%)</td>
</tr>
<tr>
<td>Moderate risk, n (%)</td>
<td>0 (0%)</td>
<td>3 (10.0%)</td>
</tr>
<tr>
<td>High risk, n (%)</td>
<td>1 (3.3%)</td>
<td>5 (16.7%)</td>
</tr>
<tr>
<td>Any documented score</td>
<td>5 (16.7%)</td>
<td>12 (40.0%)</td>
</tr>
<tr>
<td>Documented scores, n (%)</td>
<td>25 (83.3%)</td>
<td>18 (60.0%)</td>
</tr>
<tr>
<td>Low risk, n (%)</td>
<td>4 (13.3%)</td>
<td>9 (30.0%)</td>
</tr>
<tr>
<td>Moderate risk, n (%)</td>
<td>1 (3.3%)</td>
<td>3 (10.0%)</td>
</tr>
<tr>
<td>Calculated Wells liberal*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 4, n (%)</td>
<td>22 (73.3%)</td>
<td>13 (43.3%)</td>
</tr>
<tr>
<td>&gt; 4, n (%)</td>
<td>8 (26.7%)</td>
<td>17 (56.7%)</td>
</tr>
<tr>
<td>Calculated Wells conservative†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 4, n (%)</td>
<td>29 (96.7%)</td>
<td>23 (76.7%)</td>
</tr>
<tr>
<td>&gt; 4, n (%)</td>
<td>1 (3.3%)</td>
<td>7 (23.3%)</td>
</tr>
</tbody>
</table>

Results are presented as number (percentage); *Liberal assumption required either documented Wells score, documented gestalt “moderate” or “high” likelihood of PE, or PE documented in pre-test differential diagnosis. †Conservative assumption required either documented Wells score, documented gestalt “high” likelihood of PE, or PE documented as most likely in pre-test differential diagnosis.

Table 2. Appropriate use of D-dimer testing and CTPA studies depending on assumptions for calculating Wells score from clinical documentation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Liberal*</th>
<th>Conservative†</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-dimer testing performed, n=60</td>
<td>55 (91.7%; 81.5 to 96.8%)</td>
<td>55 (91.7%; 81.5 to 96.8%)</td>
</tr>
<tr>
<td>Appropriate D-dimer use, n=55</td>
<td>38 (69.1%; 55.9 to 79.8%)</td>
<td>49 (81.7%; 77.8 to 95.3%)</td>
</tr>
<tr>
<td>Potentially avoidable D-dimer, n=55</td>
<td>21 (38.2%; 26.5 to 51.4%)</td>
<td>7 (12.7%; 6.0 to 24.3%)</td>
</tr>
<tr>
<td>Appropriate D-dimer non-use, n=30</td>
<td>4 (13.3%; 5.3 to 29.7%)</td>
<td>1 (3.3%; 0.5 to 16.7%)</td>
</tr>
<tr>
<td>Inappropriate D-dimer non-use, n=30</td>
<td>1 (3.3%; 0.5 to 16.7%)</td>
<td>4 (13.3%; 5.3 to 29.7%)</td>
</tr>
<tr>
<td>CTPA studies performed, n=53‡</td>
<td>36 (67.9%; 54.5 to 79.0)</td>
<td>36 (67.9%; 54.5 to 79.0)</td>
</tr>
<tr>
<td>Appropriate CTPA use, n=36</td>
<td>34 (94.4%; 80.9 to 99.4%)</td>
<td>32 (88.9%; 74.1 to 96.2%)</td>
</tr>
<tr>
<td>Potentially avoidable CTPA, n=36</td>
<td>2 (5.6%; 0.6 to 19.1%)</td>
<td>4 (11.1%; 3.8 to 25.9%)</td>
</tr>
<tr>
<td>Appropriate CTPA non-use, n=30</td>
<td>17 (56.7%; 39.2 to 72.6%)</td>
<td>17 (56.7%; 39.2 to 72.6%)</td>
</tr>
<tr>
<td>Inappropriate CTPA non-use, n=23</td>
<td>0 (0%; 0 to 13.5%)</td>
<td>0 (0%; 0 to 13.5%)</td>
</tr>
</tbody>
</table>

Results are presented as number (percentage; 95% confidence interval of percentage); *Liberal assumption required either documented Wells score, documented gestalt “moderate” or “high” likelihood of PE, or PE documented in pre-test differential diagnosis; †Conservative assumption required either documented Wells score, documented gestalt “high” likelihood of PE, or PE documented as most likely in pre-test differential diagnosis; ‡7 decisions regarding use and non-use of CTPA were made by other services and these patients were not included of analysis of CTPA use.
In contrast, we found that a minority of CTPA may have been avoided by use of the Wells score and D-dimer testing. Kim et al found that among Timaru Hospital general medical inpatients, between 6 and 30% of all CTPAs requested may have been avoided. We found that a small minority of patients were potentially under-investigated with D-dimer, but that no patients failed to undergo CTPA when it was indicated. Utilising a recently validated D-dimer cut-off point based on the patient’s age, a small number of CTPA studies may be able to be avoided. In the original study 11% of patients with low pre-test probability had D-dimers were safely considered negative after applying an age-adjusted cut-off point, with older patients more likely to be reclassified as negative. Limitations included that data were collected retrospectively, Wells score was inferred from clinical notes and the sample size was relatively small.

During the work up for PE in the Adult Emergency Department, pre-test probability appears to be underused, and D-dimer testing is frequently overused. However, the majority of CTPA studies were appropriately used. It may be possible to avoid a small number of CTPA by adopting an age-adjusted cut-off point for D-dimer testing.

Acknowledgement: The funding support of the Auckland Hospital Adult Emergency Department is greatly appreciated.

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References
LETTER

Realignment of tobacco control services—will it be sufficient to achieve the nation’s Smokefree 2025 Goal?

Richard Edwards, Janet Hoek, Robert Beaglehole, Nick Wilson, George Thomson, Chris Cunningham

The Ministry of Health’s recent announcement of a realignment of tobacco control services has heralded a welcome focus on the New Zealand Government’s Smokefree 2025 goal, and an acknowledgement that we are not on track to achieve it. However, we believe that the realignment will not address some key issues, most importantly the requirement that the Government should adopt and implement a comprehensive plan to achieve the goal.

In the realignment contracts for all face-to-face stop smoking services, and local and national health promotion and advocacy services will end in June 2016 and be re-tendered. This action is apparently a response to the recent Review of tobacco control services and emerging evidence that the Government’s Smokefree 2025 goal will not be achieved if the current business as usual approach continues, particularly for Māori and Pacific populations. Prior to this announcement a decision had already been taken to replace the highly successful and internationally renowned dedicated Quitline service in favour of a broader national telehealth service.

Subsequent media coverage has implied that realising the Smokefree 2025 goal requires a reassessment of funding allocated to anti-tobacco groups. Whether intentional or not, these media reports suggest the tobacco control sector, in the form of smoking cessation providers and advocacy organisations, are seen as an impediment to achieving Smokefree 2025. We believe this implication is incorrect.

We suggest that the biggest threat to the 2025 goal is insufficient central government planning and action at a national population level. The government has not developed an overarching action plan, enacted sufficient effectively implemented legislation and policy measures, and has not funded mass media campaigns at appropriate levels. The Review of tobacco control services report also identified these problems, but the proposed tobacco control services realignment does not appear to address these important matters.

Ironically, the national advocacy organisations under review have consistently argued against a business as usual approach and called for more effective policy measures. Specifically, they have repeatedly pointed out the need for a national action plan to achieve Smokefree 2025 and called for greater recognition of priority groups including Māori and Pacific smokers.

We strongly support initiatives that will catalyse progress towards the 2025 goal. Improving support for smokers to quit will undoubtedly be an important component of action to achieve the Smokefree 2025 goal. The Review of tobacco control services includes useful recommendations regarding provision of smoking cessation services, including enhancing the delivery of smoking cessation support in health service contexts (e.g. pharmacies, mental health providers, smoking in pregnancy) and non-health settings (e.g. WINZ offices, budgeting services) to maximise the reach among high smoking prevalence groups such as Māori and Pacific. The recommendations also suggested reviewing enrolments and quit rates achieved by different Aukati KaiPaipa and Pasifika providers.

However, most other cessation-related recommendations in the Review of tobacco control services report relate to DHB or Ministry performance, and concern the organisation and delivery of cessation services; including funding, quality control and monitoring, and training. Some recommendations were explicitly addressed to the Ministry of Health—e.g. developing a mechanism to ensure critical evaluation of new cessation initiatives, and ensuring robust data on enrolments, treatment and quit rates are reported for all services and complete reporting of referrals to cessation services following

brief advice. If the realignment addresses these issues and results in a more effective and better targeted smoking cessation support system, that will be a welcome outcome.

However, improving cessation support will not be sufficient to achieve the 2025 goal. Tobacco control experts nationally and internationally agree that achieving substantial reductions in smoking prevalence requires a multifaceted, comprehensive approach. It is essential to create an environment that discourages smoking initiation while encouraging and supporting existing smokers to quit and stay quit.

Specifically, this environment requires a policy agenda that better controls tobacco marketing and promotion, sufficiently increases the cost of tobacco, reduces the areas in which tobacco may be consumed, decreases the availability of tobacco, and provides on-going cues to quit via mass media campaigns. All these measures are established as effective. New ideas, such as tobacco product regulation, including removing additives or reducing nicotine, or phasing down the number of tobacco retail outlets also merit further consideration. Some policy can be introduced at local level (e.g. smokefree bylaws for outside public areas), but most require national policy to be implemented. Even smokefree outside areas may be better more effectively implemented through national legislation.

Many of these measures were recommended in the Māori Affairs Select Committee report, from which the Smokefree 2025 goal emerged. However, even where recommendations were largely supported in the Government’s response, full implementation has often not occurred. For example, expenditure on mass media tobacco control campaigns, a proven evidence-based approach actually fell in successive years after adoption of the Smokefree 2025 goal. The Government undertook to “consider” other recommendations, such as reducing nicotine and additives in tobacco products, and reducing tobacco availability. However, 5 years later, details of that consideration and its outcomes are still to be released.

The Review of tobacco control services also recommended that the Ministry of Health work with the Health Promotion Agency to expand awareness of, engagement with, and positive support for, the Smokefree 2025 goal. Such work is particularly important, given evidence many people misunderstand the goal. We hope the realignment responds to confusion over the 2025 goal by supporting more effective national and local health promotion, advocacy, and policy, by engaging stakeholders across government departments and in business, and by stimulating greater community engagement with the Smokefree 2025 goal.

Crucially, an ambitious and world-leading goal like Smokefree 2025 requires a clear and comprehensive action plan. The Māori Affairs Select Committee report into the tobacco industry recommended a national tobacco control strategy. The Government unfortunately did not accept this recommendation. The Review of tobacco control services report echoed the recommendation that the Ministry develop a national action plan to achieve Smokefree 2025.

In the absence of such a plan, the National Smokefree Working Group, which comprises tobacco control sector representatives (including national advocacy groups), recommended national actions that should be undertaken during 2011–2015. These suggestions included smokefree cars, mandatory retailer registration, substantial ongoing tobacco tax increases, standardised (plain) packaging, enhanced health warnings, full disclosure of additives, and bans on duty free sales. Of these recommendations, only tobacco tax and action on duty free sales will have been partially addressed by the end of 2015, despite the best efforts of advocacy groups to stimulate policy action.

We would welcome improvements to New Zealand’s smoking cessation support services that enhance their reach among high prevalence groups, and their effectiveness in supporting smokers from these groups to quit. We would also welcome changes that result in more effective communication of the Smokefree 2025 goal, development of local strategies and interventions, and promote community engagement. To achieve these outcomes, the proposed realignment will need to focus not only on evaluating providers, but also on implementing better organisation, targeting, quality control, monitoring and evaluation by the Ministry of Health and DHBs. It will also be crucial that the
proposed engagement process for the alignment is genuine, positive and comprehensive so tobacco control services have appropriate input into the new systems and services that are put in place.

However, the realignment will not address the need for a national action plan, setting out the measures, policy agenda, and timescales that will lead to 2025. The National Smokefree Working Group has now developed a new action plan for 2015–2018. We call on the Ministry of Health and Government to expand the current realignment process to consider the Smokefree Working Group’s plan, and current national and international research and developments in tobacco control thinking.

A key output from the realignment should be a national plan that outlines the specific actions that government will take to create an environment that protects all New Zealanders from the scourge of tobacco and ensures that New Zealand realises its world-leading smokefree goal by 2025.

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References


NEW ZEALAND MEDICAL JOURNAL

100 YEARS AGO

Medical Arrangements for the Dardanelles

Published in a 1915 edition of the NZMJ.

The increase in the magnitude and scope of the operations in the Dardanelles has entailed a corresponding increase in the medical provision for the forces engaged. The Prime Minister stated in the House of Commons on July 28th that the total number of killed and wounded among the naval and military forces engaged in the Dardanelles down to July 18th was 37,982; of these, 8,099 were killed (officers, 562; men, 7,537), while the wounded numbered 29,883 (officers, 1,375; men 28,508).

In the August number of the “St. Bartholomew’s Hospital Journal” Captain L. B. Cane, R.A.M.C., gives an account of the difficulties of transporting the wounded to the ships and from them to the base hospital. Within three weeks, he says, nearly twenty thousand wounded men were taken to Alexandria and hundreds continued to arrive daily.

“Many of these were shot long before they reached the Turkish shore; some of the boats were sunk and others turned back full of wounded, with scarcely an uninjured man left on board to land. From the beginning the hospital ships have been quite insufficient to deal with such thousands of wounded, and have had to be supplemented by many of the transports in which the troops went out. In some instances these refilled so soon with urgent cases that they returned to the base even before the last of their men and stores had been disembarked. Several medical officers from the field ambulances or other units were put on board each transport, with what orderlies could be spared. These worked night and day during the return voyage, but, in spite of all exertions, found it often quite impossible to render more than the most urgent first aid treatment. Several transports returned with over 800 wounded, one with nearly 1,100 and one with 1,618, and in each only three overworked medical officers, a few orderlies, and no nurses, to do the entire work of an improvised floating hospital, full of surgical cases, during its two and a half days voyage back to Alexandria.”

By the middle of June more complete arrangements had been made, and a number of transports were fitted out for use as hospital ships, with staffs of four medical officers, six nurses, and twenty orderlies on each. The transference of the wounded from the shore had frequently to be carried out under fire. Often the men had dragged themselves or been helped by less severely wounded comrades for about two miles to a dressing station, from which they were carried some distance to the shore. Then they had to be conveyed through shallow water to landing boats or lighters, which were rowed or towed out to the transport or hospital ship. Those who could not walk were slung over the ship’s side by ropes; fortunately the sea was smooth.

Hundreds of wounded had to be hurriedly dressed on board and then disposed about the decks and in every available space in the ship. At Alexandria notice of the probable date of arrival of each ship and the approximate number carried was in most cases received a short time before she was due, and hospital trains and motor ambulances were waiting on the quay.

Four Red Cross trains were in use, each capable of taking about 200, though generally not more than three were got off in a day. A fleet of about forty motor ambulances disposed of the rest, and the work was carried out for the most part smoothly and expeditiously.

Disembarkation, however, was not always free from danger. Captain Cane gives a picture of an officer with seven wounds and a fracture being lowered over the side who, owing to the slipping of the ropes, narrowly escaped being titled out of the stretcher.

The worst cases were usually removed first to the hospital in Alexandria, the others being sent to Cairo or elsewhere by motor ambulances and trains. On one day five ships full of wounded were alongside at once. At one time, when there was an exceptional rush, and after the worst cases had been taken off the ships and detained in Egypt, some 3000 were sent on to Malta.
During the early operations the hospital ships lay sometimes for days close in to the shore between great battleships firing broadsides at the Turkish positions and in full view of the fighting. Occasionally aeroplanes dropped shells on the Red Cross ships, sometimes killing a few of the wounded.
Canada to legalise physician-assisted dying

In a decision noting that physicians currently legally assist patients who wish to die in Belgium, Colombia, Luxembourg, the Netherlands, Switzerland, and three US states, on February 6, Canada’s Supreme Court set the stage for Canadian doctors to soon join their ranks.

Apparently, all nine judges in Canada’s Supreme Court agreed in this ruling—a rare unanimity in such a controversial subject. The current law against physician-assisted dying will remain in place for another 12 months.

In the meantime, it falls to the colleges of Canadian medical professionals, the Canadian Parliament, and possibly provincial legislatures to respond with laws or regulations that respect the Constitutional rights of patients and providers.

Lancet 2015;385:678.

Type 2 diabetes and cancer

Many studies have examined the association between type 2 diabetes and risk of developing cancer and cancer mortality and strong claims of significance exist for most of the studied associations.

This report is a review of 27 meta-analyses which have studied these associations. The reviewers used stringent criteria and report that only 26% of the meta-analysis demonstrated a true association. In their opinion, evidence could be substantiated only for the associations between type 2 diabetes and risk of breast, intrahepatic cholangiocarcinoma, colorectal and endometric cancer.

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Intraarterial treatment for acute ischemic stroke

In patients with acute ischemic stroke caused by a proximal intracranial arterial occlusion, intraarterial treatment is highly effective for emergency revascularisation. However, proof of a beneficial effect on functional outcome is lacking.

This randomised trial carried out in 16 medical centres in the Netherlands aimed to elucidate.
500 patients (mean age 65 years) were randomised to either intraarterial treatment plus usual care or usual care alone. 89% of the patients were treated with intravenous alteplase before randomisation. Retrievable stents were used in 81.5% of the intraarterial group.

The researchers concluded that intraarterial treatment within 6 hours after stroke onset was effective and safe. There was a 13.5% difference in the rate of functional independence of the intervention group at 90 days.

PROCEEDINGS

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The regulation of postnatal growth of skeletal muscle by gonadal steroids in mice

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The principal positive and negative regulators of the postnatal growth of skeletal muscles are insulin-like growth factor one (IGF-1) and myostatin, respectively. The role of the gonadal steroids testosterone (T) and 17β-estradiol (E2) in the regulation of growth of skeletal muscles, IGF-1 and myostatin remains controversial. Male and female mice (C57BL/6 strain) underwent bilateral gonadectomy or sham surgery at 4 weeks of age, with insertion of subcutaneous silastic implants containing T, E2 or cholesterol (placebo) (n=8 per treatment and sex). Blood and hindlimb muscles were collected at 13 weeks of age and muscle mass was normalised to bone length. Concentrations of IGF-1 in plasma were determined by ELISA. RNA and protein were harvested from the quadriceps muscles for quantitative PCR and Western blotting, respectively.

In male mice, gonadectomy reduced the normalised mass of hindlimb muscles and concentrations of IGF-1 mRNA, while increasing the abundance of mature myostatin protein (P < 0.001). Replacement of T normalised these parameters, while administration of E2 only normalised the mass of hindlimb muscles. Concentrations of IGF-1 in plasma were not altered by any treatment in males. In female mice, gonadectomy ± E2 replacement did not alter the normalised mass of hindlimb muscles or the abundance of mature myostatin protein, despite reducing concentrations of IGF-1 in plasma and skeletal muscle (P < 0.05). T significantly increased the normalised mass of hindlimb muscles and the concentrations of IGF-1 in skeletal muscle, but not in plasma, while reducing the abundance of mature myostatin protein. We conclude that the anabolic action of T on skeletal muscle is partially through modulation of the activity of both IGF-1 and myostatin. However, E2 appears to increase the mass of skeletal muscles independently of IGF-1 or myostatin.

Early onset of muscle activation (EMG) during emergence from a general anaesthetic is not predictive of high reported pain on wakeup

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During emergence from general anaesthesia the time of onset of electromyographic activity (EMG) varies starkly between patients. The causes and characteristics of EMG onset remain unknown. We hypothesised that patients who report high-pain on wakeup will show EMG activation at an earlier time-point during waking due to strong nociceptive stimulus compared to patients who report low-pain. EMG and electroencephalographic (EEG) signals were simultaneously recorded from the forehead of 273 patients waking following surgery at the Waikato District Health Board Hospital. The time from beginning of flushing of the anaesthetic gas until EMG onset was measured. Patients gave a pain score ranging from 0 (no pain) to 10 (worst pain), with low pain being categorised as less than 5, high pain as 5 and greater. Statistical logistic regression showed that onset time of EMG was not predictive of reporting high-pain (p > 0.05). Significant predictors of reporting high-pain include increased blood opioid concentration and type of surgery, with orthopaedic patients more likely to report high pain. 95 percent of patients activated muscle at an anaesthetic gas concentration of less than 0.7 MAC. Oscillatory alpha power (10 Hz.) remained unchanged between begin of flushing and EMG onset, whereas delta power (0.5 – 1.5 Hz.) decreased in an age dependent manner. Future
analyses of cortex transition pathways from the anaesthetised to awake state will need to take age into account.

**The prevalence of diabetes foot disease in the Waikato region**

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**Background:** Diabetic foot disease is a well-recognised and a serious complication of diabetes. The prevalence of diabetic foot disease is unknown in the New Zealand population of people with diabetes. Understanding the prevalence and severity of foot disease in the diabetic population is necessary in helping to predict the need for podiatry services in this population. It is also important to be able to target those at most risk for regular monitoring.

**Aim:** To establish the prevalence of high risk diabetic foot disease in the Waikato region.

**Method:** The population comprised of all known people with diabetes who attend the Waikato Regional Diabetes Service mobile retinal photo screening service in a six month period. For all of those who consented a foot screen was performed at the same appointment as the retinal photo screen. All patients were asked a number of key demographic and treatment questions. A foot screen was carried out on all patients including testing for sensation and pedal pulses. A digital image was taken of the dorsal and plantar aspect of each foot. The foot screening was also assessed in a random sample of 5% of cases by a registered podiatrist to ensure the validity and repeatability of the findings. Individuals were categorised into low, moderate or high risk groups based on the Scottish Foot Action Group, Diabetic foot risk and stratification triage tool. Data were entered into Excel, and analysed using SPSS and STATA statistical programmes. Ethics was approved by University of Auckland Ethics Committee.

**Results:** The total population was 3850, of this 2192 people with diabetes had a foot screen within a 6 month period during 2014. Participants tended to be older and were less likely to be Māori. Mean age of participants was 63 years, men 52%. Māori 21% and Non-Māori 79%. Sixty five percent were categorised as low risk, 22% moderate risk and high risk including active foot complications was 13%. Older patients and those who had diabetes for greater than 3 years were most likely to be at high risk. Those who attended rurally based clinics were also more likely to be at high risk while non-smokers were at lower risk. Interestingly those with Type 2 diabetes were at greater risk than those with Type 1 disease.

**Discussion:** This project is the first prevalence study in New Zealand on diabetic foot disease and has highlighted similar results to previous international prevalence studies. It is representative of the Waikato region and New Zealand diabetes population. This study has highlighted the need for more podiatry services to address diabetic foot disease. Foot screening is cost effective and easy to perform. It should be included in future planning to meet the ever growing need of New Zealanders with diabetes.

**Following triple valve surgery**

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**Background:** Triple valve surgery is a complex procedure which has a reported operative mortality of 25% and 10 year survival of 40%. In view of increasing number of triple valve surgery being conducted in our unit, we looked at the long term survival for this group.
**Objectives:** The objective of this research project was to identify pre-operative determinants of early and late mortality in patients who undergo triple valve surgery, and predict the 5 year survival for this group.

**Methods:** This was a retrospective study conducted on a total of 39 patients (mean age 56 ± 13 years), who underwent triple valve surgery in Waikato DHB from March 2005 to January 2015. Data was collected from the hospital notes, clinic letters and from correspondence to GP practice. All collected data was analysed using PRISM graph pad statistics package.

**Results:** 71% valve pathology was secondary to Rheumatic etiology, with Māori population making up 85% of the whole population. Valvular regurgitation was the most common pathology needing intervention, with almost equal number of mechanical and bioprosthetic valves. The calculated 30 day mortality was 10.1% and overall mortality was 25.6%. The calculated 5 year survival rate was 71.2%. The combination of pulmonary hypertension causing moderate to severe right ventricular impairment were identified to be the most significant predictors of mortality using multiple linear regression method. Efforts to optimise RV function and pulmonary pressures using pre-operative Sildenafil seemed to have a significant benefit for these patients.

**Conclusions:** Triple valve surgery continues to be a challenge even in this modern era. Our study has identified the impact of severe pulmonary hypertension in combination with right ventricular impairment on short and long term survival.

**Symptoms and signs of acromegaly: an ongoing need to raise awareness among healthcare practitioners**

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**Introduction:** Chronic excess growth hormone production results in acromegaly, a condition associated with widespread physical changes, including soft tissue and bony overgrowth. Left untreated, acromegaly reduces life expectancy. The diagnosis usually occurs many years after the onset of symptoms by which stage irreversible physical changes have usually occurred.

**Method:** A cross-sectional questionnaire study was performed in order to evaluate features of acromegaly reported by patients with the illness prior to their diagnosis. The aim of this study was to identify features of acromegaly that were most prevalent to help increase awareness about the disease amongst healthcare practitioners.

**Results:** Eighty-one participants were included. Three physical features were predominant amongst the participants prior to diagnosis. These were acral changes, facial feature changes and oral symptoms. In some participants these features were reported to be present for more than 10 years prior to the diagnosis of acromegaly. Multiple co-morbidities associated with acromegaly were reported. Two-thirds of the participants felt that an earlier diagnosis could have been possible. Most participants were in contact with General Practitioners (GPs) and/or dentists prior to being diagnosed. Endocrinologists were found to have the highest diagnosis rate, followed by GPs. Dentists had a poor diagnosis rate despite a high prevalence of oral symptoms among study participants.

**Conclusion:** Increased awareness of acromegaly among primary healthcare practitioners is important, as they are the first-point-of-contact for most patients with the healthcare system. Early recognition of symptoms and signs of acromegaly by health professionals would reduce delays in time-to-diagnosis, enable early treatment and is likely to improve the outcome of patients with acromegaly.
Quality of life and sexual distress in women with vulval dermatoses

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Introduction: Erosive vulvovaginal lichen planus (EVLP) is a chronic and painful genital dermatosis. This study evaluated quality of life and sexual function in women with EVLP.

Methods: Women with genital dermatoses completed a survey including the Dermatology Life Quality Index (DLQI), Hospital Depression and Anxiety Scale (HADS), Female Sexual Distress Scale (FSDS) and Female Sexual Function Index (FSFI). Patient characteristics including age, diagnosis and current treatment were also recorded. Results from women with EVLP were compared with other diagnoses.

Results: Ninety-eight women participated from March 2013 to March 2014. Of these, 23 had EVLP (23%). Other diagnostic groups for comparison were lichen sclerosus (52/98) and vulval dermatitis (12). In women with EVLP, 10/23 (43%) reported at least moderate impact on quality of life. A larger proportion of women with lichen sclerosus reported little impact on quality of life compared with EVLP and dermatitis groups (p=0.006). Overall, scores on the HADS suggested depression in 12% and anxiety in 14%. 60% of women with EVLP scored >11 on the FSDS suggesting sexual distress. In those who completed all sections of the survey (n=39) DLQI was positively correlated with HADS (p= 0.03), FSDS (p<0.01) and FSFI (p=0.02).

Conclusion: Over half of women with EVLP reported sexual distress. Quality of life was relatively better in women with lichen sclerosus compared with EVLP. There were positive correlations between the DLQI, HADS, FSDS and FSFI.

Improving outcomes from metastatic prostate cancer in New Zealand

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Background: 600 NZ men die each year from metastatic prostate cancer. Half of these men have metastatic disease at first diagnosis and their 5 year survival is poor compared with other countries. There are no agreed New Zealand guidelines for the management of metastatic prostate cancer. Our aim was to review the current management of metastatic disease.

Methods: We undertook 2 studies 1) Using data from the New Zealand cancer registry we identified men aged 40+ yrs diagnosed with prostate cancer between 1 Jan 2006 and 31 Dec 2011. We collected data on age, ethnicity and stage. We then identified data from the NZ Hospital and Pharmaceutical databases on use of anti-androgen (ADT), orchiectomy and chemotherapeutic treatments in this group of men. 2) In our second study we identified a cohort of 2127 men with prostate cancer in the Midland Region diagnosed from 2009-2012 and searched the electronic patient records to identify men with metastatic disease. We collected clinical data such as Gleason score, PSA level and clinical and pathological stage. Data were linked to mortality records, laboratory data and the NZ Pharmaceutical data collection.

Results: Study 1) Of 16000 men with prostate cancer 925 were identified with metastatic disease. 72% of these men received ADT. Only 0.2% received chemotherapeutic agents. Māori and Pacific men were more likely to receive ADT than non-Māori/non-Pacific men. Māori men were more likely to be treated with orchitectomy, and less likely to receive LHRH analogues. Older men with metastatic disease were less likely to receive ADT. In study 2) We identified 234/2127 (11%) men with metastatic disease. Māori/Pacific men were more likely to have metastatic disease at diagnosis. In the local study 2.4% of men received chemotherapy. Again older men were less likely to be treated with ADT or chemotherapy. There were differences in treatment initiated by urologists compared to
radiation oncologists and only 1% of ADT prescribed was by a medical oncologist. There appeared to be a lack of consistency in monitoring of metastatic patients with biomarkers (PSA and testosterone).

**Conclusion:** 11% of men with prostate cancer present with metastatic disease. The recording of stage of diagnosis of prostate cancer on the Cancer Registry is poor and does not allow detailed investigation of management through data linkage. However it does appear that there is potential under use of ADT and chemotherapy. From more detailed local data we have confirmed there is wide variation in ADT treatment and monitoring of patients and potential under-use of chemotherapy to extend life.