CONTENTS

This Issue in the Journal

4 A summary of the original articles featured in this issue

Editorials

6 Drinking up rugby
Brad Peckler, Mai Nguyen

9 Transient ischaemic attacks: “mini-strokes” with major but preventable consequences
John Gommans, P Alan Barber

Original Articles

12 Ambulance triage and treatment zones at major rugby events in Wellington, New Zealand: a sobering experience
Andrew H Swain, Amanda Weaver, Alasdair J Gray, Mark Bailey, Stephen G Palmer

25 Who should manage transient ischemic attacks? A comparison between stroke experts, generalists, and electronic decision support
Annemari Ranta, Pietro Cariga

32 Progression of diabetic maculopathy in patients on the Wellington Diabetic Screening Programme initially graded M3
Neil Avery, Kenneth Chan, Keith Maslin

37 The future of the New Zealand plastic surgery workforce
Brandon M Adams, Michael F Klaassen, Swee T Tan

47 A standardised and validated patient survey in primary care: introducing the New Zealand General Practice Assessment Questionnaire (NZGPAQ)
Gerard Zwier

55 The effect of Māori ethnicity misclassification on cervical screening coverage
Peter Sandford, Micol Salvetto, Dale Bramley, Samuel Wong, Lannes Johnson

66 Blood pressure and hypertension in New Zealand: results from the 2008/09 Adult Nutrition Survey
Rachael M McLean, Sheila Williams, Jim I Mann, Jody C Miller, Winsome R Parnell
Review Article

80 Palliative care patients’ use of emergency departments
Ross Lawrenson, James Waetford, Veronique Gibbons, Peter Kirk, Sandra Haggar, Rangimahora Reddy

Clinical Correspondence

89 A rare cause of nasal septal abscess
David Waterhouse, Jeremy Hornibrook

92 Hemifacial spasm leading to diagnosis of Moyamoya disease
Teddy Y Wu, Andrew Smith, Dean Kilfoyle

96 Medical image. Liver parenchyma visible during gastroscopy
Nadim El Majzoub, Assaad Soweid

Letters

99 What does ‘undiagnosed’ diabetes really mean?
Wing Cheuk Chan, Doone Winnard, Campbell Brebner, Brandon Orr-Walker

102 The cost of non-funded vaccinations in New Zealand
Jose D Perezgonzalez

105 The uptake rates of influenza vaccine in pregnant women in the Nelson region of New Zealand
Sylvia Ross, Judy Ormandy, Bia Jungji Kim

107 Chiropractic manipulation of the neck
Andrew Gilbey, Shaun Holt, Edzard Ernst

100 Years Ago in the NZMJ

109 Organisation

Proceedings

110 Proceedings of the Annual Meeting of the Waikato Clinical School, March 2013

Methuselah

118 Selected excerpts from Methuselah
This Issue in the Journal

**Ambulance triage and treatment zones at major rugby events in Wellington, New Zealand: a sobering experience**
Andrew H Swain, Amanda Weaver, Alasdair J Gray, Mark Bailey, Stephen G Palmer

In 2011 and 2012, Wellington hosted the quarter finals of the Rugby World Cup as well as the New Zealand rounds of the International Rugby Board’s Sevens tournament. These events attracted large numbers of fans and revellers and many required medical attention for minor injuries and illness which were most frequently associated with excessive consumption of alcohol. In preparation for these events, on-site treatment facilities staffed by paramedics were established at the stadium and in the CBD in an attempt to ease the strain on the Wellington Free Ambulance Service and the city’s Emergency Department. The paramedics worked to pre-prepared guidelines and succeeded in producing a secure environment in which dehydration, vomiting, hypothermia, minor injuries and other conditions could be treated. This reduced unnecessary ambulance transport to the Emergency Department and allowed hospital staff to focus on more serious clinical emergencies. Significant healthcare savings were generated by using this model.

**Who should manage transient ischemic attacks? A comparison between stroke experts, generalists, and electronic decision support**
Annemarei Ranta, Pietro Cariga

Stroke and mini-strokes (‘TIAs’) are medical emergencies and rapid intervention can reduce the risk of long term disability and death. This study confirms that stroke experts are highly consistent and guideline adherent when managing potential strokes and mini-strokes, while generalist management is frequently incomplete, at times inappropriate, and often non-guideline adherent. This study also indicates that the use of the bpac TIA/Stroke electronic decision support tool can closely mimic expert care and therefore offering access of this tool to generalists has the potential to significantly improve TIA/stroke management in situations were rapid access to experts cannot be guaranteed. The effect of this tool on stroke outcomes is currently being assessed in the form of a large multi-centre New Zealand wide clinical trial with results anticipated late 2013.

**Progression of diabetic maculopathy in patients on the Wellington Diabetic Screening Programme initially graded M3**
Neil Avery, Kenneth Chan, Keith Maslin

Patients with moderate diabetic maculopathy in Wellington are currently monitored under a primary screening service. To ensure this is appropriate and no patient safety is not compromised we reviewed this screening protocol. Screening photographs were obtained, and graded for initial and subsequent screening sessions. The number of
patients who had progression of maculopathy, loss of vision and the duration between screening visits were reviewed. A significant number of patients had worsening of their maculopathy between visits, however none had worsening visual acuity due to diabetic eye disease. This suggests patients with moderate maculopathy can be maintained under an optometrist based screening programme, as is the case in the United Kingdom.

The future of the New Zealand plastic surgery workforce
Brandon M Adams, Michael F Klaassen, Swee T Tan

The New Zealand (NZ) plastic and reconstructive surgery (PRS) workforce provides reconstructive plastic surgery (RPS) public services from six centres throughout NZ. This study analysed the current workforce, its distribution and future requirements. The NZ PRS workforce is compared with international benchmarks. NZ has a lower number of plastic surgeons per capita than comparable countries and is maldistributed with some areas notably lacking in workforce numbers. The current workforce maldistribution will worsen with future population growth and distribution. Up to 60% of the NZ population will be at risk of inadequate access to PRS services by 2027. Development of PRS services must be coordinated to ensure that equitable and sustainable services are available throughout NZ.

A standardised and validated patient survey in primary care: introducing the New Zealand General Practice Assessment Questionnaire (NZGPAQ)
Gerard Zwier

To improve the quality of care in GP practices it is important that a survey questionnaire is used which has been shown to be valid and reliable. Questionnaires which have low validity may not measure what they purport to measure and questionnaires that have little reliability will show different results each time they are used. This article documents how a very good questionnaire used by the National Health Service in the UK has been adapted to the New Zealand environment. Since 2005, some 50,000 patients have returned completed questionnaires. Subsequent analyses have shown that it is a valid and reliable survey tool. It is argued that instead of trying to understand the complex relationship between socio-demographic factors, patient expectations and situational effects, it is more productive to identify and monitor patient satisfaction with a particular GP or specific practice in an ongoing fashion and with the same questionnaire. This will enable health professionals to recognise and appreciate high scoring GPs and practices which will enable them to better understand how they can improve the quality of care.

The effect of Māori ethnicity misclassification on cervical screening coverage
Peter Sandiford, Micol Salvetto, Dale Bramley, Samuel Wong, Lannes Johnson

Cervical screening is an important element of cervical cancer prevention. The National Cervical Screening Programme (NCSP) reported that only 58% of eligible Maori women had been screened in the three years to March 2012 compared with
83% in non-Maori, non-Pacific, non-Asian women. This huge disparity has existed for a number of years. We investigated whether this difference might be due to Maori women being incorrectly counted as non-Maori by the NCSP. We discovered that even if all Waitemata women recorded as Maori in the NCSP register had been screened, the cervical coverage rate would only have reached 69.7% - well short of the 80% target. We then compared the NCSP ethnicity of these women with their ethnicity recorded in two other databases. If women classified as Maori on the other two data bases had also been counted as Maori by the NCSP, the current Waitemata Maori coverage rate would rise from 49.3% to 68.8% with a further 20% of these Maori women were on the NCSP-R but had not been screened for over three years. Maori women registered with a GP but who had never been screened made up a further 7.5%. Improved quality of ethnicity data on the NCSP register will be necessary if Waitemata, and probably other DHBs in New Zealand, are to achieve the cervical screening coverage target for Maori.

Blood pressure and hypertension in New Zealand: results from the 2008/09 Adult Nutrition Survey
Rachael M McLean, Sheila Williams, Jim I Mann, Jody C Miller, Winsome R Parnell

This study reports blood pressure results from the 2008/09 Adult Nutrition Survey – the first nationally representative measured blood pressure levels in New Zealanders aged 15 years and above. Results show that although use of medication to lower blood pressure has increased since 1997, blood pressure levels may be increasing among younger New Zealanders of New Zealand European and Other (NZEO), and Māori ethnicity; particularly those aged 35 to 54 years of age. Elevated blood pressure is an important risk factor for cardiovascular disease (heart disease and stroke). Public health interventions to improve nutrition, increase physical activity and reduce overweight and obesity are warranted.
Drinking up rugby

Brad Peckler, Mai Nguyen

We congratulate Andrew Swain and colleagues for their study of ambulance triage and treatment zones at major rugby events in Wellington. It is also worth commending Wellington Free Ambulance, Accident Compensation Corporation, and Wellington City Council to have the foresight to fund this undertaking.

The data is not surprising to anyone who is familiar with these types of events. The goal of reducing emergency department (ED) presentations is important for medical and economic reasons. The caveat is that it must be done safely. The parameters given for releasing patients are quite generous but arguably reasonable when trying to sift through sick patients. It would have been interesting to see if a breathalyzer would have changed the amount of patients held or their eventual disposition.

As mentioned by Swain et al there was no way of accounting for patients after they were discharged from the safe zones if they chose to present to ED. There were a number of patients who bypassed the ambulance service and self presented to the ED or in a few cases never made it to the event.

Wellington Hospital Emergency Department sees approximately 150 patients per day. Intoxicated patients can be difficult to manage and take up large amounts of resources and staff time. Differentiating sick from not sick is notoriously fraught with difficulties in the intoxicated patient. This is especially true when very little is known about the circumstances of the presentation for medical evaluation or when it is heard second or third hand.

Comparing the ED triage data for the two 24-hour periods (Friday and Saturday) of the Wellington Sevens Rugby Tournament (when there was a medical staffed “Safety Zone”) to when services were not available in the preceding 2 years demonstrates only a modest reduction in patient presentations. The percentage of total ED presentations related to the 2 days respectively of the Sevens for 2011 was 7% and 9% (without) and for 2012 was 3% and 4% (with Safety Zone).

Without the benefit of a “Safety Zone”, ED presentations related to the Sevens in 2009 were 8% and 10% and for 2010 the percentages were 7% and 11%. Interestingly, the 2 days of the World Cup were only 1% and 3% respectively. Though the numbers are not large, it still presents a burden on a busy ED and any reduction in ED crowding and bed block is welcome. There are only 29 beds of which 20 are monitored and would be suitable for these patients.

Economically the analysis speaks for itself but it only scratches the surface. Described are the hard costs that are actually measurable. There are inferred costs that should also be considered. These include the cost of clerking, ancillary staff time, triage and nursing time, and physician time. There also is an intangible cost of just occupying a bed space. That is the cost of not being able to place a potential sicker patient in a treatment bed because it is occupied.
This cost is difficult at best to measure and quantify. Examples include the undifferentiated chest pain patient who has active coronary disease or a pulmonary embolus, the undefined septic patient, the subtle stroke patient, a sick child, or the patients who leave without being seen. Thus, the costs incurred as a medical system are far greater than actually calculated by Swain et al.

Swain et al described a culture of binge drinking around a specific event. Indeed, according to the Ministry of Health 25% of New Zealanders aged between 12–65 years binge drink. Moreover, market research has estimated that same number can be as high as 50%.

The relationship between sporting events and binge drinking is very clear and not unique to New Zealand. Binge drinking occurs and is a fact of life but this can also be a chance for an intervention in time of crisis. While it is doubtful that an intoxicated person would benefit from counselling at the time of presentation, prevention is a reasonable strategy. A clear message before the event may have some benefit. Anti-binge campaigns have been successful when directed to specific target audiences.

Campaigns against drinking and driving, promoting safe driving practices, and violence against women are visible parts of our society. It would be hard to argue that alcohol is not part of rugby culture. As a medical community can we help to curb that culture with an anti-binge campaign? Would a media campaign prior to the Sevens help change that culture?

There are many strategies to combat binge drinking at events such as barring entry to the stadium for those patrons who already significantly intoxicated, restriction of sales by time and amount, increasing the price, decreasing the ethanol content of beverages, raising the drinking age, and importantly restricting advertising and sponsorship opportunities.

Discussion of these topics goes beyond the scope of this editorial, however Swain et al demonstrate a clear public health issue and their paper is a unique addition to the literature. The savings described in this study are modest but enough to justify a campaign to reduce binge drinking that could benefit the public good.

Alcohol at rugby events is a given but moderation in consumption is a reasonable thing to strive for.

**Competing interests:** None declared.

**Author information:** Brad Peckler, Mai Nguyen, Emergency Medicine Specialists, Wellington Regional Hospital, Wellington

**Correspondence:** Brad Peckler. Email: brad.peckler@ccdhb.org.nz

**References:**


Transient ischaemic attacks: “mini-strokes” with major but preventable consequences

John Gommans, P Alan Barber

Transient ischaemic attack (TIA) can be defined as symptoms consistent with stroke that resolve within 24 hours. The public and many health professionals refer to TIAs as ‘mini-strokes’, terminology that belies their potentially serious prognosis. Although people make a full recovery from a TIA, acute ischaemic lesions revealed on MRI scans occur in just under half of patients.

In the population-based OXVASC study, stroke risk following TIA was 8% at 1 week and 18% at 3 months. There is nothing ‘mini’ about the strokes that follow a TIA with one in five fatal and two-thirds disabling. Up to 80% of these strokes may potentially be avoided with prompt medical assessment and treatment. However, the time window for intervention is brief as half of the strokes that follow a TIA occur within the first 48 hours.

A traditional outpatient service response to TIA is no longer adequate. The New Zealand (NZ) clinical guidelines for stroke management recommend specialist assessment, investigation and early management in patients at high stroke risk within 24 hours of TIA, either via urgent admission or “rapid access” TIA clinics. Recent NZ studies have found that most District Health Boards (DHBs) do not manage TIA as urgently as guidelines recommend. This represents a lost opportunity to prevent many of the strokes that follow TIA.

Preventing stroke requires a ‘whole of system’ approach starting with public awareness of common stroke/TIA symptoms and the need to seek immediate assessment.

The FAST message (Face, Arm & Speech check = Time to act FAST) indentifies 90% of stroke and TIA cases and is used for public awareness campaigns in New Zealand, Australia, the USA, the UK and parts of Europe. Despite this, recognition of stroke and TIA symptoms remains suboptimal.

TIA diagnosis is based on an accurate history and clinical assessment (remember, patients are usually seen after they have returned to normal) with brain imaging used to exclude stroke and TIA mimics. It is important to get the diagnosis of TIA and assessment of stroke risk right at the first point of contact. Unfortunately, this is often not the case with TIA over-diagnosed by as much as 30–50% in primary care and emergency departments.

The NZ stroke guidelines recommend use of the ABCD2 tool with points for Age>60 years, Blood pressure $\geq$ 140/90 mmHg, Clinical features (unilateral weakness and/or speech disturbance), Duration of symptoms ($>10 \& \geq 60$ minutes) and Diabetes.

By using the ABCD2 tool, diagnostic accuracy and risk prediction is improved. However, it is also important to assess other stroke risk factors not identified by the ABCD2 such as atrial fibrillation, carotid stenosis and crescendo TIA.
Stroke prevention is greatest following specialist assessment and urgent investigation and implementation of evidence-based therapies. These include antiplatelet therapy, anticoagulant therapy for those with atrial fibrillation, blood pressure and cholesterol lowering therapy, and early surgery for those with internal carotid artery stenosis. These recommendations are well documented in easily accessible guidelines. That is the theory! The reality for the majority of people with TIA is that rapid and accurate TIA diagnosis and implementation of evidence-based therapy is simply not occurring.

In this edition of the Journal, Ranta and Cariga present the results of a survey of the management of hypothetical possible TIA patients by selected general practitioners (GPs), general physicians and stroke physicians. The results are consistent with international literature in that stroke experts are more likely to make an accurate diagnosis and recommend evidence-based treatments than general physicians and GPs.

This is not new information. What is new is that Dr Ranta has developed a novel electronic decision support (EDS) tool for the assessment and management of suspected TIA cases seen in primary care. When the same theoretical cases were assessed using this EDS tool there was excellent agreement with stroke expert diagnosis, triage advice and guideline recommended therapy, even when used by non-doctors.

Furthermore, the EDS tool prompted higher rates of recommendations for non-pharmacological interventions such as dietary advice, smoking cessation and advice regarding driving restrictions. As the authors state, the ‘check-list’ nature and automatic prompts of an electronic tool are the likely explanation for this superior performance.

There is often limited access to stroke physicians and urgent investigations in NZ. A web based EDS tool embedded within electronic patient management systems that mimics expert advice should improve the diagnostic accuracy and utilisation of evidence-based therapy in a primary care setting. In addition to recommending immediate initiation of therapy, the triage function advises urgent transfer to secondary care for those TIA patients at highest stroke risk.

The EDS also generates appropriate referrals for rapid access outpatient investigations and TIA clinics for those at lower stroke risk. The hope is that an EDS tool may reduce the risk of a ‘mini-stroke’ turning into a major stroke. This remains to be proven but is being addressed in the FASTEST Trial: a randomised controlled trial examining the safety, efficacy, and cost effectiveness of this EDS tool in routine clinical practice (ACTRN12611000792921).

Competing interests: Dr Gommans is a co-investigator in the ongoing FASTEST Trial.

Author information: John Gommans, General Physician and Geriatrician, Hawke’s Bay DHB, President of Stroke Foundation of NZ, and member of NZ Stroke Guidelines Reference Group, Hastings; P Alan Barber, Professor of Clinical Neurology, University of Auckland, Director of the Auckland City Hospital Stroke Service, and Member of the NZ Stroke Guidelines Reference Group, Hastings

Correspondence: Dr John Gommans, Hawke’s Bay Hospital, Private Bag 9014, Hastings, New Zealand. Fax: +64 (0)6 8781319; email: john.gommans@hbdhb.govt.nz
References:


Ambulance triage and treatment zones at major rugby events in Wellington, New Zealand: a sobering experience

Andrew H Swain, Amanda Weaver, Alasdair J Gray, Mark Bailey, Stephen G Palmer

Abstract

Aims A prospective analysis was undertaken of the workload of prehospital triage and treatment facilities established in Wellington for the 2011 and 2012 International Rugby Sevens, and the Rugby World Cup 2011 (RWC). The introduction of an alcohol intoxication pathway, the impact of the initiative on ambulance and Emergency Department (ED) workload, and its cost effectiveness were assessed.

Methods A log of patients seen and their diagnoses and treatment was maintained. An alcohol questionnaire was completed when applicable. Patients intoxicated with alcohol were managed in accordance with a flowchart designed for paramedic use. Costs and savings were calculated.

Results Half the patients were New Zealanders. The average age was 25 years with a slight female preponderance (52.9% female). 30% were students. Alcohol was a contributory or causative factor for the patient’s attendance in 80-90% of cases. Approximately 60% of the 121 patients seen at the last two events would have had to be transferred to the ED in the absence of the treatment centre. Cost savings for the ambulance service and ED for the RWC and 2012 Sevens are estimated to be NZ$70,000. No adverse clinical event was identified.

Conclusions With minimal supervision, event medics and paramedics can safely care for the majority of patients attending large rugby events in New Zealand, easing the pressure on ambulances and the ED, and generating significant cost savings for those services.

Mass gatherings (which may be defined as congregations of more than 1000 persons) are less common in New Zealand than other parts of the world but in 2011 and 2012, Wellington hosted the quarter finals of the Rugby World Cup 2011 (RWC) as well as the New Zealand rounds of the International Rugby Board’s Sevens tournament. Although the medical literature contains papers on healthcare planning for rock concerts, carnivals, sporting and other large events, the only report we have found relating to healthcare issues at major rugby competitions relates to injuries sustained by competitors.

These rugby events have attracted a large number of sports fans and revellers to the capital and many required medical attention for minor injuries or illness which were most frequently associated with excessive consumption of alcohol. The Sevens tournament in particular has developed a reputation for fancy dress competitions and revelry.

In preparation for these rugby events, prehospital treatment and triage facilities were established in an attempt to ease the strain on the Wellington Free Ambulance Service.
and the city’s ED. This paper reports on the initiative which aimed to improve safety for rugby fans and reduce the burden on health services during these major events.

Methods

During the Wellington Sevens tournament on 4th and 5th February 2011, triage and treatment facilities (safe zones) were piloted by Wellington Free Ambulance at Westpac Stadium situated adjacent to the city during the day and in the central hospitality zone in the evening. The latter contained a small resuscitation area, camp-beds and a cushioned mat for intoxicated patients, and a table and chairs for the management of ambulatory patients.

The facility remained open overnight until 0500 hours and was staffed by event medics (first-aiders) and paramedics, supported by one Emergency Department doctor. The arrangement was repeated at the Rugby World Cup quarter final weekend of 8th and 9th October 2011 and during the International Sevens weekend of 3rd and 4th February 2012.

Potential patients either presented to the safe zone or were identified by police and radio-equipped patrols of event medics who transported them by carry chair or stretcher. There were no established exclusion criteria. On arrival, they were assessed and treated by the event medics and paramedics.

For the RWC quarter final weekend and the 2011 and 2012 Sevens weekends, patients could be referred to the on-site doctor as necessary. Decisions were taken regarding the need for transfer of the patient to the ED but profound intoxication with alcohol was not an automatic indication for hospital transfer.

A log of patients seen and treatment given was maintained and a standard ambulance patient report form (PRF) was completed.

An intoxication treatment pathway (Fig. 1) was developed in advance of the 2011 Sevens where it was tested. The form was designed for use by event medics and paramedics without on-site medical support. Feedback was received regarding the effectiveness of the pathway and the ability of medics to apply it.

In response to the experience gained from the 2011 Sevens, a similar facility was set up every Friday and Saturday night in the city’s hospitality zone prior to the RWC and during RWC pool matches. This “Safer Cities” service was funded by Wellington City Council (WCC), the Accident Compensation Corporation (ACC) and Wellington Free Ambulance (WFA), and was staffed by a small number of event medics and paramedics with no on-site medical support. It prompted the development of a questionnaire (Fig. 2) intended to collect information on the drinking habits of those attending the centre.

This questionnaire was designed following input from various groups (WCC, ACC, WFA, NZ Police, NZ Alcohol Advisory Council) and was employed at subsequent RWC events and the 2012 Sevens. It was used in conjunction with an alcohol advice pack supplied to intoxicated patients or their escorts on departure.

The effectiveness of the service was assessed by incorporating into the Safer Cities Form a statement asking paramedics whether in the absence of the centre, they believed that the patient would have had to be transferred by emergency ambulance to the ED. This question was answered by recording “Yes”, “Likely”, “Unlikely” or “No” on the safer cities form (Fig. 2). Each case was discussed with an experienced paramedic to ensure that the need for patient transfer to ED in the absence of a safe zone was correctly judged. Measuring ED avoidance in this way was considered superior to assessing any impact within the ED as background attendances for conditions unrelated to the rugby event would be difficult to quantify, especially in view of the temporary increase in the local population.
Figure 1. Alcohol intoxication pathway
Figure 2. Safer cities form

**Intoxicated Discharge Flowchart**

- **Conscious GCS 15/15**
  - Baselines completed and within normal limits
  - Co-ordinated Movement
    - Able to walk unaided and not in any danger of falling/injury to self
  - If all criteria ok – advise discharge
  - Patients who are being discharged must sign a non-transport sticker before leaving.
  - If possible discharge to friends or family
    - Complete CAGE assessment and offer patient alcohol care pack
  - If event closing and patient has not recovered adequately, transfer to ED

- If all criteria not met – advise staying or consider transfer to ED
  - Patients declining advice and electing to self-discharge must be asked to sign a non-transport sticker.
# Safer Cities Incident Data Capture Form

<table>
<thead>
<tr>
<th>Incident number:</th>
<th>Date:<strong>/</strong>/</th>
<th>Arrival time:__:_</th>
<th>Event:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surname:</td>
<td>First name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of birth:</td>
<td>Gender: Male / Female</td>
<td>Age:</td>
<td>Ethnicity:</td>
</tr>
<tr>
<td>Occupation:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Has patient been drinking alcohol?</th>
<th>Time started:__:_</th>
<th>No. of Drinks</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of last drink:__:_</td>
<td>Place of last drink:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has the patient taken any other drugs tonight?</td>
<td>Yes / No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If the patient has not been drinking, have they consumed any alcohol in the last 24 hours?</td>
<td>Yes / No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature of incident:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of injury:__:_</td>
<td>Treated on site? Y/N</td>
</tr>
<tr>
<td>Diagnosis:</td>
<td></td>
</tr>
<tr>
<td>Treatment:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is alcohol the cause of this incident? (circle one)</th>
<th>Yes / No / Probably</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Has patient been transported to ED for alcohol related issues prior?</td>
<td>Yes / No / Unknown</td>
<td>No of times</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Has a 'brief intervention' been conducted with the patient?</th>
<th>Yes / No</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the patient transported for further care? Yes / No</td>
<td>Where to:</td>
<td>How?</td>
</tr>
<tr>
<td>If not transported by WFA, was the patient advised to seek medical advice? Y/N</td>
<td>Referred to:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If this 'safer cities' site had been unavailable and the patient had been attended by an EAS ambulance, would they have been transported to hospital? (circle one)</th>
<th>Yes / Likely / Unlikely / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departure time:__:_</td>
<td>Has a PRF been written (by events staff)? Y/N</td>
</tr>
</tbody>
</table>

©NZMA
Results

Wellington International Sevens 2011—The initial findings of this study, documented at the 2011 Wellington Sevens, are summarised in Table 1. The average age of patients seen was 25 years. Significantly more patients attended the stadium area than the hospitality zone which functioned for a shorter period of time.

Of the total of 73 patients treated, 27 were thought to be dehydrated in association with the hot weather and alcohol consumption and were given intravenous saline. Three also received intravenous glucose. Only 19 of 73 (26%) patients needed to be transported to the ED, achieving a significant reduction in the number of patients who would have been transferred there by ambulance staff in the absence of a triage facility.

It is noteworthy that all injured patients seen in the hospitality zone had presented with wounds sustained on broken glass, mainly involving the feet. Many revellers went barefoot in response to the warm temperature and the desire to remove fancy dress. This was unfortunate as some areas were covered by broken drinking glass.

Patients with glass injury were not directed immediately to the ED but after careful inspection, cleaning, and dressing of their wounds, they were instructed to attend a local ED or general practitioner during normal hours the next working day for clinical review and radiology to exclude retained glass.

Table 1. Wellington International Sevens 2011

<table>
<thead>
<tr>
<th>Variables</th>
<th>Stadium Area</th>
<th>Hospitality Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of service (hours)</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Patients seen &amp; treated</td>
<td>63</td>
<td>10</td>
</tr>
<tr>
<td>Intravenous fluid required</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>Intravenous glucose given</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Patients transported to the ED</td>
<td>16/63 (25%)</td>
<td>3/10 (30%)</td>
</tr>
<tr>
<td>Glass injuries</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

Rugby World Cup 2011—A number of RWC pool matches were held in Wellington but the busiest weekend was that of 8th-9th October when four test matches were held at the stadium. Patient details are summarised in Table 2.

On the two quarter final days, a total of 35 patients were seen in the triage and treatment facility in the hospitality zone. Sixty percent were male and the average age was 29. Most were New Zealanders and none had attended the match.

The average treatment time was 57 mins and the most common diagnoses were alcohol-related in 28 (80%), with intoxication being the primary diagnosis in 16 (46%). All except one of the intoxicated patients were rehydrated with intravenous saline to which glucose was added in most cases. 100ml of 10% dextrose was given if the blood glucose was less than 10mmol/L.
Alcohol-related injuries occurred in 10 attendees (29%). Only six (17%) of patients required direct referral to the ED and all but one were transported by ambulance. One patient was transported because the facility had to close at 0500 hours. Event medic and paramedic staff considered that two-thirds of the patients seen would have, or were likely to have been transferred to the ED by emergency ambulance if no safe zone had been available.

Wellington International Sevens 2012—The findings made at the 2012 Wellington Sevens are also summarised in Table 2. The average age of patients seen was 25 years at the stadium during the day but slightly younger patients were seen in the hospitality zone in the evenings. As at the 2011 Sevens, significantly more patients attended the stadium area than the hospitality zone which functioned for one night only.

Table 2. Rugby World Cup (RWC) 2011 and 2012 Sevens

<table>
<thead>
<tr>
<th>RWC</th>
<th>Hosp. Zone</th>
<th>2012 SEVENS</th>
<th>Stadium</th>
<th>Hosp. Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>35</td>
<td>64</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Male:Female (% male)</td>
<td>21:14 (60%)</td>
<td>25:39 (39%)</td>
<td>11:11 (50%)</td>
<td></td>
</tr>
<tr>
<td>Age (average)</td>
<td>17-68 (29)</td>
<td>17-65 (25.9)</td>
<td>15-31 (20.35)</td>
<td></td>
</tr>
<tr>
<td>Nationality:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealander</td>
<td>16 (45.7%)</td>
<td>New Zealander</td>
<td>38 (59.4%)</td>
<td>17 (77%)</td>
</tr>
<tr>
<td>International</td>
<td>13 (37.1%)</td>
<td>UK</td>
<td>17 (26.6%)</td>
<td>3 (13.6%)</td>
</tr>
<tr>
<td>Not Recorded</td>
<td>6 (17.1%)</td>
<td>European</td>
<td>3 (4.7%)</td>
<td>1 (4.5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maori</td>
<td>3 (4.7%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pacific</td>
<td>2 (3.1%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>1 (1.6%)</td>
<td>1 (4.5%)</td>
</tr>
<tr>
<td>Occupation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>11 (31.4%)</td>
<td>Employed</td>
<td>19 (29.7%)</td>
<td>11 (50%)</td>
</tr>
<tr>
<td>Students</td>
<td>11 (31.4%)</td>
<td>Students</td>
<td>17 (26.6%)</td>
<td>5 (22.7%)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>2 (5.7%)</td>
<td>Not Recorded</td>
<td>28 (43.8%)</td>
<td>6 (27.3%)</td>
</tr>
<tr>
<td>Not Recorded</td>
<td>11 (31.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment times (average)</td>
<td>9 m–3h 5m (57 mins)</td>
<td>2m–4h15 (1h 1min)</td>
<td>19 m–1h15m (54 mins)</td>
<td></td>
</tr>
<tr>
<td>Alcohol involved</td>
<td>28 (80%)</td>
<td></td>
<td>54 (84.3%)</td>
<td>20 (90.1%)</td>
</tr>
<tr>
<td>Diagnoses*:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intoxication</td>
<td>16 (45.7%)</td>
<td>Intoxication</td>
<td>46 (71.9%)</td>
<td>6 (27.3%)</td>
</tr>
<tr>
<td>Trauma</td>
<td>10 (28.6%)</td>
<td>Trauma</td>
<td>23 (35.9%)</td>
<td>12 (54.5%)</td>
</tr>
<tr>
<td>Assault</td>
<td>2 (5.7%)</td>
<td>Assault</td>
<td>1 (1.6%)</td>
<td>3 (13.6%)</td>
</tr>
<tr>
<td>Medical</td>
<td>8 (22.9%)</td>
<td>Medical</td>
<td>5 (7.8%)</td>
<td>4 (18%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glass injuries</td>
<td>1 (1.6%)</td>
<td>5 (22.7%)</td>
</tr>
<tr>
<td>Given IV fluid</td>
<td>15 (42.9%)</td>
<td></td>
<td>11 (17.2%)</td>
<td>6 (27.3%)</td>
</tr>
<tr>
<td>Given IV glucose</td>
<td>14 (40%)</td>
<td></td>
<td>11 (17.2%)</td>
<td>6 (27.3%)</td>
</tr>
<tr>
<td>Direct ED Transfer</td>
<td>6 (17.1%)</td>
<td></td>
<td>5 (7.8%)</td>
<td>0</td>
</tr>
<tr>
<td>To ED if no facility:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11 (31.4%)</td>
<td>Yes</td>
<td>20 (31.2%)</td>
<td>8 (36.4%)</td>
</tr>
<tr>
<td>Likely</td>
<td>12 (34.3%)</td>
<td>Likely</td>
<td>13 (20.3%)</td>
<td>6 (27.3%)</td>
</tr>
<tr>
<td>Unlikely</td>
<td>10 (28.6%)</td>
<td>Unlikely</td>
<td>22 (34.3%)</td>
<td>3 (13.6%)</td>
</tr>
<tr>
<td>No</td>
<td>2 (5.7%)</td>
<td>No</td>
<td>9 (14.1%)</td>
<td>5 (22.7%)</td>
</tr>
</tbody>
</table>

(*Some patients had more than one diagnosis, e.g. intoxication and head injury)

Of the total of 86 patients treated, 17 were sufficiently intoxicated and dehydrated by the warm weather to require intravenous saline, supplemented with a small dose of intravenous dextrose. Only five of 86 patients (5.8%) needed to be transported to the
ED, a further reduction on the figures for 2011. Paramedics determined that 47 of the
86 patients (54.7%) would have, or were likely to have required direct transfer to the
ED in the absence of a safe zone.

In 2012, six injuries were sustained on broken glass (7% of patients), all but one in the
hospitality zone. This was an improvement on the previous year. Once again, these
patients were not directed immediately to the ED but after careful inspection, cleaning
and dressing of their wounds, were instructed to attend a local ED or general
practitioner during normal hours the next working day for clinical review and
radiology to exclude retained glass.

Shivering had been frequently observed in patients who received intravenous fluid at
ambient temperature at the RWC, despite the use of double blankets. At the 2012
Sevens, bags of intravenous crystalloid were therefore warmed briefly in a microwave
and stored in a temperature-monitored insulated box prior to administration. This
course of action resulted in a marked reduction in shivering or complaints from
patients of feeling cold.

**Cost implications**—Table 3 summarises the balance of expenditure and savings
associated with the RWC and 2012 initiatives. In principle, the cost of consumables to
the ambulance service can be balanced against a corresponding reduction in the cost
of ED consumables.

The hire charge for temporary facilities at the stadium and hospitality zones
(exhibition trucks), together with staff allowances and salaries for non-volunteer staff,
are easily offset by the cost of ambulance provision for patients who would otherwise
have been transferred to the ED, combined with their ED treatment costs. Although
some patients with minor conditions or injuries would have been treated at a lower
cost than that of ED per-capita funding, others would have required transfer to the
short-stay ward, generating a higher cost.

The relevant costs are:
- Safe zone exhibition trucks: NZ$ 1,000/day
- Processing of emergency ambulance call: NZ$ 35
- Emergency ambulance transfer to the ED: NZ$ 613.64
- ED care (less than 6 hours) funded at: NZ$ 355 per person
  (Staff allowances & salaries: see Table 3)

### Table 3. Costings

<table>
<thead>
<tr>
<th>Expenditure (NZD)</th>
<th>Savings (NZD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RWC 2011</strong></td>
<td></td>
</tr>
<tr>
<td>Temporary facility</td>
<td>2,000</td>
</tr>
<tr>
<td>Salaries (non-volunteer staff)</td>
<td>2,028.88</td>
</tr>
<tr>
<td>Staff allowances</td>
<td>330</td>
</tr>
<tr>
<td>Emergency call processing</td>
<td>23 x 35</td>
</tr>
<tr>
<td>Ambulance transfers to ED</td>
<td>23 x 613.64</td>
</tr>
<tr>
<td>Consumables</td>
<td>balance</td>
</tr>
<tr>
<td>ED costs (ambulatory patients)</td>
<td>23 x 355</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>4,358.88</td>
</tr>
</tbody>
</table>

NZMJ 5 April 2013, Vol 126 No 1372; ISSN 1175 8716
Expenditure (NZD) | Savings (NZD)
---|---
**2012 Sevens**
Temporary facility | 4,000
Salaries (non-volunteer staff) | 9,068.52
Staff allowances | 555
Emergency call processing | 47 x 35 | 1645
Ambulance transfers to ED | 47 x 613.64 | 28,841.08
Staff allowances | balance | balance
Consumables | balance | balance
ED costs (ambulatory patients) | 47 x 355 | 16,685
**TOTAL** | 13,623.52 | 47,171.08

**Discussion**

The establishment of safe zones (sometimes referred to as sobering-up centres) for intoxicated individuals is not a new concept but there are very few reports from within New Zealand. No report of such facilities at major rugby events has been found, despite the culture of post-match drinking associated with rugby.

Judicial systems in many countries have called for facilities to be established to deal with public intoxication but to automatically delegate such responsibility to the police may introduce clinical risk.

In New Zealand, the Ministry of Health highlighted potential health issues prior to the Rugby World Cup and these included alcohol consumption and alcohol-related ED presentations.

The police, ambulance service and emergency departments are traditionally responsible for managing those at risk from alcohol intoxication but safe zones in which individuals can be monitored whilst they sober up have potential advantages which include:

- A secure environment supervised by a healthcare professional
- Avoidance of unnecessary ambulance transport for further care
- Reduced demand on emergency services including ambulances, paramedics and the ED, allowing hospital staff to focus on more serious clinical emergencies.

Whilst data for the workload encountered in the safe zones at the 2011 International Sevens is limited, our subsequent findings indicate that those requiring clinical attention at these large rugby events were likely to be New Zealanders in their twenties with a slight female preponderance (64 females out of 121; 52.9%).

Between 22% and 32% of attendees were students. Older persons were also affected by alcohol but seemed to be more risk-averse and tolerant of its effect.

During the RWC when there were many overseas visitors, only 37% of patients resided outside the Pacific region and during the 2012 Sevens, only 26 of 86 (30.2%) were from overseas. One observation was that overseas groups, although intoxicated, seemed to be more mutually supportive and looked after their members.

Alcohol was believed to be a contributory or causative factor in the patient’s attendance at the safe zone in 80-90% of instances. The average treatment time was
approximately 1 hour but some patients were discharged after a few minutes whilst the maximum duration of treatment was over 4 hours. We consider it a good use of resources to keep these patients in a safe, clinically supervised environment away from the ED whilst they recover from profound intoxication.

Shivering and low tympanic temperatures were common findings amongst patients at the first two events. This susceptibility was attributed to the vasodilatory action of ethanol combined with environmental exposure but the use of warmed intravenous fluids seemed to correct the problem. Other reports focus on the complications resulting from high ambient temperatures.\textsuperscript{1,5,6,11}

Patients intoxicated with alcohol have been successfully triaged by ambulance staff of intermediate grade\textsuperscript{12} but other groups have had less success using paramedics.\textsuperscript{13,14} Our alcohol pathway facilitated triage and with supervision, it was rapidly adopted by event medics (first aiders) without difficulty, allowing them to determine which patients could be managed in the safe zone and which required transfer to the ED.

The feedback from paramedics has been very positive and the pathway is largely responsible for the clinical gains that have resulted from this initiative. Whilst there is no evidence that intravenous fluids or dextrose accelerates the elimination of alcohol,\textsuperscript{15-17} dehydration from repeated vomiting or the diuretic effect of alcohol is common.\textsuperscript{18}

Most patients appeared to benefit from this therapy and regain independent mobility within a reasonable timeframe, allowing them to be discharged to the care of friends or relatives and be fit for transport home. No adverse event or feedback was reported by the ambulance service, the ED or the hospital.

Alcohol intoxication predisposes to injury.\textsuperscript{19} A range of minor injuries was encountered with glass being a frequent cause of wounds at the 2011 Sevens. Since that time it is pleasing to note that the number of injuries sustained on glass has declined. This is attributed to the use of more plastic substitutes, particularly in the hospitality zone.

Eleven of 35 patients (31.4\%) were transferred to the ED at the RWC and 10 of 86 (11.6\%) at the 2012 Sevens. Safe zone staff considered that in the absence of their facility, the patient would have or was likely to have been transferred by ambulance to Wellington ED in 23 of 35 cases (65.7\%) at the RWC or in 47 of 86 cases (54.7\%) at the 2012 Sevens, respectively 12 and 39 more patients than would otherwise have been hospitalised.

Some patients with minor conditions or injuries would have by-passed the safe zone and attended the ED independently but this could not have been prevented. The more modest ED avoidance rate at the RWC compared to the Sevens may be linked to stronger mutual support amongst overseas rugby supporters.

The above figures should be considered in the context of an average daily ED attendance of 142 patients over the weekend of the RWC and 156 over the weekend of the 2012 Sevens. Patients who would have been transferred to the ED would have occupied space in one of 29 cubicles and required nursing care.
The typical cost of treating such a patient who can be discharged from the ED within 6 hours is NZ$355 but for any patient staying longer than this (and requiring admission to the short-stay unit), the cost is NZ$690.

Costs associated with the provision of standard hospital care to those intoxicated with alcohol are significant.\textsuperscript{20} Substantial economies for both the ambulance service and the hospital resulted from the establishment of our facility which provided convenient and safe care for patients attending the RWC, International Sevens and associated social events.

Overall savings exceeded NZ$18,000 for the RWC and NZ$33,500 for the 2012 Sevens. Future charges for hire of facilities will be less since permanent accommodation has now been made available for use at weekends in the hospitality zone.

One limitation in the data collection was that nationality and other historical information was sometimes unavailable as a result of the patient’s alcoholic state. Information was then obtained from accompanying relatives or friends whenever possible. We were unable to clearly identify impairment from the ingestion of recreational drugs although a handful of patients were suspected of this, or the consumption of spiked drinks.

Drug abuse has been more of a problem at pop music or similar events.\textsuperscript{2}\textsuperscript{11} Another limitation was that although patients not requiring transfer to the ED expressed a clear intention to go home or to other supervised accommodation when they were discharged to friends or family, it is not known if any changed their mind and attended hospital.

At both the RWC and Sevens, a base providing simple first aid was also active at the stadium but this is a standard arrangement for events and the workload quoted in this study relates purely to activity requiring safe zone intervention.

In conclusion, the establishment of safe zones for major rugby events in Wellington satisfied the aims of producing a secure environment supervised by healthcare professionals, reducing unnecessary ambulance transport, and easing the demands on emergency services, allowing hospital staff to focus on more serious clinical emergencies.

The experience has promoted continuing discussions between WFA, ACC, alcohol advisory groups, NZ Police and licencees in the hospitality industry aimed at identifying locations where excessive alcohol consumption and its adverse effects arise. In the meantime, the Safer Cities service described above continues to function every weekend in central Wellington.

**Conclusion**

The establishment of safe zones at major rugby events in Wellington during 2011 and 2012 provided an effective and protected environment for the treatment of patients suffering from alcohol intoxication as well as minor injury or illness. It reduced the workload for the ambulance service and the ED, and generated cost savings for these services.
Competing interests: Nil.

Author information: Andrew H Swain, Senior Lecturer in Emergency Medicine, Department of Surgery & Anaesthesia, University of Otago, Wellington; Amanda Weaver, Paramedic, Wellington Free Ambulance, Wellington; Alasdair J Gray, Medical Student, University of Aberdeen, Scotland; Mark Bailey, Clinical Effectiveness Manager, Wellington Free Ambulance, Wellington; Stephen G Palmer, Medical Officer of Health, Hutt Valley District Health Board, Lower Hutt

Acknowledgements: The authors acknowledge the efforts of volunteer and non-volunteer paramedic staff in their support of the safe zones and wish to thank ACC, Wellington City Council, and Wellington Free Ambulance for their financial sponsorship of the initiative. We are grateful to Dr A. Cromhout of Wellington Hospital Emergency Department for assisting with consumables and to Ross Weddell, Events Coordinator (WFA), for providing costings. We acknowledge Robert Ives, Community Care Manager (WFA), and Andy Parr, Emergency Preparedness Manager (WFA) who were responsible for establishing the safe zones.

Correspondence: Andrew H Swain, Senior Lecturer in Emergency Medicine, Department of Surgery & Anaesthesia, University of Otago, PO Box 7343, Wellington 6242, New Zealand. Fax: +64 (0)4 3895318; email: andrew.swain@otago.ac.nz

References:
Who should manage transient ischemic attacks? A comparison between stroke experts, generalists, and electronic decision support

Annemarei Ranta, Pietro Cariga

Abstract

Aims Rapid expert management of transient ischemic attacks (TIA) has been shown to reduce the incidence of stroke, but is not always achievable. This study aims to demonstrate that TIA management by stroke experts is indeed more guideline adherent than that of generalists and that a TIA/stroke electronic decision support (EDS) tool closely mimics expert advice and improves guideline adherence.

Methods 11 general practitioners (GPs), 12 general physicians, and 12 stroke specialists assessed and provided management plans for 7 hypothetical patients with potential TIAs. Responses were compared with the advice provided when patient data was entered into a TIA/stroke EDS programme.

Results Diagnosis and medical management was highly consistent and guideline adherent amongst stroke experts. Diagnostic accuracy was lower in the GP and general physician groups (76% and 79% respectively) and only one-third of generalists initiated best medical therapy when indicated. The TIA/stroke EDS consistently agreed with expert diagnosis, investigations, and medical management and provided most comprehensive lifestyle advice.

Conclusion This study (a) confirms that stroke expert care achieves higher guideline adherence and (b) provides validation that the TIA/stroke EDS tool is able to mimic expert advice and can reliably apply best practice guidelines.

Transient ischaemic attacks (TIAs) identify people at high risk of stroke. The key intervention that reduces subsequent stroke is rapid initiation of best medical therapy via urgent (<24 hour) specialist review.\(^1,2\) Care following this model has been associated with an 80% reduction in 90 day stroke risk from 10.3% to 2.1% (adjusted hazard ratio 0.20, 95% CI 0.08-0.49; p=0.0001).\(^2\)

In New Zealand, providing a 24 hour, 7 days a week, rapid access stroke specialist run TIA service is challenging. Involving other, less specialised clinicians is often the only alternative.\(^3\) However, the quality of care provided by such clinicians is uncertain and generally assumed to be inferior.

Electronic decision support (EDS) has been used in a variety of health care settings,\(^4\) but has not been widely used in the management of TIA or stroke.

In 2009 the MidCentral stroke service in collaboration with BPAC (Inc) launched a TIA/Stroke EDS tool after completion of a small pilot.\(^5\)

This tool consists of a web-based single page data entry form (Figure 1) and a computer algorithm that utilises criteria from the New Zealand TIA guidelines\(^3\) to (a)
confirm a diagnosis of TIA or stroke and (b) recommend an evidenced based management plan which can, depending on risk stratification, range from immediate hospital referral to community management by the GP with access to relevant diagnostics.

Figure 1. TIA/stroke EDS data entry form with sample case
This study aimed to (a) confirm the notion that stroke specialist care is indeed superior to both general practitioners (GPs) and general physicians without special expertise in stroke and to (b) assess whether this novel TIA/Stroke electronic decision support (EDS) tool can help to enhance the management skills of generalists to more closely mimic management provided by experts and improve overall guideline adherence.

**Methods**

Twelve physicians with expertise in stroke care (neurologists and physicians/geriatricians with special training/experience in stroke care), ten GPs, and 12 general physicians without special training or experience in stroke care were recruited via various methods.

Stroke experts were identified through an informal New Zealand stroke doctor network and contacted via email with an 86% response rate. General physicians were recruited from the investigators’ home institution during a regular medical grand rounds lecture with a 71% response rate. These physicians all participate in the general medicine roster and are actively involved in the management of patients with stroke and TIs.

GPs were recruited from the authors’ home DHB by contacting all GPs via email for whom an email address was on file in the department of neurology with a 27% response rate.

All participants were asked to assess seven hypothetical cases based on real life referrals to the MidCentral Stroke/TIA Service. Subsequently, all seven cases were entered into the EDS tool by the primary investigator for comparison to clinician responses.

To ensure that EDS advice was not strongly dependent on the degree of expertise of the individual entering the data, two volunteers with no medical background were also asked to enter these same seven cases into the TIA/stroke EDS tool.

The seven cases consisted of two patients with transient symptoms not typical of TIA (Case 1 & 7), one with a posterior circulation TIA (Case 2), one with an anterior circulation TIA (Case 3), one with a subtle posterior circulation stroke with delayed presentation (Case 4), one with a hyperacute anterior circulation stroke (Case 5), and one with progressive cranial nerve signs and symptoms developing over 48 hours and no vascular risk factors based on a real life patient with Miller-Fisher variant of Guillain-Barré syndrome (Case 6).

Clinicians were asked to make a diagnosis, triage the patient, and design a management plan. Answers were generally recruited in free text format to limit prompting.

Parameters assessed included: diagnosis (including anatomic localisation i.e. anterior versus posterior circulation), medication initiation (which and when), investigations requested and patient counselling (smoking cessation, diet advice, driving restrictions).

All cases were in part hypothetical and even when they closely approximated a real life patient a definite final diagnosis was not always possible. Thus in most cases the majority opinion of the stroke experts was considered to represent the ‘best possible diagnosis.’

Management appropriateness as regards triage, diagnostic work-up and medication/counselling was assessed by comparison with expert majority opinion and best practice guideline recommendations.

Diagnostic cost was estimated using MidCentral DHB public hospital prices. An appropriateness score was calculated by adding 10 points for each appropriate investigation and subtracting 10 points for each inappropriate or omitted investigation.

Investigations considered include MRI, CT, carotid imaging, electrocardiogram, echocardiogram, and Holter monitor/24 hour telemetry. When more than one option was suggested the cheapest option was used in calculations. Laboratory cost, other investigations, and hospitalisation costs were not considered.

**Results**

Diagnosis and localisation was highly consistent amongst stroke experts. Stroke experts concurred with one another as regards diagnosis and anatomic localisation.
(anterior versus posterior circulation) in 93% (range: 75–100% depending on the case) and 98% (93–100%) of cases respectively. Where a definite diagnosis was known (Cases 3–6) all 12 experts arrived at the correct diagnosis.

GPs and general physicians demonstrated diagnostic accuracy of 76% (45-100%) and 79% (33-100%) respectively. Accurate localisation was achieved by GPs in only 9% (0-27%) and by general physicians in 58% (33-77%) of cases (Figure 2).

By contrast when appropriate patient data was entered into the TIA/Stroke EDS expert diagnosis and localisation were matched 100% of the time.

**Figure 2. GP and general physicians (%) achieving diagnostic and localisation consistency with expert majority opinion**

Triage advice was more consistent across all groups although with this variable GPs outperformed general physicians: 84% (60–100%) of GPs achieved appropriate triage advice compared with only 59% (39–100%) of general physicians; by contrast the software achieved this in 100% of cases.

When appropriate (as determined by both expert majority opinion and best practice guidelines) 92% of stroke experts recommended immediate initiation of best medical therapy (BMT) consisting of antiplatelet(s), statin, and an antihypertensive.

In comparison only 27% of GPs and 31% of internists initiated BMT immediately when indicated. The software recommended BMT initiation at first point of contact in every case where appropriate.

All three clinician groups significantly underperformed when it came to additional management advice including counselling on diet, smoking cessation, and driving restrictions.

By contrast, these items were consistently addressed by advice generated by the automated software (Figure 3).
Figure 3. Management consistency with New Zealand TIA Guidelines: GPs, general physicians, stroke experts, and EDS software

![Figure 3](image)

BMT=Best Medical Therapy; ‘smoking, ‘lifestyle,’ and ‘driving’ refers to whether need for counselling was mentioned.

Overall the estimated management costs were highest amongst stroke experts and lowest amongst GPs and appropriateness of investigation amongst clinicians was highest in the expert group and generally inversely proportional to cost (Figure 4).

Figure 4. Investigation appropriateness and cost by clinician group

![Figure 4](image)

*Score is calculated by adding 10 points for each investigation ordered in accordance with New Zealand guidelines and subtracting 10 points for each omitted or inappropriate investigation ordered.
When two non-doctors were asked to enter the seven cases into the TIA/stroke EDS tool the same answers were elicited as when entered by a stroke expert except on a single occasion when a volunteer accidentally entered incorrect clinical data. The resultant diagnosis over-estimated the acuity of the problem prompting hospital level rather than outpatient care, however, other advice rendered remained appropriate.

**Discussion**

Unsurprisingly and quite reassuringly, stroke expert management was highly concordant with one another and generally guideline based. As expected diagnostic and localisation skills were poorer in the generalist groups with general physicians outperforming GPs.

The frequent omission of initiation of best medical management by generalists compared with experts echoes previous findings\(^1,2\) and strongly supports the notion that generalists in isolation do not adequately implement secondary preventive measures. However, it is noteworthy that even experts frequently omitted implementing non-medical preventive strategies.

Diagnostic cost increased with level of expertise and the appropriateness of the diagnostics requested did as well. This is not surprising and further highlights that while expert care is probably more expensive than generalist care it is also more comprehensive and appropriate.

The performance of the TIA/Stroke EDS tool was superior to that of generalists, achieved diagnostic accuracy comparable with experts and closely mimicked expert triage and medication management advice.

The ‘check-list’ nature of an electronic tool is the likely explanation for its superior performance as regards the more comprehensive inclusion of otherwise often neglected non-medical management provision and highlights one of the clear strengths of such tools.

While cost effectiveness of investigation of the EDS tool appeared superior to both generalists and experts this finding has to be interpreted with caution. Firstly, the appropriateness score did not take into account potential variations amongst investigations as regards degree of importance, secondly cost assessment was solely based on investigation and specifically did not consider the cost of the EDS tool itself, and finally the EDS never advises to obtain MRI scanning as it is a primary care based tool and thereby will almost by definition incur a lower management cost than experts.

Whether an MRI is ever the most appropriate first investigation in the management of a probable stroke or TIA patient is debatable and beyond the scope of this paper. Nonetheless, the findings suggest that some degree of standardisation may in fact offer potential cost savings. The perhaps somewhat surprisingly lower ‘indication score’ amongst experts compared with the EDS was primarily related to frequent omission to request ECGs amongst the experts.

While the software can add value to generalist driven TIA care it is important to note that accuracy of data entry is paramount. Some precautions can be set to ensure that if in doubt the software errs on ‘over-estimating’ rather than ‘under-estimating’ clinical
risk ensuring adequate patient safety at the potential expense of optimum resource utilisation. However, on top of that it appears important that the individual using the software tool has some medical expertise so that overt errors are readily recognised and all management decisions are sanctioned by a clinician before being implemented.

This is a small, observational study limiting the conclusions that can be drawn. However, the close concordance with expert advice does provide a degree of validation of this tool and several outcome measures strongly suggest that there is a role for an electronic decision support tool in aiding general doctors with the management of TIAs especially when experts are not readily available.

A large randomised controlled trial (FASTESt Trial: ACTRN12611000792921) is currently underway to conclusively ascertain the safety, efficacy, and cost effectiveness of this tool in clinical practice.

Competing interests: Nil.

Author information: Annemarei Ranta, Consultant Neurologist, Department of Neurology, MidCentral Health, Palmerston North and Associate Dean, Undergraduate Medical Education, University of Otago, Wellington at Palmerston North; Pietro Cariga, Consultant Neurologist, Department of Neurology, MidCentral Health, Palmerston North.

Acknowledgements: We thank the clinicians who participated in this study frequently on their own precious time and without remuneration.

Correspondence: Dr Annemarei Ranta, Department of Neurology, MidCentral Health, Private Bag 11036, Palmerston North 4442, New Zealand. Fax: +64(0)63508391; email: anna.ranta@otago.ac.nz

References:

Progression of diabetic maculopathy in patients on the Wellington Diabetic Screening Programme initially graded M3

Neil Avery, Kenneth Chan, Keith Maslin

Abstract

Aim  To determine the likelihood of progression from M3 grade maculopathy, and therefore the safety of these patients remaining under the care of a primary screener.

Methods  Patients graded M3 at diabetic screening were selected from the Wellington screening database. Photographs for this visit and the subsequent visit were obtained, and graded by a consultant ophthalmologist. Photographs graded M3 were included and progression of maculopathy between visits, number of patients with a reduction in vision and duration between visits were determined.

Results  Mean duration between visits for all patients was 255 (± 59.5) days. Of the 54 eyes studied, 15 or 33.3% progressed to M4 maculopathy at the subsequent visit. Despite progressing from M3 to M4, none had a reduction of vision by more than one line of Snellen acuity at follow up due to diabetic maculopathy.

Conclusions  Rates of progression of maculopathy from M3 to M4 were of clinical significance. Despite this none had worsening visual acuity due to diabetic eye disease. This suggests patients with M3 maculopathy could be maintained under a primary screening programme, as is the case in the United Kingdom.

Diabetes is a major health problem facing health care providers worldwide. 4% of New Zealanders have diabetes with this number increasing as the population ages and obesity rates increase. Among these patients 27% have some degree of diabetic retinopathy, with 12% severe enough to need care from an ophthalmologist. With rates of diabetes rising the numbers suffering from diabetic eye disease are rising, providing a challenge for ophthalmologists, and particularly the public health system.

Screening for diabetic eye disease is vital to reduce the burden of disease, however it is an expensive process. Appropriate screening systems combined with timely treatment however make them cost effective in terms of sight years preserved. To achieve this collaboration with other ophthalmic healthcare professionals important in reducing the burden of care on the public health system.

In 2002 the WIPA (Wellington Independent Practitioners Association) was established to provide diabetic eye screening services for the Wellington region. Screening involves non-mydriatic fundus photographs, with mydriasis used if an unsatisfactory image is obtained, and slit lamp biomicroscopy performed by the optometrist if this is unsatisfactory. Photographs are graded according to the National Diabetes Retinal Screening Grading System with grades for both maculopathy and retinopathy. Maculopathy grading is from M0 (least severe) to M5 (most severe), in addition there is a category MT for stable treated maculopathy.
Patients graded M3 or higher, or those with other pathology are recommended to be referred to an ophthalmologist for treatment. The criteria for M3 maculopathy are exudates or thickening within two disc diameters, but outside one disc diameter from the centre of the macula, and for M4 maculopathy exudates or retinal thickening within one disc diameter of the centre of the macula, with no foveal involvement. Furthermore those who are unable to have a satisfactory photograph or retinal examination by the screening optometrist due to reasons such as cataract are referred for further management. In addition to diabetic eye disease screening detects significant amounts of incidental non-diabetic ocular disease, resulting in improved visual outcomes for these patients.

Grading of photographs has been an issue for diabetic screening programmes worldwide. Sallam et al found only 72.3% agreement with photographic grading and hospital slit lamp biomicroscopy grading. Benbasat and Pollack found variable rates of inter- and intra-examiner agreement when grading retinal photographs. Counts of microaneurysms were found to be in agreement only 39 to 85% of the time with two assessments by the same examiner. This has lead to other methods, including development of automatic grading by computer systems. Automated computer grading has been shown to be safe and reduce the burden on healthcare professionals. Some studies even found computerised grading more sensitive in detection of haemorrhages and exudates. Despite this the ability to detect other pathology, and the potential to miss other serious conditions such as tumours make it less attractive.

With the need for diabetic screening established, it is less clear how best to carry out this screening, and in collaborative programmes with other ocular healthcare professionals at what point referral for review by an ophthalmologist is required. This paper reviews the rates of progression of diabetic maculopathy from those graded M3 initially by optometrists, and assesses the safety of the current referral criteria referring M4 but not M3 used by the WIPA Screening Programme.

**Methods**

From the Wellington Independent Practitioners Association (WIPA) screening database all patients with M3 maculopathy (as defined by the New Zealand National Diabetes Retinal Screening Grading System 2006) were identified from the inception of the database in 2002 to 30 June 2009. M3 or mild maculopathy was defined as exudates and/or retinal thickening within 2 disc diameters of the centre of the macula but outside 1 disc diameter.

45 eyes of 54 patients enrolled in the WIPA Screening Programme were studied. Photographic screening data was collated from the initial presentation with M3 maculopathy, and their first subsequent visit. The photographs for each visit were graded by the grading optometrist and a consultant ophthalmologist. Those photographs graded M3 at the initial visit by both the optometrist and ophthalmologist were included.

Exclusion criteria were those patients who had been referred to clinics for pathology in the fellow eye, had been lost to follow-up, had no photos available or for whom the grading deferred between the optometrist and ophthalmologist.

Main outcome measures were the percentage of patients whose maculopathy progressed to greater than M3 at the subsequent visit, the duration between screening visits, and the number of patients with a significant reduction in Snellen visual acuity (more than one line) among those progressing from M3 maculopathy.
Results

Of the 54 eyes graded M3 by both the screening optometrist and consultant ophthalmologist, 18 or 33.3% progressed to M4 maculopathy at the subsequent visit. 3.7% or two of 54 eyes improved from M3 to M2 maculopathy, and 63.0% or 34 of 54 eyes remained M3 (Figure 1). Mean duration between screening photographs was 255.0 (± 59.5) days.

Despite progressing from M3 to M4, only one patient (5.6%) had a reduction of vision by more than one line of Snellen acuity at follow up. This was not due to progression of their diabetic maculopathy.

Figure 1. Rates of progression of maculopathy

![Pie chart showing rates of progression: 3.70% progressed to M4, 63.00% stable at M3, 33.30% improved to M2.]

Discussion

Photographic screening for diabetes enables patients to see the photographs and discuss them, and rates of attendance improve when they are taken and screening locations spread about the community. This results in further opportunities to emphasise the importance of diabetic control and taking ownership of one’s health outcomes. Health professionals such as optometrists are more effective at this than a photographer in a technician role, and may help improve not only ocular outcomes, but also more general health outcomes.

The rates of progression of maculopathy from M3 to M4 were of clinical significance. Despite this no patient had worsening visual acuity at the subsequent visit due to the diabetic eye disease. This suggests patients with M3 maculopathy are safe to remain under a well managed screening programme with accurate grading, clear referral pathways for those who progress, and a peer review system.

This guideline would be consistent with the British guidelines, which recognise only maculopathy with exudates or retinal thickening within 1 disc diameter of the central macula as requiring referral. For the Wellington Screening Programme this means...
appropriate training for graders and supervision of the screening optometrists by an Ophthalmologist is vital.

Finally the mean interval between screening photographs at 255 days was slightly outside the guideline set of 6 months (183 days). As with the issue of when a referral for review by an ophthalmologist is required, the appropriate interval between screening visits has not been clearly established. This study found rates of progression for those with moderate maculopathy to be significant, however this may have been reduced if the screening interval were shorter. Despite this no patient lost vision as a result of this progression, suggesting an interval of 255 days may be safe.

While providing useful information there is more work to be done before it can be stated confidently that patients with M3 maculopathy are safe to remain under a screening programme. Firstly this was a relatively small sample of 54 eyes, with only 18 progressing to M4 maculopathy. Furthermore there were a number of people excluded for non-agreement between the grading optometrist and ophthalmologist, non-attendance, missing photographs and other reasons. It is possible non-attenders are at higher risk of visual loss, possibly therefore requiring referral at an earlier stage. While these issues may influence the progression and interval sections there is no reason to suggest the grading accuracy would be any different among these groups.

These results suggest if grading is sufficiently accurate those with M3 maculopathy are safe to remain under an optometrist run screening programme at an interval of 255 days between visits. Despite this relative safety, with progression rates at 33.3% a new grading system to help identify patients at increased risk of progression may be useful if patients with M3 maculopathy were to remain under the care of a primary screener or optometrist.

Competing interests: Nil.

Author information: Neil Avery, Registrar, Ophthalmology, Wellington Hospital, Wellington; Kenneth Chan, Registrar, Ophthalmology; Wellington Hospital; Wellington; Keith Maslin, Consultant Ophthalmologist ; Wellington Hospital; Wellington

Correspondence: Neil Avery, c/o Wellington Hospital, Newtown, Wellington 6021, New Zealand. Email: Neil.Avery@ccdhb.org.nz

References:

The future of the New Zealand plastic surgery workforce

Brandon M Adams, Michael F Klaassen, Swee T Tan

Abstract

Aims The New Zealand (NZ) plastic and reconstructive surgery (PRS) workforce provides reconstructive plastic surgery (RPS) public services from six centres. There has been little analysis on whether the workforce is adequate to meet the needs of the NZ population currently or in the future. This study analysed the current workforce, its distribution and future requirements.

Methods PRS manpower data, workforce activities, population statistics, and population modelling were analysed to determine current needs and predict future needs for the PRS workforce. The NZ PRS workforce is compared with international benchmarks. Regional variation of the workforce was analysed with respect to the population’s access to PRS services. Future supply of specialist plastic surgeons is analysed.

Results NZ has a lower number of plastic surgeons per capita than comparable countries. The current NZ PRS workforce is mal-distributed. Areas of current and emerging future need are identified.

Conclusions The current workforce mal-distribution will worsen with future population growth and distribution. Up to 60% of the NZ population will be at risk of inadequate access to PRS services by 2027. Development of PRS services must be coordinated to ensure that equitable and sustainable services are available throughout NZ. Strategies for ensuring satisfactory future workforce are discussed.

New Zealand (NZ) currently has 4.3 million citizens\(^1\) and 57 specialist plastic surgeons.\(^2\) By 2027 the NZ population will reach 5 million.\(^1\) Mean age will rise to 40 and 20% will be aged over 65, an increase from 13% in 2011. Demand for plastic and reconstructive surgery (PRS) services increases with age and is predicted to increase by 49% by 2027.\(^3\) Surgical workforce planning is challenging due to rapid and complex changes in population size, demographics, service delivery, and advances in technology.

Previous estimates of surgical need have been based on historic service use or current number of surgeons with extrapolation based on population growth alone.\(^4\) These methods do not account for current unmet needs, unequal and poor access\(^5\) due to current funding and service delivery model with an inadequate number of service providers. They also do not account for future increase in per-capita disease burden due to rising disease complexity with increased age\(^6\) and co-morbidities.\(^7\)

PRS provides both reconstructive plastic surgery (RPS) services and aesthetic plastic surgery (APS) services. Six of NZ’s 20 District Health Boards (DHBs) directly provide some RPS services funded through the public health system. These services are delivered through RPS centres ranging from a single part-time surgeon to comprehensive regional centres with part-time and/or full time surgeons, including
one centre with 16 surgeons. Supra-regional co-operation for burns, vascular anomalies, laser and craniofacial surgery is well-established.

Five regional centres provide elective and 24-hour acute RPS services. An unknown volume of elective RPS services are provided by surgeons in part-time or full-time private practices, mostly based around the six DHB-based RPS centres. These surgeons who are either in sole or group practices also provide APS services. No data is available on the volume of APS provided by these surgeons in the private sector.

In 2012, 2.5 million of NZ’s 4.3 million citizens are dependent on outreach services for outpatient assessment and/or travelling inter-district to access these services. By 2027 this number will rise to nearly 2.9 million (60%) unless the service delivery model is changed. Transition to a less centralised model with an increased number of service centres closer to the populations that preserves and strengthens links to the existing tertiary hub across the regions and supra-regional cooperation, requires support and facilitation.

Currently, the DHB-based RPS centres provide a diverse range of services and there is significant regional variation in what is provided by PRS or other surgical specialties outside of these centres based on local skill mix, population need and historical service development.

Although workforce analysis and planning discussions have increased recently in NZ these have largely focused on the entire medical workforce.\(^8,9\) Little analysis and forecasting of the NZ PRS workforce has occurred.\(^10,11\) The analysis presented in this paper extends previous work examining the PRS workforce and identifies populations which have lower access to PRS and models how this may evolve in future. A discussion of PRS public services in relation to the NZ government’s Health Targets is presented.\(^12\)

**Methods**

**New Zealand population and demographic analysis**—Current population data and forecast of population growth, demographic mix, age distribution of the population, and the proportion of elderly New Zealanders were collected from Statistics New Zealand.

**Current and historic workforce capacity**—Registration and workforce demographic data were collected from the Medical Council of New Zealand workforce surveys. Census and modelling data from Statistics New Zealand allowed calculation of population normalised surgeon ratios.

**International benchmarks and targets for provision of PRS services**—A literature search was undertaken using Medline, PRS journals, surgical college and government publications related to PRS workforce needs and forecasting in similar countries.

**Future workforce needs calculations and distribution**—International benchmarks of surgeon to population ratios were compared with predicted NZ specific need based on age specific PRS intervention rates. These were used to estimate current and future needs for the PRS workforce and its distribution.

**Calculation of plastic surgical workforce training needs**—Age at completion of plastic surgical training, mean age of practicing population and estimated age of retirement are used to calculate the current and future rate of training required to maintain a sustainable workforce. A survey of post-FRACS fellowships undertaken by NZ plastic surgeons 2001 - 2011 was used to estimate the time out of the NZ workforce.
Results

New Zealand population and demographic analysis

NZ currently has a population of 4.3 million which is estimated to increase to 5 million by 2027. This growing population is also aging with the mean age increasing from 36 in 2009 to 40 by 2031. The proportion of the population aged over 65 has risen from 8.8% in 1976 to 13% in 2009 and will rise to 20%, of the population by 2027 (Table 1).^1

Table 1. New Zealand population and age demographics

<table>
<thead>
<tr>
<th>Year</th>
<th>Population size</th>
<th>Mean age (years)</th>
<th>Percentage aged over 65 years</th>
<th>Number aged over 65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>3,100,000</td>
<td>26.0</td>
<td>8.8</td>
<td>273,000</td>
</tr>
<tr>
<td>2009</td>
<td>4,300,000</td>
<td>36.6</td>
<td>13</td>
<td>550,000</td>
</tr>
<tr>
<td>2027</td>
<td>5,000,000</td>
<td>40.0</td>
<td>20</td>
<td>1,000,000</td>
</tr>
<tr>
<td>2041</td>
<td>5,400,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Current and historic workforce capacity

NZ has a total medical workforce of 11,478 doctors in 2010.^13 The 53 registered specialist plastic surgeons constitute 0.46% of the entire medical workforce. This gives an overall ratio of 206 doctors per 100,000 population and one plastic surgeon for each 83,019 people living in NZ. Between 1997 and 2006 the number of plastic surgeons decreased slightly from 33 to 29. From 2007 to 2011 the number of registered plastic surgeons increased to 53 (Figure 1).^14-26 43 (81%) of these surgeons have an appointment within the public service.

Figure 1. Number of New Zealand Specialist Plastic and Reconstrcutive Surgeons by Year
International benchmarks and targets for provision of PRS services

NZ currently has a plastic surgeon to population ratio of 1:83,000. This compares well with France, Sweden and Australia (1:80,000), but is below that of Canada (1:72,000) and well below Switzerland (1:58,000) and the USA (1:50,000).

Future workforce needs calculations and distribution

Model 1—If NZ’s current ratio of one plastic surgeon to 83,000 population is simply maintained, a total of 60 plastic surgeons will be required by 2027.

Model 2—If the increasing disease complexity of the NZ patient population and increased age related demand for PRS services was taken into account, an increase by 49% would be required by 2027. Raymont and Simpson use age specific surgical intervention rates to arrive at their estimated 49% increase in PRS service provision, as PRS provides treatment across a wide spectrum of ages it is markedly affected by population aging including the increasing incidence of complex cutaneous malignancy. This prediction can be used to estimate the number of plastic surgeons needed by 2027. It gives a range of 79-84 surgeons needed depending on whether 2011 (when there were 53 registered plastic surgeons) or 2012 (when there were 57 registered plastic surgeons) is chosen as the baseline.

These predictions give an approximate surgeon to population ratio of 1:63,000 - 1:59,000, by dividing the number of surgeons by the predicted population in 2027.

Currently the DHBs in NZ are responsible for the healthcare of populations of 32,700 to 537,100 (Table 2). The size of these populations will increase to 37,470 - 614,911 by 2027. In 2012 there were 57 registered plastic surgeons practising within 11 of the 20 health districts.

If the population is divided into the six regions served by DHBs providing RPS public services the surgeon to population ratios would range from 1:56,846 (for the Counties-Manukau health district) to 1:157,350 (for the Northland health district). If the plastic surgeon need in 2027 was approximately one surgeon per 60,000 population the need for surgeons in each health district would range from 0.6 (West Coast) to 10.2 (Waitemata).

If it was assumed that a sustainable service centre requires three or more participating surgeons then up to 12 potential health district groupings could support a RPS public service locally (Table 2). Figure 2 provides a graphical representation of potential RPS public service centres by 2027.
Table 2. Current and predicted future distribution of NZ PRS workforce

<table>
<thead>
<tr>
<th>Region</th>
<th>DHB Population</th>
<th>Population for Each PSU</th>
<th>Surgeons in Each Region</th>
<th>Surgeon: Population Ratio</th>
<th>DHB Population</th>
<th>Surgeons Needed</th>
<th>12 Potential Service Centres and Number of Surgeons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northland</td>
<td>157,350</td>
<td>157,350</td>
<td>1</td>
<td>157,350</td>
<td>180,146</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Waitemata</td>
<td>537,100</td>
<td></td>
<td></td>
<td></td>
<td>614,911</td>
<td>10.2</td>
<td>10.2</td>
</tr>
<tr>
<td>Auckland</td>
<td>450,300</td>
<td>1,478,000</td>
<td>26</td>
<td>56,846</td>
<td>515,536</td>
<td>8.6</td>
<td>8.6</td>
</tr>
<tr>
<td>Counties Manukau</td>
<td>490,600</td>
<td></td>
<td></td>
<td></td>
<td>561,674</td>
<td>9.4</td>
<td>9.4</td>
</tr>
<tr>
<td>Waikato</td>
<td>369,040</td>
<td></td>
<td></td>
<td></td>
<td>422,504</td>
<td>7.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>210,090</td>
<td></td>
<td></td>
<td></td>
<td>240,526</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Lakes</td>
<td>102,600</td>
<td>837,490</td>
<td>7</td>
<td>119,641</td>
<td>117,464</td>
<td>2.0</td>
<td>Waikato</td>
</tr>
<tr>
<td>Taranaki</td>
<td>109,260</td>
<td></td>
<td></td>
<td></td>
<td>125,089</td>
<td>2.1</td>
<td>MidCentral</td>
</tr>
<tr>
<td>Tairawhiti</td>
<td>46,500</td>
<td></td>
<td></td>
<td></td>
<td>53,237</td>
<td>0.9</td>
<td>Hawke’s Bay</td>
</tr>
<tr>
<td>Hawke’s Bay</td>
<td>154,640</td>
<td></td>
<td></td>
<td></td>
<td>177,043</td>
<td>3.0</td>
<td>3.8</td>
</tr>
<tr>
<td>Whanganui</td>
<td>58,400</td>
<td></td>
<td></td>
<td></td>
<td>66,861</td>
<td>1.1</td>
<td>MidCentral</td>
</tr>
<tr>
<td>MidCentral</td>
<td>159,350</td>
<td></td>
<td></td>
<td></td>
<td>182,435</td>
<td>3.0</td>
<td>6.2</td>
</tr>
<tr>
<td>Wairarapa</td>
<td>40,280</td>
<td>993,770</td>
<td>12</td>
<td>82,814</td>
<td>46,115</td>
<td>0.8</td>
<td>Lower Hutt</td>
</tr>
<tr>
<td>Lower Hutt</td>
<td>143,800</td>
<td></td>
<td></td>
<td></td>
<td>164,633</td>
<td>2.7</td>
<td>9.2</td>
</tr>
<tr>
<td>Capital and Coast</td>
<td>299,200</td>
<td></td>
<td></td>
<td></td>
<td>342,546</td>
<td>5.7</td>
<td>Lower Hutt</td>
</tr>
<tr>
<td>Nelson Marlborough</td>
<td>138,100</td>
<td></td>
<td></td>
<td></td>
<td>158,107</td>
<td>2.6</td>
<td>3.3</td>
</tr>
<tr>
<td>West Coast</td>
<td>32,730</td>
<td></td>
<td></td>
<td></td>
<td>37,472</td>
<td>0.6</td>
<td>Nelson Marlborough</td>
</tr>
<tr>
<td>Canterbury</td>
<td>508,200</td>
<td>596,890</td>
<td>9</td>
<td>66,321</td>
<td>581,824</td>
<td>9.7</td>
<td>10.8</td>
</tr>
<tr>
<td>South Canterbury</td>
<td>55,960</td>
<td></td>
<td></td>
<td></td>
<td>64,067</td>
<td>1.1</td>
<td>Canterbury</td>
</tr>
<tr>
<td>Otago</td>
<td>181,800</td>
<td></td>
<td></td>
<td></td>
<td>208,138</td>
<td>3.5</td>
<td>5.8</td>
</tr>
<tr>
<td>Southland</td>
<td>122,000</td>
<td>303,800</td>
<td>2</td>
<td>151,900</td>
<td>139,674</td>
<td>2.3</td>
<td>Southern/Otago</td>
</tr>
</tbody>
</table>

**TOTALS**          | **4,367,300**   | **436,7300**             | **57**                   |                           | **5,000,000**  | **83.3**       | **83.3**                                          |
In 2012, there were four regional PRS centres in NZ. In 2012, there are six PRS service centres including five regional centres. By 2027, 12 PRS service centres may be required to efficiently deliver PRS services to the entire NZ population.

In 2012, the 2.5 million New Zealanders who do not reside within one of the six DHBs hosting a RPS centre rely on out-reach clinics and/or having to travel to a regional centre for RPS services. If the service delivery model remains unchanged this will rise to 2.9 million, that is, 60% of the population by 2027.

**Calculation of plastic surgery workforce training needs**

To calculate the number of newly qualified plastic surgeons required annually to provide a sustainable workforce it is necessary to estimate the mean age of qualification of new plastic surgeons, mean age of retirement, and estimate time spent out of the NZ workforce. No published figures exist for NZ but estimates may be made.

76% of NZ medical students enter directly from school and take a 6-year degree, at entry their mean age is 18.7 years. The remaining 24% are graduate entrants who take a 5-year degree with a mean age of 22.3 years on entry to medical school. This gives a mean age of graduating medical students of 25.3 years \[\frac{(18.7+6.0)\times0.76 + (22.3+5.0)\times0.24)}{0.76+0.24}\]. \[^{30}\]

Surgical Education and Training (SET) in PRS through the Royal Australasian College of Surgeons is a 5-year programme that starts after a minimum of two post-graduate years but more frequently after four post-graduate years. This gives a mean age of the newly qualified plastic surgeon of 34.3 years (25.3+4+5).

NZ plastic surgeons commonly undertake a period of post-FRACS fellowship training overseas. Between 2001 and 2011 the 32 graduating NZ plastic surgeons had undertaken 71 such fellowships totalling 66.5 working years. This gives a mean of 2.1 years of working life outside of NZ, per surgeon.
No data exists for the age of retirement of NZ plastic surgeons. United States data shows a mean intended age of retirement of age 66 years with an actual mean age of retirement at age 61.8 years. This data accounts for lost working years by choice or due to ill health.

Estimated surgical practicing life may therefore be estimated by subtracting the mean age of completion of post-FRACS fellowship training overseas from the estimated mean retirement age. This formula yields a mean practicing life of 25.4 years \[61.8 – (34.3 + 2.07)\].

If NZ requires 83.3 practising plastic surgeons by 2027, then 3.3 new surgeons per year will be required. This figure is derived by dividing the number (83.3) of surgeons required by the mean practice (25.4 years) per surgeon.

**Discussion**

NZ has an equal or lower plastic surgeon to population ratio than comparable countries. With the aging population and increasing disease complexity there will be a marked increase in the need for PRS services and hence the number of plastic surgeons.

Estimating an increase in the number of plastic surgeons to be directly proportional to the population growth will be inadequate as the need for PRS interventions rises markedly in later life. It also appears that the current training intake of the SET programme is sufficient to achieve a sustainable PRS surgical workforce with 83 surgeons by 2027. This differs from a recent Health Workforce New Zealand report on the 2011 Prioritisation of Medical Disciplines for funding of training positions which identified plastic surgery as the third lowest priority. However, since the publication of that report some revisions by the Ministry of Health have occurred resulting in a decision to maintain funding of existing PRS training positions for 2013.

The presented training model is based on the assumption that sufficient opportunity for graduating plastic surgeons exists to allow return to practise in NZ. If the duration of active practise in NZ is reduced by emigration, parental leave or early retirement, training numbers will need to be increased. If undergraduate medical training moves towards graduate entry practicing years may be decreased. If retirement age is earlier than that of the United States the practicing life would also decrease.

Table 2 shows the current mal-distribution of the PRS workforce with respect to the distribution of the population. Current PRS services are mainly clustered in a small number of tertiary (regional) centres with reduced accessibility of these services by populations residing away from these centres.

If the current service delivery model remained unchanged, then by 2027 nearly 2.9 million (60%) of the population will rely on visiting services for clinic appointments and/or travel to one of the six PRS centres for treatment. The risk of under serving these populations will increase further if the current model of service delivery is unchanged.

Communities in peripheral areas currently bear the cost of transport to access PRS services but also the opportunity costs associated with the lost productive time of both patient and family members associated with transport and time required to access distant services. Approximately 60% of RPS services (unpublished data) that patients currently travel to access in existing tertiary (regional) centres do not require high cost equipment and could be efficiently delivered at appropriately resourced peripheral locations.
The presence of a local PRS service would also provide improved accessibility of the service by other disciplines especially in management of trauma and elective management of many common conditions. These include facial trauma, minor burns, acute and elective hand surgery, breast reconstruction surgery and skin cancer surgery.

When population growth and PRS surgical needs predictions are combined it is evident that by 2027 there are up to 12 health district groupings could benefit from, and sustain, its own local PRS service of a general nature (Table 2). However, any change in the service delivery model will require detailed analysis of what type of service can be appropriately provided locally closer to the populations while maintaining highly specialised care of less common conditions at the regional (tertiary) hubs (Figure 2). This type of analysis and planning has recently occurred in NZ for South Island Neurosurgical services.

An optimal model of service delivery would ensure equity of access is likely to require a regionally distributed service with new on-site RPS ‘nodes’ in the growing peripheral regions that provide RPS services of a general nature. These peripheral ‘nodes’ are integrated and networked with existing regional (tertiary) ‘hubs’ which provide RPS service of the general nature to their local populations but continue to provide tertiary services for the entire region to ensure efficiency of all levels of service provision.

There is an opportunity to develop integrated, coordinated PRS services that serve multiple health districts where assessment and procedures may occur at a number of peripheral ‘nodes’ with a ‘hub’ providing tertiary RPS to avoid duplication of high cost equipment or low volume sub-speciality services.

These regionally distributed services would most likely develop from existing regional centres. The current four regional centres would likely to continue as tertiary ‘hubs’ for the peripheral ‘nodes’ by providing burn surgery, cleft lip and palate surgery, head and neck and skull base surgery, and hypospadias surgery. Current coordination of supra-regional services such as craniofacial surgery, burns surgery, vascular anomalies and laser surgery would be maintained and strengthened.

Clinical leadership is required within PRS to provide vision and direction that ensures sustainable, efficient and equality of access to quality PRS services that meets future needs of the NZ population. The proposed model of service delivery that is networked nationally would ensure delivery of the National Health targets. These new and existing connected RPS centres require surgeons with leadership and management skills who must be developed from the current cohort of surgeons and trainees.

Planning and implementation of the change in the model of service delivery must occur at both the professional and DHB administrative governance level to ensure that appropriate infrastructure is available to deliver service peripherally while avoiding unnecessary duplications, and that strong links are constructed and maintained to ensure strong collaboration across the entire region. This will also provide opportunities for graduating surgeons and decreases the risk of loss of educational investment in SET graduates.

Forward planning and managed development of PRS services is key to the fulfilment of the vision of providing sustainable and equitable access to quality services efficiently across the entire country. Preservation and strengthening of supra-regional co-operation by a strong, unified and collegial profession will ensure the connectedness of the services that would benefit the entire NZ population.
An adequate and sustainable PRS workforce that is properly distributed to support a service delivery model of the future are the key ingredients that will meet the National Health Strategy trifecta of “better”, “sooner” and “more convenient”.

Note: Part of this paper was presented as an E-poster at the Royal Australasian College of Surgeons’ 81st Annual Scientific Meeting in Kuala Lumpur, Malaysia, May 6–10, 2012.

Competing interests: Nil.

Author information: Brandon M Adams, Plastic Surgery Fellow, New Zealand Institute for Plastic and Cosmetic Surgery, Auckland; Michael F Klaassen, Plastic Surgeon, Parnell Surgeon, Auckland; Swee T Tan, Professor in Plastic Surgery, University of Otago; Director, Gillies McIndoe Research Institute; Plastic & Cranio-Maxillofacial Surgeon, Wellington, Regional Plastic, Maxillofacial & Burns Unit, and Director of Surgery, Hutt Hospital, Wellington

Correspondence: Professor Swee T Tan, Wellington Regional Plastic, Maxillofacial & Burns Unit, Hutt Hospital, Private Bag 31-709, Lower Hutt 5010, New Zealand. Fax: +64 (0)4 5872510; email: swee.tan@huttvalleydhb.org.nz

References:

33. Wraight, B. Health workforce New Zealand. Personal communication, 8 June 2012.
A standardised and validated patient survey in primary care: introducing the New Zealand General Practice Assessment Questionnaire (NZGPAQ)

Gerard Zwier

Abstract

Aim To determine whether the New Zealand adaptation of the UK developed General Practice Assessment Questionnaire (GPAQ) is a valid and reliable indicator of the quality of care in general practice in New Zealand and what the survey can tell us about patient satisfaction with general practice.

Method The Health Services Consumer Research Ltd Primary Care Patient Survey database which presently contains data from 184 medical practices (549 GPs) and responses from 50,000 enrolled patients was examined to determine the validity and reliability of the survey instrument. Data was briefly analysed to ascertain how survey results can best be employed to improve the quality of primary care.

Results A check on representativeness showed that older, female and European patients are over-represented. To determine validity and reliability, the “Cronbach alpha” statistic was calculated and shown to range between 0.85 - 0.96. Convergent validity was demonstrated by high correlations between items that measured closely related aspects of patient care. Discriminant validity was shown by very low correlations between variables that measured unrelated items. Further analyses show how patients’ age, sex and ethnic group influence the level of satisfaction experienced.

Conclusion The NZGPAQ survey can be employed nationwide to improve the quality of primary care because these patient survey results emphasize where service delivery is good/excellent and identify where change is needed to improve patient satisfaction.

Whilst in the UK the government has acknowledged that the regular implementation of patient surveys is one of the most important sources for quality improvement in the NHS\(^1\), in New Zealand we lack a uniform, standardised and validated primary care patient survey.

The General Practice Assessment Questionnaire (GPAQ) was originally developed in the USA but was later modified and further developed by the National Primary Care Research and Development Centre at the University of Manchester, U.K. After the UK government implemented the incentivized “Quality and Outcomes Framework” in the 2004 GP contract, the GPAQ was introduced as one of two questionnaires that practices and PHOs could use to obtain patient feedback.

Two versions of the GPAQ now exist: (a) the “consultation” questionnaire, administered at the practice and (b) a “postal” version. The survey has recently been endorsed and updated by Cambridge University.\(^2\)
In New Zealand, many practices and PHOs make use of the “Better Practice Patient Questionnaire” (BPPQ) made available by the Royal New Zealand College of General Practitioners’ (RNZGPC).

The questionnaire is available in Māori, Samoan, Chinese and Korean. Completion of the survey process enables New Zealand GPs to claim 10 MOPS credits. The BPPQ asks questions about (a) the practice, (b) the doctor and (c) the staff. It has no specific questions about the practice nurse or about an After Hours service. While it asks patients how they felt about the waiting time at the practice, it does not ask how long they usually have to wait thus making it impossible to ascertain what they think is an acceptable time to wait.

It also has an unbalanced response rate set which is skewed in favour of a positive response: the only negative response available to the patient is “poor”. Moreover, although it asks GPs to reflect on the feedback received from patients, there is no information on how the GP’s performance compares to other GPs in the practice or how the practice compares to other practices within the larger PHO.

Method

Like the GPAQ, the New Zealand General Practice Assessment Questionnaire (NZGPAQ) developed by Health Services Consumer Research (Ltd) with assistance from ProCare Health, focuses mainly on questions about access, inter-personal aspects of care and continuity of care.

The basic layout, sequence and formulation of the questions and response categories in the GPAQ are maintained. Three questions concern After Hours services. An overall satisfaction question is also included.

Three open-ended questions allow the patient to put their opinions in their own words. All questionnaires are individually numbered with a code incorporating the PHO, the practice, the doctor and a sequential number for the patient. This generates a performance measure that tracks ratings over time, by GP, by practice and by PHO.

The NZGPAQ questionnaire is available in Māori, Samoan, Tongan, Chinese and Thai languages. It has been approved by the RNZCGP for MOPS CQI purposes and can be used in the accreditation process.

The present overview is divided into two separate sections:

- an assessment of the participation rate, the resulting representativeness of the sample and the reliability and validity of the questionnaire and
- an analysis of the results of the survey data

This overview is concluded with a recommendation regarding future requirements.

Results

Participation rate—Since 2005 the NZGPAQ has been used by 184 medical practices (812 participants representing 549 individual GPs) and responses have been recorded from close to 50,000 enrolled patients enrolled in five PHOs (see Table 1).
Table 1 Number of practices surveyed over last 7 years

<table>
<thead>
<tr>
<th>Year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participating practices</td>
<td>63</td>
<td>24</td>
<td>20</td>
<td>55</td>
<td>53</td>
<td>59</td>
<td>55</td>
<td>184</td>
</tr>
<tr>
<td>Participating GPs</td>
<td>132</td>
<td>34</td>
<td>56</td>
<td>166</td>
<td>184</td>
<td>124</td>
<td>116</td>
<td>549</td>
</tr>
<tr>
<td>Patients surveyed</td>
<td>6,894</td>
<td>411</td>
<td>2,764</td>
<td>8,180</td>
<td>11,445</td>
<td>9,820</td>
<td>9,719</td>
<td>49,233</td>
</tr>
</tbody>
</table>

Because of the trailblazing role of ProCare Health, 87% of the data in this database comes from the three ProCare PHOs. Other PHOs presently included in the dataset are South Seas Healthcare, Langimalie Tongan Society, Nelson Bay Primary Health and Waihopai PHO in Invercargill.

Although each practice had been instructed to give every patient during a specific time period the opportunity to participate in the survey, there is substantial variance in the number of questionnaires returned.

Originally, it was stipulated that 50 questionnaires was the minimum number of questionnaires required for an accurate and useful analysis. However, more recently, Cambridge University has amended this number to 35 per GP if “fairly reliable” results are needed and 60 per GP if “very reliable” results are required.

Of the 812 survey participants (549 individual GPs) who participated during the last seven years (2005-2011) 472 or 58% returned the required minimum number of questionnaires. However, if we accept the lower criterion of 35 per GP, 611 or 75% returned a sufficient number of questionnaires to generate “fairly reliable” results.

**Representativeness**—Although detailed data on demographics was not available on all PHOs included in the survey, an analysis of the demographics pertaining to the ProCare patient population (n=671,000) was compared to the sample of patients submitted by their practices (n=41,000). Results showed that older, female and European patients are over-represented (p<.0001).

Across the board, patient satisfaction ratings ranged from 3.62 on a scale which asked about affordability (where 1=very expensive and 5=very affordable) to 5.52 on a scale (where 1=very poor and 6=excellent) which asked about the doctor’s concern and caring for his/her patient.

The scores were well distributed and had relatively large standard deviations ranging from 14% to 31%. The relatively smaller standard deviations on items measuring patients’ rating of how they were treated by their GP (14% - 16%) and by the practice nurse (16%-17%) suggest the scores are unanimously endorsed whereas, conversely, large standard deviations on items measuring satisfaction with the patients’ ability to speak to their GP (31%), the time they had to wait to be seen (28%) and affordability (27%) demonstrate that there was considerable variability across the practices.

**Reliability of the data**—Following the review of the reliability of the nationwide patient questionnaire used by New Zealand District Health Boards, the reliability of the NZGPAQ questionnaire was also assessed by means of the “Cronbach alpha” statistic. The value of alpha can range between zero and one and it is generally...
accepted that if a set of items has an alpha above .60, it is usually considered to be internally consistent. If it goes above .80, it signifies a very high reliability. Above .90 suggests an “excellent” internal consistency.

Results show that on measures that gauge satisfaction among patients regarding access, a high alpha level of 0.85 was achieved. Satisfaction with the manner in which they were treated by the doctor and nurse achieved very high alpha levels of 0.969 and 0.952 (see Table 2).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating of access</td>
<td>0.858</td>
</tr>
<tr>
<td>Rating of doctor</td>
<td>0.969</td>
</tr>
<tr>
<td>Rating of nurse</td>
<td>0.952</td>
</tr>
</tbody>
</table>

Another method by which one can assess the reliability of a survey instrument is to perform a test-retest reliability analysis.

However, as patients completing the questionnaire are anonymous, we could not ask the same patient to complete the same questionnaire three years later. Therefore we have to contend ourselves with examining the results of replicating the exercise three years later and calculate correlations between the overall satisfaction scores. Of course, the longer the period in between, the less likely it is to obtain the same score.

If we compare the scores at practice level, the correlation is +0.84. If we go down to GP level the correlation between the two sets of data is still quite high at +0.72. So this suggests that patients score their overall satisfaction with practices fairly consistently and only a little less so when they score their overall satisfaction with GPs. This is a very important finding as it demonstrates that the survey can be relied upon to give consistent results.

Validity—Convergent validity is demonstrated when variables (constructs) that are expected to be related are, in fact, related. An example of this is the very strong positive relationship that exists between the item that asks the patient about the ease with which they can get to an After Hours service and their satisfaction with the After Hours service (0.724).

Similarly, the very strong negative correlation between the item which asks patients how long they usually have to wait at the practice before the consultation and the item which asks them to rate this waiting time (-0.624) also demonstrates very good construct validity.

Discriminant validity (or divergent validity) tests that constructs which should have no relationship do, in fact, not have any relationship. For example, one would not expect the patients’ response to a question about access, i.e. “How quickly do you usually get seen by any doctor?” to be correlated to questions which ask specifically about the current appointment; i.e. “Thinking about your consultation today, how do you rate the doctor on the following aspects of care?” Results show that the correlations range from r=0.004 to r=0.01.
As the survey clearly distinguishes between items that ought to correlate with one another and items between which one would not expect to find a strong association, these findings confirm excellent construct validity.

**Frequency distributions**—As shown in a number of articles, results show that age is strongly correlated with satisfaction: older patients are more likely to express greater satisfaction than are younger patients.

Similarly, patient satisfaction correlates with the patient’s sex, which can partly be explained by sociodemographic differences: female patients tend to be younger, less likely to be in full time employment and thus are less likely to find the consultation to be affordable. Results also showed that female patients are more likely than male patients to have to wait more than half an hour before being seen. Consequently, they are also less likely to rate the waiting time in the practice to be acceptable.

Satisfaction is also known to vary with respect to the ethnicity of the patient. Here too, European patients are more likely than non-European patients to reply with “completely satisfied” when asked to say how satisfied they are. Maori, Pacific and Asian patients are more likely to be female and younger than European patients. They are also more likely to be looking after home and family and be much more frequent visitors to the practice.

As shown in a number of articles, results show that age is strongly correlated with satisfaction: older patients are more likely to express greater satisfaction than are younger patients.

Naturally enough, affordability also played a role in overall satisfaction with the practice: 77% of patients who responded with “very affordable” to the question “How affordable was the consultation for you personally?” also said that they were “completely satisfied” with the practice vs only 26% of patients who felt the consultation was “very expensive”.

Finally, in response to the question “What After Hours service do you use when your general practice is closed?” close to 60% reported using the Accident and Medical Clinics, while another 15% stated they used the Hospital Emergency Department. The St John ambulance service received the most praise: one in three patients (34%) said they were “very satisfied”.

**International comparison**—The item scales used by Ramsay et al. and Bower at al were calculated and compared with those reported by Potiriadis et al who reported the results obtained in her Australian GPAQ survey along with those obtained in the UK (see Table 3).
Table 3. Inter-country comparison

<table>
<thead>
<tr>
<th>Satisfaction with:</th>
<th>n</th>
<th>Mean item score New Zealand</th>
<th>n</th>
<th>Mean item score Australia</th>
<th>n</th>
<th>Mean item score UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptionist</td>
<td>49,033</td>
<td>85.7%</td>
<td>7,122</td>
<td>81.8%</td>
<td>19,803</td>
<td>69.1%</td>
</tr>
<tr>
<td>Access to practice</td>
<td>43,689</td>
<td>76.6%</td>
<td>7,111</td>
<td>68.6%</td>
<td>19,302</td>
<td>58.3%</td>
</tr>
<tr>
<td>Continuity of care</td>
<td>45,272</td>
<td>80.4%</td>
<td>7,080</td>
<td>76.5%</td>
<td>18,586</td>
<td>66.1%</td>
</tr>
<tr>
<td>Communication</td>
<td>45,599</td>
<td>89.1%</td>
<td>7,104</td>
<td>84.0%</td>
<td>19,528</td>
<td>75.9%</td>
</tr>
<tr>
<td>Nursing Care</td>
<td>18,703</td>
<td>83.4%</td>
<td>2,142</td>
<td>80.0%</td>
<td>13,740</td>
<td>76.3%</td>
</tr>
<tr>
<td>Practice overall</td>
<td>47,724</td>
<td>86.3%</td>
<td>7,097</td>
<td>81.6%</td>
<td>19,039</td>
<td>76.5%</td>
</tr>
</tbody>
</table>

Results showed that the mean scores for the seven NZGPAQ items ranged from 76.6% for satisfaction with access to the practice to 89.1% for satisfaction with communication between the GP and the patient. The New Zealand results were very much higher than the UK results and, across the board, about 5% higher than the Australian results.

Discussion

This is not the first time that the GPAQ has been adapted for use in a different country. In 2006 the questionnaire was translated in Thai and tested on reliability and validity suggesting that the Thai version of the GPAQ can be used to evaluate the quality of primary care in Thailand\(^{13}\).

However, comparing the finding of the present survey with those reported by Potiriadis et al (2008) in Australia tells us little about the relative satisfaction levels between the three countries because the methodology between the studies is too different to be useful.

With respect to the UK scores, Potitiadis explains that the reason for the difference in the results between the UK and her survey was likely to be the result of the sampling methods used: the UK data was derived from UK national benchmarks while her GPAQ questionnaire was one of several questionnaires embedded within a postal survey sent to patients of GPs interested in mental health research.

With respect to the disparity between the Australian scores and New Zealand scores we can add to that by saying that the difference is accounted for by the well established bias towards more favourable rating from patients who complete the questionnaire during the practice visit (the “consultation” version) compared with patients enrolled at the practice who receive a questionnaire in the mail (the “postal” version).

The difference in satisfaction ratings is about 4%-5%\(^{14}\).

Yet there are two areas in which the NZGPAQ may be usefully employed to increase the quality of patient care in New Zealand: (a) in the formulation of standards and (b) in closing the feedback loop\(^{15}\).

There is no reason not to involve patients in the formulation of standards of practice. One example is the maximum waiting time of 48 hours for appointments to see GPs.
Another example is the standard for what constitutes an acceptable waiting time for consultations to begin. In our case, the finding that 83.4% of patients reported usual waiting times to be within 20 minutes of arrival suggests that an appropriate standard of care could be that 75% of patients ought to be seen within 20 minutes of arrival at the practice.

The main purpose of implementing patient surveys is not about the 10 MOPS credits. Instead, the real reason for doing patient surveys is that they allow us to identify shortcomings in service delivery and, where necessary, to make changes to current practice. This is what the NHS had in mind when it offered GPs incentives for acting on the results of the survey.

And so, rather than implementing dozens more surveys in which we try and understand the complex relationship between sociodemographic factors, patient expectations and situational contingencies, which no doubt will lead to a morass of conflicting and contradictory findings, it will be more productive if we were to identify and monitor patient satisfaction with a particular GP or a specific practice in an ongoing fashion and with the same questionnaire.

Comparing patient ratings on an inter-practice and intra-practice level will enable us to recognize and appreciate high scoring GPs and practices. Moreover, as was the case in secondary care, the regular implementation of the survey will show us which modifications in service delivery have led to increases in patient scores and which changes have had little or no effect.

If ever the New Zealand Ministry of Health decides to follow the approach taken by the UK Department of Health and incentivise the implementation of patient surveys, GPs will be asked to undertake only approved and validated surveys. It goes without saying that the quality assurance of the survey instrument itself is critical here since only a high-quality instrument is able to supply high-quality data, which can serve as a reliable basis for improvement strategies.

**Competing interests:** Gerard Zwier is Managing Director of Health Services Consumer Research Limited. The NZGPAQ is free to use for New Zealand General Practitioners and can be downloaded from [http://www.hscr.co.nz/wp-content/uploads/2011/02/](http://www.hscr.co.nz/wp-content/uploads/2011/02/). Practices and PHOs wishing to implement the NZGPAQ with help from HSCR, please contact the author. Commercial companies selling patient evaluation services using the NZGPAQ are required to pay a royalty fee to Cambridge University.

**Author information:** Gerard Zwier, Managing Director, Health Services Consumer Research Limited, Auckland

**Acknowledgements:** We are grateful to the 549 GPs, their patients and practice staff for participating in the surveys. We particularly thank Dr Tom Marshall (as the Foundation Chairman of ProCare Health taking an early interest in the survey) and Mr Ron Hooton, CEO ProCare Health, for his permission to publish the data from the survey.

**Correspondence:** Gerard Zwier PhD, Managing Director, Health Services Consumer Research Limited, PO Box 440, Shortland Street, Auckland 1140. New Zealand. Email: inbox@hscr.co.nz
References:


3. The Royal New Zealand College of General Practitioners Cornerstone General Practice Accreditation Programme MOPS triennium 2011-2013 CQI Activity (Continuous Quality Improvement).


The effect of Māori ethnicity misclassification on cervical screening coverage

Peter Sandiford, Micol Salvietto, Dale Bramley, Samuel Wong, Lannes Johnson

Abstract

Aim There is a large difference in the cervical screening coverage rate between Māori and European women in New Zealand. This paper examines the extent to which this difference is due to misclassification of ethnicity.

Methods Data from Waitemata District Health Board’s two Primary Health Organisations (PHOs) was used to identify the population of Waitemata domiciled women aged 25-69 years eligible for cervical screening. Their cervical screening status was obtained from the National Cervical Screening Programme register (NCSP-R). Data from Auckland and Waitemata DHBs was used to determine the women’s ethnicity in the National Health Index (NHI). Women who had withdrawn from the NCSP-R, women who were deceased and women for whom an NHI ethnicity code could not be obtained were excluded from the analysis. Ethnicity codes from the three sources (PHO registers, NCSP-R and NHI) were compared to identify women classified as non-Māori in the NCSP-R but Māori in either of the other two data sources. The effect on Māori cervical screening coverage rates of not counting these women was assessed.

Results Within the study population there was a total of 6718 women identified as Māori on the NCSP of whom 5242 had been screened within the last 3 years and 1476 who had not. In addition to these, there were 2075 women identified as Māori in either the PHO or NHI databases but not in the NCSP-R who had been screened within the preceding 3 years, and a further 2094 who had not been screened. There were also 797 women identified as Māori in the NHI or PHO datasets who were not on the NCSP-R (and therefore were not screened). If all screened women classified as Māori from any source were counted, Waitemata DHB’s Māori screening coverage rate would rise from 49.3% to 68.8% (or to 61.0% and 63.2% respective if just PHO and NHI Māori were counted).

Conclusion Misclassification of ethnicity could explain (in absolute terms) up to 19.5% of the 35.0% difference in cervical screening coverage rate between Māori and non-Māori, non-Pacific, non-Asian coverage in Waitemata District. Misclassification is likely to have similar effects on coverage estimates throughout New Zealand. Without improving the accuracy of ethnicity data in the NCSP-R it will be impossible for the country to achieve the target coverage rate of 80% among Māori.

One of the most striking disparities in New Zealand health services provision is the difference between Māori and European/Other ethnicities in cervical screening coverage.

Nationally, Māori coverage is 58.2%, compared with 82.6% in non-Māori, non-Pacific, non-Asian (NMNPNA) women.¹ The difference in coverage has only
declined slightly over the years despite concerted efforts to improve coverage rates including targeted Ministry of Health funding to subsidise smears for high needs groups including Māori. In September 2008 the rates were 53.7% for Māori and 81.9% for NMNPNA.

The problem is particularly worrying in the Auckland Region—in Waitemata DHB Māori coverage for the quarter ending December 2011 was 49.3% compared with 84.3% for NMNPNA.

A report commissioned by the Ministry of Health concluded that lack of coordination was the key cause of low coverage rates and in response it has funded the formation of a new coordination service based at Auckland DHB. One possibility that this analysis did not consider, however, is that some of the difference in coverage between Māori and NMNPNA might be due to misclassification of ethnicity and consequent numerator-denominator mismatch.

Ministry of Health estimates of ethnic-specific cervical screening coverage are calculated as the number of eligible women screened in the preceding 3 years divided by the projected population of women in each ethnicity in this age range, adjusted for the estimated prevalence of total hysterectomy in each ethnic group. The data for the numerator comes from the National Cervical Screening Programme register (NCSP-R) managed by the National Screening Unit. The denominator estimates are provided by Statistics New Zealand.

The National Cervical Screening Programme now reports coverage rates in the age range 25-69 rather than 20-69 (the eligible age range), partly on the grounds that women 20-22 years of age have not had three years in the eligible age range in which to obtain a smear. If a woman has never had a cervical smear in New Zealand nor cervical cancer, then she will not appear on the NCSP-R.

The ethnicity definition used for both the numerator and denominator of the rate is based on a ‘prioritised’ ethnicity classification. National ethnicity protocols allow individuals to have more than one ethnicity and in the 2006 census 10.4% of individuals recorded more than one ethnicity (8.8% in Waitemata).

Under the prioritised ethnicity classification, if Māori is recorded as one of the ethnicities, the person is classified as Māori; those who record any Pacific ethnicity are classified as Pacific if they have not also recorded Māori; and those recording any Asian ethnicity are classified as Asian if they have not recorded a Māori or Pacific ethnicity.

The ethnicity code used for the numerator of the cervical screening coverage is based on that recorded on the laboratory form that is sent with the woman’s smear. If that form has no ethnicity recorded on it, then the previous ethnicity code recorded for that woman is used.

The NCSP-R attempts to contact women with no recorded ethnicity in order to obtain this information from them. However, it is not clear how ethnicity was added originally to the NCSP-R, and although the current enrolment form is in alignment with ethnicity data protocols, in practice most women are enrolled automatically into the programme (provided that they consent to it) when their smear is sent to the laboratory.
The mismatch in the source of ethnicity data for the numerator and the denominator creates the potential for misclassification to affect the reported ethnic-specific coverage rates. There are indications that this bias may be significant.

Firstly, the 2006 National Health Survey (NHS) found that 75.1% of Māori women aged 20-69 had had a cervical smear in the preceding 3 years – a rate not significantly different from that among non-Māori (78.6%)\(^6\). Although this particular sample was restricted to those with a primary care provider that they use when sick, the magnitude of the difference to the coverage figure reported by the NCSP is conspicuous. A similar difference between NCSP coverage rates and the 2002/3 National Health Survey was noted in an analysis by the NCSP published in 2005,\(^7\) stating that it is not clear which is most accurate.

Secondly, concern that undercounting Māori in the NCSP-R could be causing Māori coverage rates to be under-estimated was raised in an audit of cases of invasive cervical cancer in 2004, where 19% of Māori women had misclassified ethnicity and it was stated that “If the misclassification of ethnicity that the Audit has found amongst women with invasive cervical cancer is also present amongst women enrolled on the NCSP-R who do not have cervical cancer (and it is likely that it is), then this will have an impact on monitoring information (e.g. coverage amongst Māori women will be underestimated) and operational planning”. \(^8\)

This paper attempts to gain a better understanding of the possible impact of ethnicity misclassification on Māori screening coverage estimates. It uses ethnicity data from two alternative data sources, the Primary Health Organisation (PHO) register and the National Health Index (NHI), to assess the possible effects of ethnicity misclassification on reported screening coverage for Māori women domiciled in the Waitemata District Health Board area.

**Methods**

Waitemata DHB has two accredited PHOs with whom almost all general practices are affiliated, and the vast majority of Waitemata residents are registered with one of these practices.

The data in this analysis was derived from the registers held by ProCare PHO and Waitemata PHO in the final quarter of 2011 of all 25-69 year old women. These women were matched by their NHI number to NCSP records which included data on whether the woman had been screened in the last 3 years. The same listing of women was matched with both Waitemata and Auckland DHB data to identify the woman’s ethnicity in the NHI.

The NHI ethnicity could only be identified for women who had had some contact with the DHB services at some point in time, but this was 81% of them (113,558 of 140,207).

The merged dataset was filtered to exclude those women for whom the NHI ethnicity code was not available,\(^9\) women who were deceased, and all women who had withdrawn from the NCSP-R (the latter two categories comprise just 0.4% of the total eligible population). The following groups of 25-69 year old women were then identified, separating them according to whether or not they had been screened in the preceding 3 years:

- Women identified as Māori only on the NCSP-R.
- Women identified as Māori on the NCSP-R and on either the PHO or NHI registers.
- Women identified as Māori on the PHO register but not on the NCSP-R.
- Women identified as Māori on the NHI register but not on the NCSP-R.
- Women identified as Māori on either the PHO or NHI registers but not on the NCSP-R.
- Women identified as Māori in the PHO register but not enrolled on the NCSP-R.
In addition, the numbers of Māori for whom no NHI ethnicity data was available was also recorded by source (PHO or NCSP) and separate estimates of screening coverage were calculated for these women.

The combined total of Waitemata domiciled Waitemata PHO and ProCare PHO registered women identified as Māori on the NCSP register who had been screened in the previous 3 years was divided by the NCSP reported December 2011 coverage rate for 25-69 year old Māori women domiciled in Waitemata DHB (49.3%) in order to impute a (total hysterectomy adjusted) population for those women registered with a PHO for whom an NHI ethnicity code was available.

In making this imputation, it was assumed that the coverage rate in this population is the same as the coverage rate in the total Waitemata Māori population that includes, in addition, (a) women for whom an NHI ethnicity code was not available; (b) women enrolled in a PHO other than Waitemata or ProCare and (c) women not enrolled with a PHO. The validity of these assumptions is addressed in the discussion.

**Results**

Figure 1 shows the composition of the study population divided by their inclusion or not on the NCSP register, along with the numbers of Māori women in the group for whom no NHI ethnicity code was available.

Overall, 93.0% of women in the PHO register who are classified as Māori in either that source or in the NHI were on the NCSP register. This is significantly higher than the proportion for the PHO population as a whole (88.6%; p<0.0001).

The proportion of women for whom an NHI ethnicity code was available was also higher for (PHO defined) Māori than for the population as a whole, both for those on the NCSP register (94.0% vs 82.1%; p=0), and those not on the NCSP register (81.7% vs 66.2%; p=0). This may reflect a higher rate of DHB service use among Māori than in the general population.

Clearly the availability of NHI codes was higher for those registered with the NCSP than those not registered (again reflecting differences in health service utilisation between the groups). PHO defined Māori were 2.3% of all women for whom no NHI ethnicity was available. This proportion does not differ significantly between those on the NCSP register and those not on the NCSP register (p=0.35).

The mean age of women classified as Māori on all three databases was 42.2 years compared with 41.7 years for women who were Māori on either the NHI or PHO databases, but not on the NCSP-R (p=0.063).

Figure 2 illustrates how misclassification of ethnicity may affect reported screening coverage rates. The first column of the graph shows that a total of 5249 women identified as Māori on the NCSP screening register had had a smear within the preceding three years. Given the NCSP reported coverage rate of 49.32%, this number implies a total Māori study population of 10,642.

Adjusting for the 5.6% of women classified as Māori on the NCSP-R for whom we had no NHI code, and given that Waitemata and ProCare jointly cover 95.2% of all PHO-enrolled Waitemata domiciled Māori, this would imply a total hysterectomy-adjusted screening eligible population for the District as a whole of 11,839 women. This is just three less than the NCSP estimated denominator of 11,842 that is based on census projections.
Figure 1. Study population showing Māori women according to ethnicity recorded in NCSP, PHO and NHI datasets

Waitakere Domiciled Waitakere and ProCare PHO women aged 25-69

On NCSP Register = 124,262
- NCSP Maori: 465
- PHO Maori: 787
- NHI Maori: 5277

Not on NCSP Register = 16,026
- NHI ethnicity unavailable = 21,354
- NCSP Maori: 90
- PHO Maori: 130
- NHI Maori: 657

NB: Venn diagrams are not drawn to scale.
This first column also shows the number of women identified as Māori on the NCSP register who are not up to date with their screening (1478). If all of these women had been screened, then the coverage rate would have increased to just 63.2% - well short of the 80% target.

Even if the PHOs had managed to screen, in addition, all 688 women not on the NCSP register (implying that they have never been screened) but classified as Māori in the PHO database, then the coverage rate achieved would still only be 69.7%.

Now, if the 1247 women who were classified as Māori in the PHO register and who have already been screened are counted towards Māori coverage (column 2), then the current rate would rise by 11.7% from 49.3% to 61.0%, with an additional 18.1% among the 1921 women on the register but unscreened. If instead of using a PHO definition of Māori, we use the NHI defined Māori in combination with the NCSP Māori (column 3), then the current coverage rate would have been similar (63.2% with an additional 17.9% on the register but unscreened).

The final column in Figure 2 shows how coverage would be increased by using a definition of Māori based on any of the three datasets. Current coverage would rise to
68.8% with 19.7% on the register but unscreened, and a further 7.5% (797 women) comprised of Māori women enrolled in the PHO but not on the NCSP register. Altogether these groups make up 96.1% of the imputed Māori population. The remaining 4.0% may be made up of Māori women who are not enrolled with a PHO.

Table 1 presents the NCSP ethnicity of those women who were classified as Māori in the PHO or NHI registers but not in the NCSP-R. It shows that in absolute numbers the potential gain in screening coverage for Māori is likely to be mainly at the ‘expense’ of European coverage. However the reclassification of 277 Pacific women would have a more significant impact on coverage in that group as they comprise approximately 4.3% of the total Pacific population.

On the other hand, a certain proportion of European women would also be reclassified as Pacific so the net effect on this ethnic group is not known (and its estimation is beyond the scope of this paper).

Table 1. NCSP ethnicities of women classified as Māori in PHO or NHI registers but not in NCSP register.

<table>
<thead>
<tr>
<th>NCSP Ethnicity</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>282</td>
<td>9.8</td>
</tr>
<tr>
<td>Asian</td>
<td>29</td>
<td>1.0</td>
</tr>
<tr>
<td>European</td>
<td>2157</td>
<td>75.2</td>
</tr>
<tr>
<td>Pacific</td>
<td>277</td>
<td>9.7</td>
</tr>
<tr>
<td>Other</td>
<td>122</td>
<td>4.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2867</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Discussion

To our knowledge, this is the first published study investigating in any depth the possible effects of ethnic misclassification on cervical screening rates. However, the NCSP is aware that ethnicity misclassification is a problem and in the past has produced ‘adjustors’ in an attempt to correct for this. An unpublished report for the NCSP found national Māori coverage rates to be underestimated by 22%, Pacific by 25% and Asian by 18% (Hazel Lewis, personal communication). Our estimate for Māori would seem consistent with this.

In the absence of a gold standard reference, it is not possible to be certain that the large numbers of non-overlapping Māori populations in the NCSP, PHO and NHI registers are all the result of misclassification, but surely this is the most likely explanation. What is less certain is whether it is correct to assume that all of the misclassification has been from Māori to non-Māori, rather than vice versa.

On the other hand, no consideration has been given to the possibility that some of the women classified as non-Māori in all three databases are in fact Māori. Support for the assumption that Māori are far more likely to be misclassified as non-Māori than vice versa in primary care datasets has been found in a number of studies, and a 2009 audit of ethnicity coding in Waitemata found 97.1% sensitivity but just 88.1% specificity (Lindsay G, personal communication in 2010).
In the 2004 audit of invasive cervical cancer referred to above, the authors suggested that “The most accurate way of identifying all Māori women from routine data sources was to define ‘Māori’ as ‘Māori on at least one routine data source’. This enabled 97% of those women identifying as Māori at interview to be correctly identified using routine information sources and misclassified only two percent of non-Māori women as Māori.

Until ethnicity data collection from cytology request forms is complete and accurate the NCSP-R could improve its own data by comparing it with those held by the NCR and the NHI databases… and use the definition of ‘Māori on any source’.

This recommendation to use a definition of ‘Māori on any source’ is effectively the approach used in this study. Through this it was possible to ‘account for’ 96.1% of the projected census population of 25-69 Māori women (adjusted for hysterectomy). The remaining 3.9% of the population could be comprised of Māori women who are not enrolled with a PHO.

This would be reasonably consistent with data obtained from the 2006/7 NHS which found that 94.8% of Māori have a health practitioner or service they usually go to first when unwell or injured. The proportion of Waitemata Māori women in this age group registered with a PHO is reported to be just (78.9%), but clearly this figure also subject to ethnicity misclassification bias.

Better ethnicity coding would obviously lead to higher reported Māori coverage rates. It might be argued that this would be little more than a statistical exercise bringing no real benefit to patients. This is not true. More accurate ethnicity coding will also make it possible to identify many additional Māori women on the NCSP-R who have not been screened who could then be targeted in existing programmes designed to reduce inequalities.

**Limitations**—The most obvious limitation of this study is that it was necessarily restricted to Māori women registered with Waitemata and ProCare PHOs in whom an NHI ethnicity code was available. We have estimated that this study incorporates of 89.8% of the census projection estimate of the eligible total district population. With such a high proportion in the study population, the scope for error and bias to influence the findings is limited.

One of the two groups missing from the analysis was those in whom NHI ethnicity was unavailable. Among those in this group who were enrolled with the NCSP, the ratio of Māori in both the PHO and NCSP databases to those in just one of those databases was 1.18, compared with 2.15 for those in whom an NHI code was available. This suggests that if anything, the degree of ethnicity misclassification is higher in this group than in the study population with NHI ethnic codes, and hence, that our estimates of Māori cervical screening coverage rate underestimation are probably conservative.

Indeed, even if rates are calculated for Māori including those in whom no NHI ethnicity was available, the potential coverage is still 68.8%, the same potential coverage rate when they are excluded, but in this case, the denominator rises to 95.8% of the census projected population (from 89.8%).
There were 474 eligible Māori women enrolled with a PHO other than ProCare or Waitemata which is 4.0% of the census projected population. It is unlikely that the pattern of ethnicity misclassification is materially different for these women given that they are operating in a similar environment with similar systems and processes.

The remaining group missing from the analysis comprises the women not registered with any PHO. If coverage among these women is lower than that in the study population, as would seem plausible, then the extent to which ethnic misclassification causes Māori coverage to be underestimated will also have been understated. That is because the higher coverage in the study population will lead to an imputed population higher than it would have been had the coverage rate been exactly that of the total population requiring more ‘misclassified Māori’ for each percentage point increase in coverage.

Since the proportion of women not registered with a PHO was estimated to be just 3%, it is unlikely that this effect would be significant.

Can these findings be generalised to New Zealand as a whole?

The findings in the unpublished report to the NCSP mentioned above suggest that this is a problem throughout the country. The discrepancy between self-reported cervical smear uptake in the NHS and the figures from the NCSP are also suggestive that this problem is present well beyond Waitemata DHB although it may vary in magnitude across the country.

As pointed out in the preceding paragraph, there is little reason to think that the quality of ethnicity data would be better in non-Waitemata practices or in other PHOs, given that one company, (Medtech®) dominates the Practice Management System market share throughout the country, and that other relevant systems for recording ethnicity are also common to those used in Waitemata.

In addition, the procedure for updating ethnicity codes each time a new laboratory form is received by the NCSP-R is one that occurs nationwide. However, since the NCSP-R is managed on a regional basis, it is possible that some regions make more effort to gather complete and accurate ethnicity data than others.

How should the NCSP address this problem?

It is important to begin from the concept of ethnicity adopted by Statistics New Zealand as a social construct of group affiliation and identity.3 Its definition of ethnicity is:

“A social group whose members have one or more of the following four characteristics:

- They share a sense of common origins
- They claim a common and distinctive history and destiny
- They possess one or more dimensions of collective cultural individuality
- They feel a sense of unique collective solidarity.11
Two key characteristics of the definition are that ethnicity is self-defined and that people can and do change their ethnic affiliation, both over time and in different contexts.

In the light of ethnic mismatch between different databases we are presented with a dilemma. Do we follow the ethnic data collection protocols, emphasising consent and self-definition, and choose the most recent code, risking that this may not have been collected in full accordance with the protocols? Or do we follow the recommendations of the NCSP auditors and apply an ‘ever Māori’ approach on the grounds that this will most accurately estimate the true coverage rates with the least level of numerator-denominator bias?

We suggest that neither approach is appropriate and instead propose a third course of action which would be to identify those women in whom there is a mismatch, and attempt to contact them to obtain the current ethnicity in a manner consistent with the ethnicity data collection protocols. Although time-consuming and requiring some additional resource, this approach would avoid any change to a woman’s ethnicity code in a given database without her consent and ensure data collection meets national standards whilst greatly improving the accuracy of the screening coverage estimates.

Ultimately though, what is needed is a single source of high quality ethnicity data that can be used as the basis for both numerator and denominator, or which is at least consistent with census population projections. Proposals from the Ministry of Health National Information Technology Board for electronic data sharing of health information that by 2014 would potentially allow individuals to review and update their ethnicity at any time, may offer the best pathway to achieving this.12

Competing interests: Nil.

Author information: Peter Sandiford, Public Health Physician in Planning and Funding, Waitemata District Health Board, Auckland; Micol Salvetto, Population Health Analyst, Waitemata Primary Health Organisation, Auckland; Samuel Wong, Population and Health Workforce Research Manager, ProCare Primary Health Organisation, Auckland; Dale Bramley, Chief Executive Officer, Waitemata District Health Board, Auckland; Lannes Johnson, Clinical Director, Waitemata Primary Health Organisation, Auckland

Acknowledgements: The authors acknowledge the kind assistance of Hazel Lewis, Bobby Almendral and Vera Schmidt of the National Screening Unit; Purna Vishwanath and Jean Wignall of Auckland DHB; and Zina Ayar of Waitemata DHB. The authors are also very grateful for the collaboration of Waitemata and ProCare PHOs that has made this work possible.

Correspondence: Dr Peter Sandiford, Public Health Physician, Waitemata District Health Board, Level 1, 15 Shea Terrace, Auckland 0740, New Zealand. Fax: +64 (0)9 4418957; email: peter.sandiford@waitematadhb.govt.nz
References and endnotes:

1. Data from the National Cervical Screening Programme for March 2012. Figures apply to hysterectomy adjusted 3 year coverage in 25-69 year olds although it should be noted that there have been recent changes in the way that population projections are calculated.


9. Patients were included if their NHI codes were ‘Not stated’, ‘Don’t Know’, or ‘Response unidentifiable’ as these were patients in whom there had been an opportunity to gather the ethnicity data.


Blood pressure and hypertension in New Zealand: results from the 2008/09 Adult Nutrition Survey

Rachael M McLean, Sheila Williams, Jim I Mann, Jody C Miller, Winsome R Parnell

Abstract

Aims To report the blood pressure results from the 2008/09 New Zealand Adult Nutrition Survey (2008/09NZANS).

Methods Blood pressure measurements were available for 4,407 adults who were part of a survey involving face-to-face interviews with 4,721 New Zealanders aged 15 years and over. Three measurements were taken one minute apart, and the mean of the second and third readings has been used for this analysis. Hypertension was defined as systolic blood pressure (SBP) $\geq 140$ mmHg or diastolic blood pressure (DBP) $\geq 90$ mmHg or self reported use of antihypertensive medications. Comparisons were made with previously published New Zealand population blood pressure estimates.

Results Mean SBP for the New Zealand adult population was 126 mmHg. The prevalence of hypertension was 31%, with 15% reporting taking antihypertensive medication. Mean SBP has increased since 2002/03 for New Zealand European and others (NZEO) aged 35-54 years and Māori aged 35-74 years, reversing a downward trend observed in NZEO between 1982 and 2002.

Conclusions The increasing blood pressure levels are concerning. Given the importance of elevated blood pressure as a risk factor for cardiovascular disease, intensive screening, public health measures aimed at lowering population blood pressure, and further population monitoring are warranted.

In New Zealand current guidelines recommend an assessment and treatment approach based on cardiovascular risk rather than treating blood pressure as an isolated risk factor. $^1$ Thus, individuals with blood pressures higher than the 140/90mmHg which conventionally defines hypertension, $^2$ may not be treated with antihypertensive medication because of an five year absolute cardiovascular risk below 15%. However high blood pressure is an important modifiable risk factor for cardiovascular and kidney disease, and has been identified as a leading cause of death worldwide.

The World Health Organization estimated that in 2004 high blood pressure was responsible for 7.5 million (or 12.8%) of deaths. $^3$ Observational studies of over one million adults show that systolic blood pressures above 115 mmHg, and diastolic blood pressures above 75 mmHg are associated with increasing risk of coronary heart disease and stroke. $^4$

Thus public health measures aimed to reduce blood pressure levels in the population at large are required to complement treatment strategies for individuals with hypertension. In most populations, blood pressure rises with increasing age, with more than half of adults aged 60 years or over reported to have high blood pressure in high income countries. $^5$
New Zealand cardiovascular disease mortality rates have decreased substantially since the early 1970’s. However, ethnic disparities persist, with age-standardised Māori and Pacific mortality rates exceeding those of New Zealand European and Asian rates throughout the period.\(^6\)

In many other high income countries including Scotland, the United States, and Australia there have recently been reports of a flattening of the decline, particularly in relatively young adults of low socioeconomic status.\(^7\)

Recent modelling in New Zealand suggests that rates of ischaemic heart disease mortality are likely to increase in the future as cohorts of people who have grown up in a more ‘obesogenic’ environment enter adulthood and middle age.\(^8\)

This ‘obesogenic’ environment results in inadequate levels of physical activity, sedentary behaviour, increased consumption of high fat, salt and sugar foods, and increased prevalence of obesity.\(^9\) Population monitoring of risk factors such as blood pressure is an essential component of a public health approach to cardiovascular risk reduction.

The 2008/09 New Zealand Adult Nutrition Survey (2008/09NZANS) provides an opportunity to assess the current prevalence of high blood pressure in a large, representative cohort of adult New Zealanders.

**Methods**

A detailed description of the survey methods can be found elsewhere.\(^10\) Briefly, the 2008/09NZANS was a nationally representative, cross-sectional survey of 4,721 New Zealanders aged 15 years and above.

Participants were recruited using a 3-stage, stratified, area-based sampling frame; this involved the selection of 607 geographical areas (meshblocks), followed by the selection of households within each meshblock and then a randomly selected respondent within each household.

The response rate for the 2008/09NZANS was 61%. Increased sampling of Māori and Pacific people and some age groups (15-18 and 71+ years) occurred in order to achieve adequate numbers for producing robust sub-population specific data.

Participants were drawn from urban and rural regions, but were restricted to persons living in private dwellings. Participation in the survey was voluntary. Informed, written consent was obtained. The New Zealand Health and Disability Multi-Region Ethics Committee granted ethical approval for the survey (MEC/08/04/049).

Data for the 2008/09NZANS were collected between 27 October 2008 and 28 October 2009. During a home-visit, a trained interviewer collected sociodemographic and dietary information using computer-assisted personal interview software.

Ethnicity was self-reported, using the Statistics New Zealand standard ethnicity question from the New Zealand Census 2006. Participants were categorized into 3 ethnic groups: Māori, Pacific and New Zealand European and Others (NZEO), where “Others” includes mainly Asian, Middle-Eastern, Latin-American and African ethnic groups. When multiple ethnic categories were selected (n=450) a single ethnic category was assigned based on the following prioritised order: Māori, Pacific, then NZEO.

Blood pressure was measured in 4,407 participants (93% of respondents) using an automated sphygmomanometer (OMRON HEM 907) with an appropriately sized cuff. Three measurements were taken 1 minute apart, and the mean of the second and third readings were used for this analysis. Using a standard definition initially recommended by the World Health Organization (WHO) and more recently in other national surveys, ‘hypertension’ has been defined as a systolic blood pressure (SBP) ≥140 mmHg and/or a diastolic blood pressure (DBP) ≥90 mmHg or self reported use of antihypertensive medications.\(^5,11\)
Trained interviewers carried out height and weight measurements in duplicate. If the two measurements of height and weight differed by more than 1%, a third measurement was taken, and the mean of the closest two measurements was used. Standing height was registered to the nearest 0.1 cm using a stadiometer (Seca 214) and weight was assessed using electronic scales to the nearest 0.1 kg (Tanita HD-351, maximum weight 200 kg).

Statistical analysis was undertaken using Stata (version 11.2). Data from each respondent were weighted to account for the different sampling probabilities so that the results can be said to be representative of the New Zealand population. The Stata survey command was used to estimate population means and standard deviations.

Where aged-standardised ethnicity comparisons were made, populations are standardised to the WHO standard population. Differences between subpopulations were evaluated using $\chi^2$ tests and logistic regression, with p values <0.05 deemed to be statistically significant.

Comparisons were made with previously published data in order to estimate trends in mean SBP and DBP and self-reported use of antihypertensive medication. For the NZEO ethnic group, age specific comparisons were made with previously published mean SBP and DBP from four Auckland based population surveys: the Auckland Risk Factor Study (1982), the 1986-1988 Heart Study, the Auckland Heart and Health Study 1993-1994, and the Auckland Diabetes Heart and Health survey 2002-2003.

For Māori and Pacific ethnic groups, age specific mean SBP and DBP were compared with published results from the Auckland Diabetes Heart and Health survey (ADHHS) 2002-2003 only, as no other comparable data were available. Both national and Auckland specific results from 2008/09NZANS were compared in order to test the validity of these comparisons.

### Results

Mean (standard deviation) SBP for New Zealand adults aged 15 years and over, was 126 mmHg (18); 130 mmHg (16) for men and 122 mmHg (19) for women. Mean DBP was 74 mmHg (12); 75 mmHg (12) for men and 73 mmHg (12) for women (Table 1). Age standardised mean SBP for men was 129 mmHg (95%CI 128, 130), and for women 119 mmHg (95% CI 118, 120). SBP and DBP increased with age, for both men and women.

The prevalence of antihypertensive medication use (self-reported) for New Zealand adults was 15.1% (95%CI 13.6, 16.5); 13.6% (95%CI 11.7, 15.6) for men and 16.3% (95% CI 14.5, 18.2) for women. Use of antihypertensive medication increased significantly with age with 45% of men and 56% of women 70 years of age and over, reporting its use. Use of antihypertensive medication differed by ethnicity.

Māori men reported significantly higher use of antihypertensive medication than NZEO men (15.5% and 9.9%, respectively; p<0.001), and Māori and Pacific women reported significantly higher use than NZEO women (16.0%, 13.7% and 12.1%, respectively; p<0.05 for comparisons with NZEO). Overall, there was a significant association between use of antihypertensive medication and ethnicity (p<0.001).

The prevalence of adult hypertension (defined as SBP ≥140 mmHg or DBP ≥90 mmHg or self reported use of antihypertensive medications) was 30.8% (95%CI 28.7, 32.9) overall; 33.5% in men and 28.3% in women. The age standardised prevalence of hypertension was 26.4% overall (95%CI 24.6, 28.2) for men was 29.3% (95%CI 26.7, 31.9), and for women was 22.7% (95%CI 20.7, 24.6).
Table 1. Blood pressure (systolic and diastolic), antihypertensive medication use, and hypertension prevalence by age, sex and age standardised ethnicity: population estimates.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Systolic Blood Pressure (mmHg) mean (95%CI)</th>
<th>Diastolic Blood Pressure (mmHg) mean (95%CI)</th>
<th>Self reported use of antihypertensive medication % (95%CI)</th>
<th>p</th>
<th>Hypertension prevalence % (95%CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>119 (117, 121)</td>
<td>64 (63, 65)</td>
<td>1.5 (0.0, 3.9)</td>
<td>&lt;0.0001</td>
<td>6.6 (1.5, 11.7)</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>126 (124, 129)</td>
<td>71 (69, 73)</td>
<td>-</td>
<td>-</td>
<td>16.6 (9.8, 23.3)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>127 (125, 128)</td>
<td>74 (72, 75)</td>
<td>3.0 (0.7, 5.4)</td>
<td>-</td>
<td>18.6 (12.9, 24.4)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>130 (128, 132)</td>
<td>80 (78, 81)</td>
<td>6.8 (3.1, 10.5)</td>
<td>-</td>
<td>27.5 (20.1, 34.8)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>135 (132, 139)</td>
<td>81 (79, 84)</td>
<td>20.3 (13.2, 27.3)</td>
<td>-</td>
<td>49.7 (40.0, 59.6)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td>138 (134, 141)</td>
<td>77 (75, 79)</td>
<td>32.0 (23.1, 40.9)</td>
<td>-</td>
<td>59.9 (49.2, 70.6)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>70+</td>
<td>139 (136, 142)</td>
<td>71 (70, 73)</td>
<td>44.8 (38.7, 50.9)</td>
<td>-</td>
<td>67.8 (61.5, 74.0)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>Female</td>
<td>Systolic Blood Pressure (mmHg) mean (95%CI)</td>
<td>Diastolic Blood Pressure (mmHg) mean (95%CI)</td>
<td>Self reported use of antihypertensive medication % (95%CI)</td>
<td>p</td>
<td>Hypertension prevalence % (95%CI)</td>
<td>p</td>
</tr>
<tr>
<td>15-19</td>
<td>109 (104, 111)</td>
<td>66 (65, 67)</td>
<td>-</td>
<td>-</td>
<td>2.3 (0.0, 6.2)</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>110 (108, 112)</td>
<td>70 (69, 72)</td>
<td>-</td>
<td>-</td>
<td>4.6 (1.6, 7.5)</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>115 (113, 116)</td>
<td>74 (72, 75)</td>
<td>3.0 (0.8, 5.2)</td>
<td>-</td>
<td>11.9 (7.2, 16.6)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>120 (118, 122)</td>
<td>75 (73, 77)</td>
<td>8.1 (4.0, 12.1)</td>
<td>-</td>
<td>19.1 (13.1, 25.2)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>127 (124, 130)</td>
<td>78 (76, 80)</td>
<td>19.9 (14.0, 25.9)</td>
<td>-</td>
<td>36.8 (29.1, 44.4)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td>132 (129, 135)</td>
<td>74 (73, 76)</td>
<td>40.0 (31.6, 47.7)</td>
<td>-</td>
<td>54.6 (46.3, 62.9)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>70+</td>
<td>142 (140, 144)</td>
<td>73 (72, 75)</td>
<td>56.4 (51.3, 61.6)</td>
<td>-</td>
<td>80.0 (75.6, 84.1)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ethnicity*</td>
<td>Māori</td>
<td>132 (130,133)</td>
<td>78 (77, 79)</td>
<td>15.5 (12.7, 18.3)</td>
<td>0.002¶</td>
<td>36.4 (32.4, 40.4)</td>
<td>0.024¶</td>
</tr>
<tr>
<td>Pacific</td>
<td>128 (127, 129)</td>
<td>76 (75, 77)</td>
<td>10.0 (7.6, 12.4)</td>
<td>NS¶</td>
<td>29.4 (25.6, 33.3)</td>
<td>NS¶</td>
<td></td>
</tr>
<tr>
<td>NZEO</td>
<td>129 (128, 130)</td>
<td>74 (73, 74)</td>
<td>9.9 (8.4, 11.4)</td>
<td>NS¶</td>
<td>28.4 (25.4, 31.4)</td>
<td>NS¶</td>
<td></td>
</tr>
<tr>
<td>Total Male</td>
<td>130 (129, 131)</td>
<td>75 (74, 76)</td>
<td>13.6 (11.7, 15.6)</td>
<td>-</td>
<td>33.5 (30.4, 36.6)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ethnicity*</td>
<td>Māori</td>
<td>121 (120, 123)</td>
<td>76 (75, 77)</td>
<td>16.0 (13.6, 18.5)</td>
<td>0.031¶</td>
<td>30.4 (27.1, 33.6)</td>
<td>0.001¶</td>
</tr>
<tr>
<td>Pacific</td>
<td>118 (116, 119)</td>
<td>73 (72, 74)</td>
<td>13.7 (11.2, 16.1)</td>
<td>NS¶</td>
<td>25.6 (22.4, 28.8)</td>
<td>NS¶</td>
<td></td>
</tr>
<tr>
<td>NZEO</td>
<td>119 (118, 120)</td>
<td>72 (71, 73)</td>
<td>12.1 (10.6, 13.6)</td>
<td>NS¶</td>
<td>21.4 (19.2, 23.6)</td>
<td>NS¶</td>
<td></td>
</tr>
<tr>
<td>Total Female</td>
<td>122 (120, 123)</td>
<td>73 (72, 75)</td>
<td>16.3 (14.5, 18.2)</td>
<td>0.041**</td>
<td>28.3 (30.4, 36.7)</td>
<td>0.008**</td>
<td></td>
</tr>
</tbody>
</table>

Hypertension is defined as a systolic BP >=140 or a diastolic BP >=90 or self reported use of antihypertensive medications; NZEO= New Zealand European and ‘Other’ ethnicity; NS=Not significant (p>0.05); * Standardised to WHO standard population; ** compared with ‘total male’; ¶ compared with NZEO ethnicity (logistic regression)
Table 2. Self reported use antihypertensive medication by sex and ethnicity (age standardised to WHO standard population\textsuperscript{12})

<table>
<thead>
<tr>
<th>Variables</th>
<th>1997 National Nutrition Survey\textsuperscript{18}</th>
<th>2008/09NZANS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% ( 95% CI)</td>
<td>% ( 95% CI)</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Māori</td>
<td>7.5 (5.1, 10.0)</td>
<td>15.5 (12.7, 18.3)</td>
</tr>
<tr>
<td>Pacific</td>
<td>5.4 (3.1, 7.7)</td>
<td>10.0 (7.6, 12.4)</td>
</tr>
<tr>
<td>NZEO</td>
<td>8.5 (7.3, 9.7)</td>
<td>9.9 (8.4, 11.4)</td>
</tr>
<tr>
<td>Total</td>
<td>8.7 (7.5, 9.8)</td>
<td>10.6 (9.2, 12.0)</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Māori</td>
<td>10.0 (7.4, 12.5)</td>
<td>16.0 (13.6, 18.5)</td>
</tr>
<tr>
<td>Pacific</td>
<td>11.5 (9.0, 14.1)</td>
<td>13.7 (11.2, 16.1)</td>
</tr>
<tr>
<td>NZEO</td>
<td>108.5 (7.3, 9.7)</td>
<td>12.1 (10.6, 13.6)</td>
</tr>
<tr>
<td>Total</td>
<td>8.9 (7.7, 10.0)</td>
<td>12.7 (11.3, 14.0)</td>
</tr>
</tbody>
</table>

NZEO= New Zealand European and “Other” ethnicity.
Table 3a. Mean systolic blood pressure New Zealand European and Others group: Auckland Risk Factor Study (1982), the 1986-1988 Heart Study, the Auckland Heart and Health Study 1993-1994 and the Auckland Diabetes Heart and Health survey 2002-2003 and 2008/09NZANS

<table>
<thead>
<tr>
<th>Systolic blood pressure (mmHg) mean (95% CI)</th>
<th>Age group (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35-44</td>
</tr>
<tr>
<td>Survey year</td>
<td>45-54</td>
</tr>
<tr>
<td>1982</td>
<td>55-64</td>
</tr>
<tr>
<td>126.6</td>
<td>65-74</td>
</tr>
<tr>
<td>(124.7, 128.4)</td>
<td>(131.3, 134.5)</td>
</tr>
<tr>
<td>1986-8</td>
<td>(137.9, 141.9)</td>
</tr>
<tr>
<td>124.9</td>
<td></td>
</tr>
<tr>
<td>(122.6, 127.5)</td>
<td></td>
</tr>
<tr>
<td>1993-4</td>
<td></td>
</tr>
<tr>
<td>121.5</td>
<td></td>
</tr>
<tr>
<td>(119.7, 123.3)</td>
<td></td>
</tr>
<tr>
<td>2002-2003</td>
<td></td>
</tr>
<tr>
<td>118.6</td>
<td></td>
</tr>
<tr>
<td>(116.7, 120.4)</td>
<td></td>
</tr>
<tr>
<td>2008/09NZANS NZEO: (Auckland)</td>
<td></td>
</tr>
<tr>
<td>126.9</td>
<td></td>
</tr>
<tr>
<td>(122.8, 131.0)</td>
<td></td>
</tr>
<tr>
<td>2008/09NZANS NZEO</td>
<td></td>
</tr>
<tr>
<td>127.3</td>
<td></td>
</tr>
<tr>
<td>(125.0, 129.6)</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td></td>
</tr>
<tr>
<td>117.9</td>
<td></td>
</tr>
<tr>
<td>(115.9, 119.9)</td>
<td></td>
</tr>
<tr>
<td>1986-8</td>
<td></td>
</tr>
<tr>
<td>117.0</td>
<td></td>
</tr>
<tr>
<td>(117.7, 122.3)</td>
<td></td>
</tr>
<tr>
<td>1993-4</td>
<td></td>
</tr>
<tr>
<td>111.3</td>
<td></td>
</tr>
<tr>
<td>(109.5, 113.1)</td>
<td></td>
</tr>
<tr>
<td>2002-2003</td>
<td></td>
</tr>
<tr>
<td>105.1</td>
<td></td>
</tr>
<tr>
<td>(103.5, 106.8)</td>
<td></td>
</tr>
<tr>
<td>2008/09NZANS NZEO: (Auckland)</td>
<td></td>
</tr>
<tr>
<td>113.9</td>
<td></td>
</tr>
<tr>
<td>(110.3, 117.6)</td>
<td></td>
</tr>
<tr>
<td>2008/09NZANS NZEO</td>
<td></td>
</tr>
<tr>
<td>115.6</td>
<td></td>
</tr>
<tr>
<td>(113.8, 117.5)</td>
<td></td>
</tr>
</tbody>
</table>

NZMJ 5 April 2013, Vol 126 No 1372; ISSN 1175 8716
URL: http://journal.nzma.org.nz/journal/126-1372/5594/ ©NZMA
### Table 3b. Mean diastolic blood pressure New Zealand European and Others group: Auckland Risk Factor Study (1982), the 1986-1988 Heart Study, the Auckland Heart and Health Study 1993-1994 and the Auckland Diabetes Heart and Health survey 2002-2003 and 2008/09NZANS

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Survey year</th>
<th>Diastolic blood pressure (mmHg) mean (95%CI)</th>
<th>NZANS</th>
<th>NZEO: (Auckland)</th>
<th>NZEO</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-44</td>
<td>1982</td>
<td>79.5 (78.0, 81.0)</td>
<td>76.3</td>
<td>71.2 (68.1, 74.3)</td>
<td>72.5</td>
</tr>
<tr>
<td></td>
<td>1986-8</td>
<td>81.5 (79.5, 82.5)</td>
<td>76.9</td>
<td>74.4 (71.0, 77.4)</td>
<td>73.9</td>
</tr>
<tr>
<td></td>
<td>1993-4</td>
<td>73.3 (71.8, 74.8)</td>
<td>76.9</td>
<td>71.2 (68.1, 74.3)</td>
<td>72.5</td>
</tr>
<tr>
<td></td>
<td>2002-2003</td>
<td>75.9 (74.7, 77.1)</td>
<td>76.3</td>
<td>73.2 (70.4, 76.1)</td>
<td>72.5</td>
</tr>
<tr>
<td>45-54</td>
<td>1982</td>
<td>83.8 (82.7, 84.9)</td>
<td>75.4</td>
<td>71.2 (69.3, 73.1)</td>
<td>72.5</td>
</tr>
<tr>
<td></td>
<td>1986-8</td>
<td>81.1 (79.7, 82.5)</td>
<td>73.8</td>
<td>72.9 (69.3, 75.5)</td>
<td>76.1</td>
</tr>
<tr>
<td></td>
<td>1993-4</td>
<td>75.4 (74.0, 76.8)</td>
<td>73.8</td>
<td>73.8 (71.2, 76.4)</td>
<td>76.6</td>
</tr>
<tr>
<td></td>
<td>2002-2003</td>
<td>78.4 (77.1, 79.7)</td>
<td>73.2</td>
<td>73.2 (70.4, 76.1)</td>
<td>76.1</td>
</tr>
<tr>
<td>55-64</td>
<td>1982</td>
<td>83.5 (82.3, 84.7)</td>
<td>76.8</td>
<td>73.2 (70.4, 76.1)</td>
<td>76.1</td>
</tr>
<tr>
<td></td>
<td>1986-8</td>
<td>82.2 (80.8, 83.6)</td>
<td>73.5</td>
<td>70.4 (67.6, 73.1)</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td>1993-4</td>
<td>76.8 (75.4, 78.2)</td>
<td>73.5</td>
<td>73.5 (71.0, 76.0)</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td>2002-2003</td>
<td>79.2 (77.8, 80.6)</td>
<td>78.9</td>
<td>73.9 (71.7, 77.1)</td>
<td>73.3</td>
</tr>
<tr>
<td>65-74</td>
<td>1982</td>
<td>-</td>
<td>78.9</td>
<td>74.4 (71.7, 77.1)</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td>1986-8</td>
<td>-</td>
<td>74.4</td>
<td>77.4 (74.2, 80.6)</td>
<td>76.1</td>
</tr>
<tr>
<td></td>
<td>1993-4</td>
<td>-</td>
<td>74.4</td>
<td>77.4 (74.2, 80.6)</td>
<td>76.1</td>
</tr>
<tr>
<td></td>
<td>2002-2003</td>
<td>-</td>
<td>78.9</td>
<td>77.4 (74.2, 80.6)</td>
<td>76.1</td>
</tr>
</tbody>
</table>

2008/09NZANS- Adult Nutrition Survey; NZEO- New Zealand European and others.
Table 4. Mean systolic and diastolic blood pressure Māori ethnic group, Auckland Diabetes, Heart and Health Study (2002/03)\textsuperscript{17} and 2008/09NZANS

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>Total 35-74</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002/03 DHHS</td>
<td>123.8</td>
<td>127.3</td>
<td>131.3</td>
<td>139.1</td>
<td>130.0</td>
</tr>
<tr>
<td></td>
<td>(119.7, 127.9)</td>
<td>(123.8, 138.8)</td>
<td>(125.0, 137.6)</td>
<td>(134.8, 143.4)</td>
<td>(127.8, 132.2)</td>
</tr>
<tr>
<td>2008/09NZANS- Māori (Auckland)</td>
<td>130.6</td>
<td>129.4</td>
<td>152.3</td>
<td>147.1</td>
<td>135.8</td>
</tr>
<tr>
<td></td>
<td>(125.7, 135.6)</td>
<td>(121.9, 136.0)</td>
<td>(138.4, 166.1)</td>
<td>(128.4, 165.8)</td>
<td>(130.4, 141.3)</td>
</tr>
<tr>
<td>2008/09NZANS Māori</td>
<td>131.8</td>
<td>135.9</td>
<td>142.1</td>
<td>140.3</td>
<td>135.7</td>
</tr>
<tr>
<td></td>
<td>(127.4, 136.2)</td>
<td>(130.2, 141.6)</td>
<td>(135.6, 148.7)</td>
<td>(130.3, 150.3)</td>
<td>(132.7, 138.7)</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002/03 DHHS</td>
<td>110.4</td>
<td>116.9</td>
<td>132.3</td>
<td>144.9</td>
<td>120.5</td>
</tr>
<tr>
<td></td>
<td>(107.8, 113.0)</td>
<td>(110.9, 122.9)</td>
<td>(127.4, 137.2)</td>
<td>(141.3, 148.5)</td>
<td>(118.3, 122.7)</td>
</tr>
<tr>
<td>2008/09NZANS Māori (Auckland)</td>
<td>117.9</td>
<td>135.7</td>
<td>122.8</td>
<td>154.9</td>
<td>125.0</td>
</tr>
<tr>
<td></td>
<td>(114.2, 121.7)</td>
<td>(122.6, 148.7)</td>
<td>(115.9, 129.7)</td>
<td>(135.6, 174.3)</td>
<td>(119.6, 130.4)</td>
</tr>
<tr>
<td>2008/09NZANS Māori</td>
<td>121.3</td>
<td>134.5</td>
<td>130.2</td>
<td>139.5</td>
<td>128.1</td>
</tr>
<tr>
<td></td>
<td>(118.5, 124.2)</td>
<td>(128.5, 140.5)</td>
<td>(123.1, 137.3)</td>
<td>(132.0, 147.0)</td>
<td>(124.7, 131.5)</td>
</tr>
<tr>
<td><strong>Diastolic Blood Pressure (mmHg) mean (95% CI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002/03 DHHS</td>
<td>80.4</td>
<td>80.7</td>
<td>81.5</td>
<td>79.0</td>
<td>81.1</td>
</tr>
<tr>
<td></td>
<td>(76.0, 84.8)</td>
<td>(73.8, 83.1)</td>
<td>(78.1, 84.9)</td>
<td>(76.8, 81.3)</td>
<td>(79.6, 82.6)</td>
</tr>
<tr>
<td>2008/09NZANS-Māori (Auckland)</td>
<td>83.4</td>
<td>80.1</td>
<td>88.9</td>
<td>80.3</td>
<td>82.8</td>
</tr>
<tr>
<td></td>
<td>(78.8, 88.0)</td>
<td>(73.5, 86.7)</td>
<td>(81.1, 96.7)</td>
<td>(74.7, 85.8)</td>
<td>(79.7, 85.9)</td>
</tr>
<tr>
<td>2008/09NZANS Māori</td>
<td>83.4</td>
<td>83.9</td>
<td>85.1</td>
<td>79.2</td>
<td>83.4</td>
</tr>
<tr>
<td></td>
<td>(79.4, 87.4)</td>
<td>(80.0, 87.8)</td>
<td>(78.7, 91.5)</td>
<td>(74.9, 83.6)</td>
<td>(81.2, 85.6)</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002/03 DHHS</td>
<td>73.9</td>
<td>75.8</td>
<td>80.0</td>
<td>82.1</td>
<td>76.2</td>
</tr>
<tr>
<td></td>
<td>(72.0, 75.8)</td>
<td>(71.6, 80.0)</td>
<td>(76.3, 83.7)</td>
<td>(80.3, 83.9)</td>
<td>(74.7, 77.7)</td>
</tr>
<tr>
<td>2008/09NZANS- Māori (Auckland)</td>
<td>73.6</td>
<td>85.8</td>
<td>74.4</td>
<td>82.0</td>
<td>77.1</td>
</tr>
<tr>
<td></td>
<td>(66.5, 80.7)</td>
<td>(76.9, 94.7)</td>
<td>(70.6, 78.2)</td>
<td>(73.9, 90.1)</td>
<td>(72.0, 82.3)</td>
</tr>
<tr>
<td>2008/09NZANS Māori</td>
<td>78.3</td>
<td>84.6</td>
<td>79.1</td>
<td>80.6</td>
<td>80.4</td>
</tr>
<tr>
<td></td>
<td>(75.1, 81.6)</td>
<td>(80.8, 88.4)</td>
<td>(74.4, 83.7)</td>
<td>(75.6, 85.5)</td>
<td>(77.8, 83.0)</td>
</tr>
</tbody>
</table>

2008/09NZANS- Adult Nutrition Survey; DHHS- Diabetes, Heart and Health Study.
There was a statistically significant increase in the prevalence of hypertension with increasing age (p <0.001), and men had a significantly higher prevalence of hypertension than women (p=0.01). For men, Māori (but not Pacific) had a statistically significantly higher prevalence of hypertension than NZEO (p=0.024), and for women both Māori and Pacific ethnic groups had statistically significant higher prevalence of hypertension than NZEO (p=0.001 for both).

Table 2 compares self-reported prevalence of use of antihypertensive medication by sex and ethnicity reported in a population based survey in 1997 and in the 2008/09NZANS. Prevalence has increased across all ethnic groups in both men and women.

Table 3 shows mean SBP and DBP compared to previously published estimates for the NZEO ethnic group. For men in the younger age-groups, mean SBP in 2008/09 was higher than reported in previously published studies, with mean SBP at 127.3 mmHg for those 35-44 years, 133.8 mmHg for 45-54 years and 134.1 mmHg for those 55-64 years. Similarly, for women, mean SBP from 2008/09NZANS was 115.6 mmHg for those 35-44 years, 123.5 mmHg for 45-54 years, and 130.0 mmHg for those 55-64 years is higher than previous estimates. A similar pattern is shown for DBP.

For Māori, comparisons with age-specific mean SBP and DBP from Auckland Diabetes Heart and Health Survey 2002-2003 (Table 4) shows that for men aged 35-74 years, the mean SBP from 2008/09NZANS was 135.7 mmHg (95%CI 132.7, 138.7), compared with 130.0 mmHg (95%CI 127.8, 132.2) in 2002/03. For women mean SBP in the 2008/09NZANS was 128.1 mmHg (95%CI 124.7, 131.5) compared with 120.5 mmHg (95%CI 118.3, 122.7) in 2002/03. There was no apparent difference in average SBP between the 2008/09NZANS and 2002/03 ADHHS for Pacific men and women aged 35-74 years.

For Pacific men, mean SBP in 2002/03 was 132.6 mmHg (95%CI 130.2, 135.0), and in 2008/09 131.6 mmHg (95%CI 129.1, 134.1). For Pacific women, mean SBP in 2002/03 was 123.0mmHg (95%CI 120.6, 125.4), and in 2008/09 124.9mmHg (95%CI 121.9, 127.9).

**Discussion**

This study provides the first nationally representative data on blood pressure levels and hypertension prevalence for the New Zealand adult population. Previous estimates have either relied on self reported hypertension prevalence, used regional (Auckland) populations, or not included sufficient numbers of participants from important population groups (such as Pacific people).

Mean systolic blood pressures in the New Zealand population are comparable with the most recent published nationally representative estimates from the United States (US) 1999-2004 National Health and Nutrition Examination Survey (NHANES). The age standardised mean SBP for New Zealand men at 129 mmHg is slightly higher than for US men over 18 years of 124 mmHg; however for women it is slightly lower at 120 mmHg for New Zealand women, compared with 122 mmHg for US women. Age standardised prevalence of hypertension for New Zealand adults was 26% overall, slightly lower than the 1999-2004 NHANES prevalence of 29%.
Comparisons with previously published age specific population estimates suggest that for New Zealand Europeans, mean SBP and DBP have increased among younger age groups since 2002/03, after a steady decline between 1982 and 2002 for New Zealand Europeans. For Māori, only one previously published data set was available, for 2002/03. This shows an increase in mean blood pressure in a 6 year period for adults 35-74 years of age.

Although we had no reason to believe that blood pressure levels from the Auckland population would differ from national results, we repeated the analyses using 2008/09NZANS data only from the Auckland urban area (Tables 3 and 4), and found no appreciable difference. We believe therefore that this represents a real increase in blood pressure amongst younger age groups for Māori and NZEO ethnic groups. Furthermore, the increase in blood pressure is consistent with observed international trends from similar countries.

In the US, for example, age standardised prevalence of hypertension increased by 18% between 1999 and 2004, from 24% to 28%. However, as the data are obtained from different surveys, at least some of this apparent increase may be attributable to biases associated with different methodology used. For example, response rates varied across the surveys from around 80% in 1982, to 61% in 2008/09NZANS.

The Auckland surveys recruited participants from the electoral roll, whereas 2008/09NZANS recruited participants using a stratified, area-based sampling frame based on mesh-blocks. Finally blood pressures were measured differently in the surveys: the three Auckland surveys used mercury sphygmomanometers and measured blood pressure twice taking the average of the two measurements, whereas 2008/09NZANS participants had their blood pressure measured using an automated sphygmomanometer and three measurements were undertaken with the average of the second and third measure used in this analysis.

However the standardised measurement of the Auckland surveys, and the use of a randomized sphygmomanometer should have minimized investigator bias in the Auckland studies, and the observation that the first blood pressure reading is likely to be higher than subsequent readings means that the increase observed is likely to have been under- rather than overestimated in this instance.

The increase in blood pressure amongst younger New Zealand adults is likely to be at least partly explained by the observed New Zealand population changes in known risk factors for preventable hypertension, particularly for obesity.

Findings from the 2008/09NZANS confirm the alarming recent increase in the prevalence of obesity in New Zealand, with the age standardised adult population prevalence of obesity at 27% in 2008/09 compared with 19% in 1997.

Overweight and obese adults now form the majority of the New Zealand adult population at 62%. The greatest increases in obesity rates since 1997 were observed in NZEO men (13% to 25%), Māori women (36% to 49%) and NZEO women (18% to 23%); these are the same population groups that have demonstrated an increase in blood pressure in the present analysis.

Furthermore, mean population sodium intake has been shown to exceed the recommended Upper Level of intake for adults (of 2300 mgs/day) in a number of
surveys\textsuperscript{25,26} with younger New Zealanders aged 15-44 years of age having higher urinary sodium excretion (and thereby higher dietary intake) than those aged 45 years and over in analysis of spot urinary sodium results from 2008/09NZANS.\textsuperscript{27}

The increased blood pressure shown among younger age groups is of particular concern. Although ischaemic heart disease mortality has decreased substantially in New Zealand since the late 1960s, recent modelling of cohort effects suggests that for men born after 1956, and for women born after 1961, ischaemic heart disease mortality is predicted to increase.\textsuperscript{8}

The increased mean systolic blood pressures demonstrated in this analysis among Māori and NZEO New Zealanders aged 35-54 years of age include cohorts from 1954 to 1973, and add weight to evidence of an increasing risk of ischaemic heart disease mortality among these age groups. The increased prevalence of obesity is likely to be driving this change.

Further monitoring of measured population blood pressure is required, especially for Māori and Pacific New Zealanders for whom fewer comparative datasets are available, in order to plan public health and health service initiatives to reverse this trend.

Use of antihypertensive medication has increased since 1997, particularly for Māori men and women, Pacific men, and NZEO women. In 2008/09, fifteen percent of New Zealand adults reported taking antihypertensive medication.

The difference between prevalence of antihypertensive medication use and prevalence of hypertension was greater in men than in women, with only 14\% of men reporting use of antihypertensive medication, while 34\% of men are defined as hypertensive. For women 16\% reported the use of antihypertensive medication, while 28\% were hypertensive. While this may represent under-treatment of elevated blood pressure, it is not necessarily the case.

Current New Zealand guidelines recommend that individuals are assessed for cardiovascular risk using charts based on Framingham data modified for use in the New Zealand population.\textsuperscript{1} On an individual level, therefore, blood pressure or hypertensive status is not assessed in isolation, but rather in the context of a range of potential risk factors including age, sex, ethnicity, smoking and diabetic status, and serum lipids. However, the increases demonstrated in blood pressure among younger age groups is likely to impact on overall population cardiovascular risk, since the greatest increases were observed in younger New Zealanders, many of whom are below the age where cardiovascular risk assessment is recommended in current guidelines.

Current guidelines recommend screening in asymptomatic people from the age of 45 years for men and 55 years for women, and 35 and 45 years respectively in people with known higher risk (including Māori, Pacific and people of Indo-Asian ethnicity).

Given the apparent increase in blood pressure among younger New Zealanders, earlier screening may be required in the future if this trend is confirmed. However, further reductions in population cardiovascular disease mortality are only possible if public health measures to reduce known hypertension risk factors are strengthened. These
include measures to increase physical activity, improve nutrition (including lowering population dietary salt intake) and reduce prevalence of overweight and obesity.²

Strengths and limitations—The 2008/09NZANS provides the first nationally representative blood pressure data. Measured blood pressure – rather than self-reported diagnosis of hypertension or antihypertensive medications - is important in order to identify trends in mean SBP as well as to estimate prevalence of hypertension. The blood pressure measurements in the 2008/09NZANS were made on a single occasion, and for individual blood pressure assessment repeated measures on different occasions are indicated. However the methods used are consistent with international best practice for population blood pressure surveys, and so results are comparable with international assessments. A particular strength of the survey is that sufficient sampling of important populations groups (Māori, Pacific, and older New Zealanders) has been undertaken to enable reliable ethnic and age specific comparisons.

Conclusions—This survey represents the first nationally representative blood pressure data on adult New Zealanders. Although mean SBP and hypertension prevalence are similar to United States estimates, increasing blood pressure levels and apparently low treatment rates are concerning. Given the importance of hypertension as a risk factor for cardiovascular disease morbidity and mortality, intensive screening, public health measures aimed at lowering population blood pressure, and further population monitoring are warranted.

Competing interests: Nil.

Author information: Rachael M McLean, Clinical Research Training Fellow, Edgar National Centre for Diabetes and Obesity Research, Department of Medicine, Dunedin School of Medicine, University of Otago, Dunedin; Sheila M Williams, Biostatistician, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, Dunedin; Jim I Mann, Director, Edgar National Centre for Diabetes and Obesity Research, Department of Medicine, Dunedin School of Medicine, University of Otago, Dunedin; Jody C Miller, Research Fellow, Department of Human Nutrition, University of Otago, Dunedin; Winsome R Parnell, Associate Professor, Department of Human Nutrition, University of Otago, Dunedin

Acknowledgements: We thank the 4721 New Zealanders who participated in the 2008/09 New Zealand Adult Nutrition Survey.

Funding: The New Zealand Ministry of Health funded the 2008/09 New Zealand Adult Nutrition Survey. The New Zealand Crown is the owner of the copyright of the survey data. The results presented in this paper are the work of the authors. Rachael McLean is supported by a Clinical Research Training Fellowship of the Health Research Council of New Zealand.

Correspondence: Rachael McLean, Clinical Research Training Fellow, Edgar National Centre for Diabetes and Obesity Research, Department of Medicine, Dunedin School of Medicine, University of Otago, PO Box 913, Dunedin 9054, New Zealand. Email: rachael.mclean@otago.ac.nz

References:


Palliative care patients’ use of emergency departments
Ross Lawrenson, James Waetford, Veronique Gibbons, Peter Kirk, Sandra Haggar, Rangimahora Reddy

Abstract

Aim To compare attendances of Māori with non-Maori palliative care patients at Emergency Departments (ED) and the outcome of their visits.

Method This was an observational study using record linkage. The study population was Waikato palliative care patients registered in a 12-month period, aged over 20 years. For each patient we recorded from the hospital records their age, gender, ethnicity, domicile (Hamilton or other), hospital visited and number of visits to the emergency department in the study period. We compared likelihood of attendance at ED and also looked at reasons for the visits and the outcome—including admit to hospital or place of discharge

Results 1185 palliative care patients were identified from the palliative care register. There were 645 men (54.4%), 197 Māori (16.6%) and 18 Pacific (1.5%). The mean age overall was 70.8 years and mean length of time on the register during the year of interest was 120.7 (median 66) days. 449 (37.9%) of the study population visited ED at least once. A multivariate analysis revealed that men visited ED more than women (Odds Ratios [OR] 1.6, p=0.001) and women with a gynaecological cancer visited ED more often than other palliative care conditions (OR 3.3, p<0.001). No other factor including ethnicity was associated with the risk of visiting ED.

Conclusion This study has helped quantify the characteristics of palliative care patients utilising ED in a relatively rural population with a high proportion of Māori. It has shown that a significant proportion of palliative care patients will attend ED, that men with palliative care needs are more likely to attend ED but Māori are not more likely to utilise the services.

We believe that New Zealand hospitals should consider the role of their ED in the management of palliative care patients.

Palliative care is the care of individuals with life limiting illnesses; people dying from active progressive diseases or other conditions that are not responsive to curative treatment. Such care aims to optimise an individual’s quality of life and support the individual’s family/whānau and other caregivers through the illness and after death.1

Palliative care endeavours to anticipate needs and provide symptom control to maximise patients’ quality of life. It has been recognised that a busy, noisy and often overcrowded Emergency Department (ED) may not be the optimal treatment environment for patients with terminal illness.2,3

Consequently a palliative care patient who needs to visit the ED may be considered as a failure of the health care system and some have suggested reduced use of the ED to be a quality measure.4
Research has shown that a common cause for visits to the ED is the need for symptom control, for example, increasing dyspnoea or for pain relief. It is acknowledged that Māori access to, utilisation and needs for palliative care services differs to non-Māori. There may also be a lack of understanding on behalf of some mainstream providers of the whānau ora model of health and illness, and Māori cultural beliefs in providing care for the dying.

Strategies identified for developing culturally appropriate palliative care services for Māori have included promoting informal links between service providers in local areas such as between palliative care providers and Māori development organisations; and employing and training staff to enable them to meet the needs of Māori. However the increased availability of culturally appropriate services does not seem to have increased access and utilisation by Māori.

Waikato District Health Board covers a population of 369,000 of whom, 129,000 (35%) live in Hamilton. Twenty percent of the District Health Board population are Māori compared with 14% for all of NZ (although only 8% of those aged over 60 years in Waikato are Māori). The Waikato District Health Board operates five EDs: one in a major tertiary hospital; one that covers the Thames/Coromandel region and three smaller centres south of Hamilton in Te Kuiti, Taumarunui and Tokoroa (known locally as the Southern ‘T’ Hospitals).

The palliative care service at Waikato District Health Board support patients through a multidisciplinary team of health professionals, including nurses, doctors and social workers. It is based at Waikato Hospital in Hamilton and has an established staff of three specialists in palliative medicine, two advanced trainees as well as six specialist palliative care nurses. Patients maybe admitted to Waikato Hospitals under the care of a specialist physician or oncologist, or may be admitted directly under the care of a palliative care physician.

The service also visits the rural hospitals and provides Community Liaison to Waikato Hospice consulting on Hospice inpatients as well as providing domiciliary visits. Patients referred by a general practitioner may be admitted directly to a ward or may be seen in the Emergency Department. There is a 24-hour service by consultants and registrars. After hours the Palliative Care phone is switched to the Oncology ward where the calls are triaged.

Health Care professionals at Hospice Waikato and in Community have direct access 24hrs a day to consultants. All newly referred patients whether from general practice or referrals from other hospital specialties are registered on the Palliative Care database. Registered patients are advised of the services available to them in the community and how to contact the palliative care service.

Once registered subsequent referrals from a general practitioner will usually be directed to the ward and so only patient initiated visits to ED will be recorded subsequently. It is believed that there should ideally be few circumstances where patients who are under the care of the specialist palliative care service present to ED where they may be seen by a generalist who is not familiar with their case. Thus such presentations can be deemed a failure in patient management or in communication.

The aim of this study was to examine attendances by palliative care patients at Waikato EDs. We aimed to identify the number, illness and palliative care needs of
people presenting at ED in relation to patient age, gender, ethnicity and domicile. We also wished to examine the outcome of their visits.

**Method**

This was an observational study using record linkage. The study population was palliative care patients aged 20 years of age and older who were on the Waikato DHB palliative care register between 1 November 2010 and 31 October 2011 and were domiciled in the Waikato DHB catchment zone. We used hospital attendance records to identify all visits to any one of the five EDs by patients who were on the palliative care register in the defined time period. Patients were identified through their unique National Health Index (NHI) number. A spreadsheet was used to enter data from the two patient data systems. For each patient their age, gender, ethnicity, domicile (Hamilton or other), hospital visited and number of visits to ED were recorded from the hospital records.

Diagnosis and date registered with the Waikato DHB palliative care service were identified from the palliative care register. Ethical approval was granted by the local Health and Disability Ethics Committee (Northern Y Ethics NTY 11/11/111).

The key outcome of interest in our analyses was a visit to the ED. The attendance rate was analysed by age in the groups: 20–49 years, 50–59, 60–69, 70–79 and 80+, gender and ethnicity (categorised as Māori, Pacific or other).

We also looked at attendance rate by diagnosis—this was categorised into 9 groups: breast cancer, colorectal cancer, gynaecological cancer (cervical, uterine, ovarian etc), lung cancer, skin cancer, upper GI cancers, urogenital cancers (prostate, bladder, renal etc) and other cancers (e.g. lymphoma, sarcoma etc). A single category of non-cancer was included for diseases such as chronic obstructive pulmonary disease, congestive heart failure and neurological disorders.

We undertook univariate analyses of attendance at ED by age category, gender, ethnicity and illness cause. We then undertook a multivariate analysis looking at first attendance at ED adjusted for age category, gender, ethnicity and illness cause. We also looked at reasons for attendance at ED and the outcome of the visit e.g. admission to hospital or discharge to the community. These outcomes were adjusted for age and ethnicity.

Data were analysed using Microsoft Excel (Microsoft Corp, 2007) and STATA v11.2 (StataCorp, 2011) software.

**Results**

1185 palliative care patients residing in the Waikato DHB catchment area were identified from the palliative care register from 1 November 2010 to 31 October 2011. There were 645 men (54.4%) and 540 women. 197 Māori (16.6%), 18 Pacific (1.5%) and 973 (81.9%) “other”/non-Māori were identified. The age ranged from 20–101 years (interquartile range 63–81).

The mean age overall was 70.8 years: non-Māori 72.5 years, Māori 63.3 years and Pacific 64.1 years. The mean length of time on the register during the year of interest was 120.7 (median 66) days: women 129 days (67.5), men 113 days (66), Māori 123 days (62), Pacific Peoples 68 days (31) and for non-Māori 121 days (69).

449 (37.9%) of the study population visited ED at least once during the study period. The distribution of visits to ED is presented in Figure 1. The percentage of Māori who visited ED at least once had a similar likelihood of attendance as non-Māori (38.6% vs 37.4% respectively) and was not statistically different (Chi-squared=0.048, p=0.827).
The maximum number of presentations by any one patient was 12. Of the 449 patients who visited the ED at least once, 202 patients (45%) went on to have more than one visit. This was similar for Māori and non-Māori (15.2% vs 17.4%) and was not statistically different (Chi-squared=1.19, p<0.552). 38% of visits to ED were within a month of a previous visit to ED. This was also similar between Māori and non-Māori.

When looking at the diagnoses responsible for patients’ referral to palliative care categorised into 9 major groups (Table 1), it was established that there was an excess of lung cancer cases for Māori compared with non-Māori (27.9% cf 17.3%) whilst urogenital cancers (principally prostate cancer) were more common in non-Māori (8.4% cf 4.6% Māori).

**Table 1. Illness categories for Māori and non-Māori palliative care patients**

<table>
<thead>
<tr>
<th>Illness</th>
<th>Māori</th>
<th>Non-Māori</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-cancer</td>
<td>35 (17.8%)</td>
<td>182 (18.4%)</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>12 (6.1%)</td>
<td>60 (6.1%)</td>
</tr>
<tr>
<td>Colorectal</td>
<td>21 (10.7%)</td>
<td>106 (10.8%)</td>
</tr>
<tr>
<td>Gynaecological</td>
<td>7 (3.6%)</td>
<td>34 (3.4%)</td>
</tr>
<tr>
<td>Lung</td>
<td>55 (27.9%)</td>
<td>171 (17.3%)</td>
</tr>
<tr>
<td>Skin</td>
<td>0 (0%)</td>
<td>47 (4.8%)</td>
</tr>
<tr>
<td>Upper GI</td>
<td>28 (14.2%)</td>
<td>135 (13.7%)</td>
</tr>
<tr>
<td>Urogenital</td>
<td>9 (4.6%)</td>
<td>83 (8.4%)</td>
</tr>
<tr>
<td>Other cancers</td>
<td>30 (15.2%)</td>
<td>170 (17.2%)</td>
</tr>
</tbody>
</table>

All skin cancer cases on the register were for non-Māori. These are in keeping with the reported national incidences of these cancers. Otherwise the diagnosis between Māori and non-Māori were similar. Apart from gender-specific cancers, colorectal,
lung, skin, upper GI and other cancers were more prevalent in men than women (60–70% vs 30–40%). The percentage of the study population with non-cancer causes of palliative care were also higher in men than women (Table 2).

Table 2. Likelihood of palliative care patients attending ED within study period

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate analysis</th>
<th>Multivariate analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>33.7%</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Male</td>
<td>41.4%</td>
<td>1.64 (1.25–2.14)**</td>
</tr>
<tr>
<td><strong>Ethnic group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>37.4%</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Maori</td>
<td>38.6%</td>
<td>0.99 (0.71–1.39)</td>
</tr>
<tr>
<td>Pacific</td>
<td>55.6%</td>
<td>(not included)</td>
</tr>
<tr>
<td><strong>Illness category</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Cancer</td>
<td>35.9%</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>Breast</td>
<td>38.9%</td>
<td>1.49 (0.83–2.67)</td>
</tr>
<tr>
<td>Colorectal</td>
<td>37.8%</td>
<td>1.07 (0.67–1.71)</td>
</tr>
<tr>
<td>Gynaecological</td>
<td>56.1%</td>
<td>3.33 (1.62–6.84)**</td>
</tr>
<tr>
<td>Lung</td>
<td>39.8%</td>
<td>1.08 (0.73–1.60)</td>
</tr>
<tr>
<td>Skin</td>
<td>40.4%</td>
<td>1.11 (0.58–2.15)</td>
</tr>
<tr>
<td>Upper GI</td>
<td>35.0%</td>
<td>0.93 (0.61–1.44)</td>
</tr>
<tr>
<td>Urogenital</td>
<td>37.0%</td>
<td>0.81 (0.48–1.38)</td>
</tr>
<tr>
<td>Other Cancers</td>
<td>36.0%</td>
<td>0.93 (0.62–1.40)</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–49yrs</td>
<td>37.8%</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>50–59yrs</td>
<td>38.9%</td>
<td>1.00 (0.58–1.75)</td>
</tr>
<tr>
<td>60–69yrs</td>
<td>40.4%</td>
<td>1.09 (0.66–1.80)</td>
</tr>
<tr>
<td>70–79yrs</td>
<td>41.3%</td>
<td>1.15 (0.71–1.86)</td>
</tr>
<tr>
<td>80+yrs</td>
<td>32.1%</td>
<td>0.79 (0.48–1.30)</td>
</tr>
</tbody>
</table>

*test for homogeneity (Pr>chi2) Gender=0.007 **P>|z|</=0.001

Women with gynaecological cancer were most likely to visit ED, otherwise cause of illness did not seem to influence the likelihood of visiting ED. A multivariate analysis of likelihood of a palliative care patient visiting ED and examining key variables including age (by age groupings), gender, ethnicity (Māori, Pacific and Other) and cause of illness revealed that being male increased the likelihood of attending ED by 60% (p=0.001) and having a gynaecological cancer increased the odds of attending ED by 230% (p<0.001).

No other factor including ethnicity was associated with the risk of visiting ED.

Of the 449 patients who visited an ED, 78.4% attended Waikato Hospital, 169/1185, 8.69% visited Thames Hospital and 12.9% visited one of the Southern ‘T’ Hospitals. When looking at patient domicile, 36.9% of patients were from Hamilton—which is
similar to the expected 35% based on population estimates—suggesting that rural patients with palliative care needs had similar access to the ED.

The main reason for attending the ED was due to pain (24%), followed by shortness of breath/respiratory problems (16%), nausea and vomiting (6%) and infection (6%). Reasons for presenting to ED were similar for Māori and non-Māori.

The outcomes of a visit to the ED are seen in Tables 3 and 4. This seems to show that patients are more likely to be admitted to hospital with increasing age but that Māori are no more likely than non-Māori to be admitted.

Table 3. Outcome of first visit to ED grouped by ethnicity

<table>
<thead>
<tr>
<th>Outcome of first visit to ED</th>
<th>Māori</th>
<th>Non-Māori</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit to ward</td>
<td>64</td>
<td>253</td>
<td>317</td>
</tr>
<tr>
<td>Died in ED</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Discharged from ED</td>
<td>25</td>
<td>93</td>
<td>118</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>To another healthcare facility</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 4. Outcome of first visit to ED grouped by age

<table>
<thead>
<tr>
<th>Outcome of first visit</th>
<th>20 to 49</th>
<th>50 to 59</th>
<th>60 to 69</th>
<th>70 to 79</th>
<th>80+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit to ward</td>
<td>60%</td>
<td>70%</td>
<td>69%</td>
<td>72%</td>
<td>76%</td>
</tr>
<tr>
<td>Died in ED</td>
<td>0%</td>
<td>2%</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Discharged from ED</td>
<td>37%</td>
<td>28%</td>
<td>28%</td>
<td>24%</td>
<td>23%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>To another healthcare facility</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Discussion

We have defined a palliative care patient to be one who has been referred for specialist palliative care advice. We acknowledge that some patients with life limiting illness may be managed by general practitioners or medical specialists without referral to the specialist service.

We identified that there were proportionately more Māori (17%) on the Waikato Palliative Care register than expected (8%). A possible reason could be due to the greater incidence of advanced cancer that is seen in Māori compared to non-Māori.12

While there have been concerns that ethnic minorities groups13 and in New Zealand, Māori12 may not access palliative care in the same way as the predominant culture, this study does suggest that Māori have reasonable access to the hospital palliative care service. Interestingly the length of time Māori patients were on the palliative care register was similar to non-Māori suggesting that although the natural history of cancers varies, the stage that patients come on to the palliative care register is similar.
The difference in the length of time Pacific patients were on the register was much shorter. This involved only 18 patients and may be an artefact of small numbers. The possibility of late presentation due to a lack of coverage for health care was not examined in this study. There was little difference in the proportion of Māori and non-Māori who had non-cancer palliative care diagnoses. As expected, Māori were generally younger.

The overall age of patients on the palliative care register was 72 years while the average life expectancy for the general population is 80.6 years. This suggests that very old patients may be less likely to be referred to palliative care and is consistent with findings from Canada.\textsuperscript{14}

It was shown that over a third of palliative care patients will visit the emergency department for help at some stage of their final illness. This is a similar proportion to that recorded in a Canadian study where 73.4\% of patients on their register did not attend the ED during follow up.\textsuperscript{2}

In this study, attendance at ED was similar for Māori and non-Māori after adjustment for age and the cause of the palliative care. Continuity of care from a family physician can have a profound impact on the need for hospital-based palliative care services.\textsuperscript{15}

The local primary health care organisation, Midlands Health Network has funding available to their general practitioners for up to 12 visits for patients with palliative care needs so cost should not be considered a barrier. There are no data to indicate whether Māori access this service equitably although there is some evidence from the literature that patient income can influence access to palliative care services.\textsuperscript{16} It maybe that the subsidy has the desired effect of removing one of the barriers to access. Integrated community based services have also been shown to reduce visits to the emergency department.\textsuperscript{4,17} There are other potential issues that may affect the use of ED by patients. One where we have an interest is health literacy as a barrier to accessing appropriate services.

The study shows that reasons for attendance at ED seem similar to the reasons found in other examples\textsuperscript{5}—i.e. urgent need for relief for pain, dyspnoea and other symptoms. Once patients had presented to ED there appeared to be no disparity with regards to management of Māori and non-Māori with similar rates of admission and discharges home. It would appear that older patients are more likely to be admitted which may be a reflection of the type and capacity of the care givers.

The relationship of the caregiver to the patient has been shown in another study to influence the likelihood of attendance of palliative care patients at ED.\textsuperscript{2} The whole aim of the palliative care service is to reduce the need for urgent symptomatic treatment. However it may be that for some patients that ED is the most cost-effective way of providing specific services out of hours.

Some complex patients will require expert diagnostic facilities or intravenous medication which may best be provided in a hospital. We also need to acknowledge that patients are on occasion being referred to palliative care much earlier in the cancer pathway and may in some circumstances still be receiving disease modifying treatment. We did not specifically look at this as a factor in the use of ED and it maybe a topic for further research.
The study highlights that ED does provide care for palliative care patients and consideration need to be given to how they are best integrated into the service. Integrated care requires the sharing of records and an understanding of the link between the primary care services in the community (general practice, district nursing and Māori providers) with the specialist palliative care services in the hospital.

Generally in Australasia, ED is not viewed as part of this integrated approach to palliative care. However in North America hospice and palliative medicine has now been recognised by the American Board of Medical Subspecialties as a field with a unique body of knowledge and practice for Emergency Care Physicians.

In Australasia palliative care is currently not seen as part of the scope of an emergency medicine specialist and there are no palliative care training rotations available for emergency medicine registrars in training in Australasia. Any review of our palliative care system should consider the role of the emergency department in providing an integrated approach to care, and should consider the training required for staff in ED to take on this role.

This study has helped quantify the characteristics of palliative care patients utilising the emergency departments in a relatively rural population with a high proportion of Māori. It has shown that while men with palliative care needs are more likely to attend ED Māori patients are not more likely to utilise the services.

We do believe that New Zealand hospitals should consider the role of their emergency departments in the management of palliative care patients and ensure that their staff are offered any relevant training to help them meet the needs of this important group of patients.

Competing interests: Nil.

Author information: Ross Lawrenson, Professor Primary Care, Waikato Clinical School, University of Auckland, Peter Rothwell Academic Centre, Waikato Hospital, Hamilton; James Waetford, Medical Student, University of Otago, Wellington; Veronique Gibbons, Research Fellow, Waikato Clinical School, University of Auckland, Hamilton; Peter Kirk, Clinical Director Palliative Care, Health Waikato, Hamilton; Sandra Haggar, Clinical Nurse Specialist Palliative care, Health Waikato, Hamilton; Rangimahora Reddy, Manager, Rauawaawa Kaumatua Charitable Trust, Hamilton

Correspondence: Professor Ross Lawrenson, Peter Rothwell Academic Centre, Waikato Hospital, Private Bag 3200, Hamilton, New Zealand. Email: Ross.Lawrenson@waikatodhb.health.nz

References:


A rare cause of nasal septal abscess

David Waterhouse, Jeremy Hornibrook

Abstract

We describe a patient with mid-facial pain and nasal obstruction due to a nasal septal abscess (NSA) complicating an occult fungal ball of the sphenoid sinus. We highlight the importance of suspecting unusual pathology in patients with NSA and no trauma history.

Case report

A 66-year-old woman presented to the emergency department with a four day history of progressive, mid-facial pain and nasal obstruction. On examination she was afebrile with no meningism or focal neurological deficits. A CT head showed no intracranial pathology and incompletely visualized her paranasal sinuses. She was treated with analgesia, xylometazoline nasal spray, oral amoxicillin/clavulanic acid and discharged from the department.

She represented 6 days later with ongoing symptoms. An otolaryngology consult confirmed a right posterior NSA which was incised under local anaesthesia. She was discharged from hospital after receiving 48 hours of intravenous flucloxacillin. *Staphylococcus aureus* and *Haemophilus parainfluenzae* were cultured from the abscess.

Her facial pain continued at a 1 week follow-up appointment and rigid nasal endoscopy revealed a persistent posterior NSA and pus from the right sphenoid sinus ostium. A paranasal sinus CT confirmed extensive sphenoid sinusitis with erosion of the anterior face of the sphenoid (Figure 1).

Figure 1. Axial CT scan of sinuses showing erosion of the anterior sphenoid and septal swelling
An urgent endoscopic sphenoidotomy was performed and the abscess re-drained. A fungal ball was identified and removed from the sphenoid sinus (Figure 2).

**Figure 2. Endoscopic image of right sphenoid sinus fungus ball**

![Image of fungus ball](image)

Histology confirmed fungal hyphae with no evidence of mucosal invasion (Figure 3). She was discharged on oral Flucloxacillin and saline nasal irrigation 22 days after initial presentation. The septal oedema resolved rapidly and at follow-up the opened sphenoid sinus has been easily inspected and free of infection.

**Figure 3. Haematoxylin and eosin (H&E) stain showing fungal hyphae**

![Histology Image](image)
Discussion

A NSA is a collection of pus between the cartilaginous or bony septum and its mucoperichondrium or mucoperiostium. It is a rare, often misdiagnosed condition which can cause potentially serious cosmetic and infective complications.

The rich venous blood supply of the nose, congenital bony dehiscence in surrounding paranasal sinuses and proximity to the cavernous sinus, orbital apex and skull base can lead to multiple septic sequelae. Pressure necrosis of the quadrilateral cartilage can occur after 24-48 hours resulting in a classical saddle nose deformity.

Fortunately most NSA are associated with obvious risk factors such as trauma or recent septal surgery and present in the anterior cartilaginous portion of the nasal septum making them identifiable by anterior rhinoscopy.

A sphenoid sinus fungal ball is an aggregation of fungal hyphae that occupy the sinus but do not invade the mucosa. Although a noninvasive condition it is associated with bacterial superinfection and bone erosion in up to 7% of cases. Endoscopic sphenoidotomy with complete removal of fungal ball is the most effective treatment.

Atraumatic NSA should alert the treating physician to an atypical aetiology and has been described in association with immunosuppression, dental infection, or adjacent paranasal sinuses inflammation. Our case report is the first to describe a NSA caused by bacterial superinfection of a sphenoid sinus fungal ball.

This case highlights the diagnostic difficulties and treatment delay often associated with atraumatic NSA. A high clinical suspicion, rigid nasal endoscopy, early paranasal sinus CT and surgical drainage are essential to treat these patients and prevent potential complications. NSA should be considered in all patients with nasal obstruction and severe midfacial pain. A sphenoid sinus fungal ball with bacterial superinfection is a potential source of NSA that can be effectively treated with endoscopic sphenoidotomy, removal of the fungal ball and culture directed antibiotics.

Author information: David Waterhouse Otolaryngology Registrar, Jeremy Hornibrook Otolaryngologist at Christchurch Hospital Christchurch, New Zealand.

Correspondence: Dr David Waterhouse, Otolaryngology Registrar, Auckland Hospital, Auckland, New Zealand. Email: Waterhouse.david@gmail.com

References:
Hemifacial spasm leading to diagnosis of Moyamoya disease

Teddy Y Wu, Andrew Smith, Dean Kilfoyle

Abstract

We present a case of Moyamoya disease presenting as hemifacial spasm due to compression of the facial nerve by a vascular loop related to compensatory enlargement of the posterior circulation vessels.

Case report

A 37-year-old man was assessed for right hemifacial spasm of 7 years duration. Clinical examination showed intermittent co-contractions of the right orbicularis oculi and zygomaticus muscles. His neurological and systemic examination were otherwise unremarkable.

His medical history was significant for a diagnosis of rheumatic fever at age 11 after developing involuntary movement of his right arm. He received penicillin prophylaxis until age 20.

Magnetic resonance imaging with angiography demonstrated several abnormalities:

- Compression of the right facial nerve by a vascular loop originating from the right anterior inferior cerebellar artery (Figure 1a).
- Bilaterally narrow internal carotid arteries consistent with Moyamoya disease (Figure 2a and 2b).
- Compensatory enlargement of the posterior circulation and external carotid arteries (Figure 2a and 2b). The right vertebral artery is hypoplastic (Figure 2a and 2b).
- T2 hyperintensity in the left centrum semiovale consistent with previous infarction (Figure 1b).
Figure 1. Axial magnetic resonance imaging showing compression of the right seventh nerve by a vascular loop from the anterior inferior cerebellar artery (1a, arrow). Axial T2 weighted imaging showing an old infarction in the left centrum semiovale (1b)
Figure 2. Significantly abnormal magnetic resonance angiogram demonstrating Moyamoya disease and enlarged posterior circulation vessels. Narrowed calibre of internal carotid arteries from the origin with marked tapering at the terminations (2a, 2b). Enlarged calibre of external carotid arteries (2b) with prominent superficial temporal arteries (2a). The calibre of the posterior circulation vessels is enlarged (2a, 2b). Note is made of a hypoplastic right vertebral artery and small left posterior cerebral artery.

Abbreviations: R, right; L, left; ICA, internal carotid artery; CCA, common carotid artery; ECA, external carotid artery; VA, vertebral artery; BA, basilar artery; PCA, posterior cerebral artery; STA, superficial temporal artery.
Discussion

Hemifacial spasm usually results from direct vertebrobasilar vascular compression of the facial nerve causing secondary hyperexcitability of the seventh nucleus. Uncommonly compression results from tumours and cerebral imaging is recommended to verify the cause.

Treatment is conservative with anticonvulsants, botulinum toxin injection and microvascular decompression if conservative therapy fails. We postulate the vascular loop had developed from the compensatory flow through the posterior circulation resultant from the Moyamoya disease as evident by the relatively enlarged calibre of left vertebral and basilar arteries.

Moyamoya disease is characterised by progressive non-atherosclerotic vasculopathy of the intracranial carotid arteries. Approximately half of the adult patients present with haemorrhage while children usually present with transient ischaemic attack or ischaemic infarction.

To our knowledge there are no prior reports of Moyamoya disease presenting as hemifacial spasm although in retrospect his childhood right "hemichorea" may have been a manifestation of the left middle cerebral artery infarct seen on imaging. There are no randomised data to guide management of Moyamoya disease. Treatment with anti-platelets has a high rate of recurrence.

Both direct (superior temporal artery to middle cerebral artery) and indirect (encephalo-duro-arterio-synangiosis, encephalo-duro-myosynangiosis or multiple burr hole surgery) bypass surgery are acceptable alternatives to medical therapy and results from non-randomised series suggest long term efficacy in secondary stroke prevention.

Author information: Teddy Y Wu, Registrar, Department of Neurology; Dean Kilfoyle, Consultant Neurologist, Department of Neurology; Andrew Smith, Consultant Neuroradiologist, Department of Radiology; Auckland City Hospital, Auckland

Correspondence: Dr Dean Kilfoyle, Department of Neurology, Auckland City Hospital, Auckland, New Zealand. Email: deank@adhb.govt.nz

References:

Liver parenchyma visible during gastroscopy

Nadim El Majzoub, Assaad Soweid

A 65-year-old man, who was recently diagnosed with poorly differentiated gastric adenocarcinoma, presented to our emergency department with melenaemia and abdominal pain.

Gastroscopy showed a huge ulceration involving the entire antrum in addition to an island of nodular reddish tissue inside the ulceration (Figure 1). Endosonography of this area revealed the edge of the liver in direct contact with the ultrasound transducer with no visible gastric wall (Figure 2).

Biopsies from the edge of the ulcer showed high grade B-cell lymphoma, while those from the reddish island revealed hepatic tissue (Figure 3). Immunohistochemistry for CD 20 was positive (Figure 4) and confirmed the original diagnosis of B-cell lymphoma.

The patient was subsequently referred for management by the oncology and surgery services.

Figure 1. Huge ulceration involving the entire antrum in addition to an island of nodular reddish tissue inside the ulceration (arrow)
Figure 2. Endosonography revealing the edge of the liver in direct contact with the ultrasound transducer (arrow)

Figure 3. Biopsy from the ulcer showing high grade B-cell lymphoma
Figure 4. Immunohistochemistry for CD 20 is positive

Author information: Nadim El Majzoub, Resident in the Pathology and Laboratory Medicine Department; Assaad Soweid, Gastroenterologist, Director of the Endoscopy Unit; American University of Beirut Medical Center, Beirut, Lebanon

Correspondence: Assaad Soweid, Associate Professor of Medicine, American University of Beirut Medical Center, PO Box 11-0236 Riad El Solh 110 72020 Beirut, Lebanon. Fax: +961 1 366098; email: as25@aub.edu.lb
What does ‘undiagnosed’ diabetes really mean?

The prevalence of ‘undiagnosed’ diabetes depends on the underlying (true) diabetes prevalence, screening coverage, the definition of diabetes, and if based on self-report of diagnosis, the degree of recall bias.

As demonstrated by the 2008/09 New Zealand Adult Nutrition Survey,¹ the results of which were recently described by Coppell et al in the Journal,² the absolute ‘undiagnosed’ diabetes prevalence also varies by age, gender, and ethnicity, so in reporting a single figure for a particular ethnicity it is important to be mindful that the relative proportions of diagnosed and undiagnosed diabetes can vary substantially across different age groups.

The distinction between ‘self-reported doctor diagnosed’ diabetes, the diabetes status recorded by a primary care practice, and the diabetes status known somewhere in the health system are important, as the differences between these three categories can highlight potential quality improvement opportunities.

Possible reasons that may contribute to recall bias that account for the difference between self-reports and medical records include language barriers and varying levels of health professionals’ ability to communicate complex and unfamiliar concepts clearly. This may lead to patients, family and whaanau having limited understanding and acceptance of disease and low health literacy.

Despite the wide 95% confidence intervals provided by Coppell’s study by ethnicity and age,² it would be worth exploring the reasons for the relatively high proportions of Pacific people identified as having ‘undiagnosed’ diabetes. Unpublished data from preliminary analysis by Counties Manukau District Health Board (CMDHB) indicates that rates of diabetes-related blood testing for Pacific peoples are similar to Maaori and higher than non-Maaori/non-Pacific rates in the Auckland metro region. CMDHB has been estimating the population prevalence of known diabetes based on linked datasets using methods similar to the Ministry of Health’s health tracker for a number of years.³ Some work has been done to validate the method.⁴,⁵ For the Pacific population in CMDHB, where 40% of New Zealand’s Pacific population live, the prevalence known diabetes by this method is also substantially higher than self-reported diagnosed diabetes for the Pacific people reported in the 2008/09 national survey.²,³ This suggests recall bias and/or information not being known consistently across health services may be contributing to the discrepancy for Pacific in the 2008/09 Adult Nutrition Survey.

The discrepancy between the records of a given primary care practice, and diabetes status somewhere in the system could occur because patients have moved to a new practice and not all their records were transferred or recorded by the new practice. Statistics New Zealand suggests more than 50% of New Zealanders aged 5 years and over move address over a 5-year period.⁶ A local CMDHB analysis also confirmed significant patient churn between practices located in the DHB area.⁷
About 21% of people enrolled in 2010 quarter 1 (Q1) were no longer in the same practice in 2012 Q1. On the other hand, new patients who had registered in the two years since 2010 accounted for about one-quarter of the practice totals. Out of all the patients enrolled in primary care practices located in CMDHB during the two year time period, only 64% of patients were enrolled in the same practice in both 2010 Q1 and 2012 Q1. Shared electronic health records and linkage provide opportunities to ensure that appropriate information generated in various parts of the health system is available to the person’s ‘primary care home’ to facilitate quality care.

Finally, since the ADA published the additional HbA1c criteria in 2010, it was retrospectively applied to people who took the survey in 2008-2009, thus the undiagnosed diabetes as defined by the recent paper by Coppell et al would also capture the additional people who would be diagnosed by HbA1c ≥6.5% (48 mmol/mol) which was not yet the formal diagnostic criterion at the time. While most international population surveys of diabetes generally undertake only one test, the diagnosis of diabetes clinically should be based on two positive test results in the screening setting.

These issues highlighted by the definitions of ‘undiagnosed diabetes’ warrant further examination as they are important both for quality improvement in clinical practice, monitoring the diabetes epidemic and future research methodology, and likely apply more broadly than Pacific peoples.

However, these discussions should not detract from the main conclusion of Coppell’s study suggesting that the prevalence of diabetes is likely to continue to increase and cost-effective implementation of diabetes prevention strategies is needed.

Wing Cheuk Chan
Public Health Physician

Doone Winnard
Public Health Physician

Campbell Brebner
Chief Medical Advisor Primary Care

Brandon Orr-Walker
Clinical Head of Diabetes Services

Counties Manukau District Health Board
Otahuhu, Auckland

References:


The cost of non-funded vaccinations in New Zealand

What do New Zealand’s healthcare and aviation have in common? Much, if attending to the way non-funded vaccinations are priced. Indeed, I recently needed a two-course rotavirus vaccine for my little one, only to face the equivalent of a return trip offered as two one-way tickets, crippling overcharges and hidden costs.

I got multiple quotes, each bringing about a new piece of information; three times I opted out of vaccination because of the ever increasing costs, only to be brought back in when finding alternative quotes online and internationally.

In hindsight, however, the experience makes for an interesting case study and provides a provocative insight into the role that Healthcare may be playing in preventing more parents from taking these vaccinations.

Methods—The ‘sample’ is a convenient one: the quotes I got during a two-day’s quest for GlaxoSmithKline’s (GSK) dual-dose ‘Rotarix®’. The data are a retrospective breakdown of costs. Hidden costs were estimated as they became apparent.

Results—I got 12 quotes, 8 from vaccination centres in the North Island (see top of Table 1), 4 from the web and from an international source (bottom of Table 1). The first column lists the chronological order of each quote, the second column lists the initial quote, the last column lists the things I considered when estimating the full cost, broken down in the remaining columns. Consultation fees (free for children) are excluded.

Table 1. Breakdown of real and estimated costs quoted for Rotarix® in 2013

<table>
<thead>
<tr>
<th>Chronology</th>
<th>Vaccination provider</th>
<th>Initial quote</th>
<th>Vaccine</th>
<th>GST</th>
<th>Delivery</th>
<th>Handling</th>
<th>Total</th>
<th>Diff. with GSK VII</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Centre A</td>
<td>76</td>
<td>95</td>
<td>14</td>
<td>86</td>
<td>42</td>
<td>237</td>
<td>43</td>
<td>0, 3, 6</td>
</tr>
<tr>
<td>V</td>
<td>Centre A</td>
<td>138</td>
<td>190</td>
<td>29</td>
<td>86</td>
<td>42</td>
<td>346</td>
<td>152</td>
<td>1, 3, 5, 6, 8</td>
</tr>
<tr>
<td>VI</td>
<td>Centre A</td>
<td>152</td>
<td>304</td>
<td>46</td>
<td>86</td>
<td>42</td>
<td>478</td>
<td>284</td>
<td>1, 3, 5, 6</td>
</tr>
<tr>
<td>IV</td>
<td>Centre B</td>
<td>138</td>
<td>114</td>
<td>17</td>
<td>22</td>
<td>35</td>
<td>188</td>
<td>161</td>
<td>1, 2</td>
</tr>
<tr>
<td>III</td>
<td>Centre C</td>
<td>76</td>
<td>124</td>
<td>27</td>
<td>43</td>
<td>42</td>
<td>238</td>
<td>44</td>
<td>1, 3, 4</td>
</tr>
<tr>
<td>IX</td>
<td>Centre E</td>
<td>238</td>
<td>133</td>
<td>20</td>
<td>43</td>
<td>42</td>
<td>238</td>
<td>161</td>
<td>1, 2</td>
</tr>
<tr>
<td>XI</td>
<td>Centre E</td>
<td>124</td>
<td>178</td>
<td>27</td>
<td>43</td>
<td>42</td>
<td>289</td>
<td>95</td>
<td>1, 3, 5, 6</td>
</tr>
<tr>
<td>XI</td>
<td>Centre E</td>
<td>152</td>
<td>95</td>
<td>14</td>
<td>43</td>
<td>42</td>
<td>194</td>
<td>0</td>
<td>3, 8</td>
</tr>
<tr>
<td>XI</td>
<td>Web quote</td>
<td>92</td>
<td>184</td>
<td>28</td>
<td>43</td>
<td>42</td>
<td>296</td>
<td>102</td>
<td>1, 12</td>
</tr>
<tr>
<td>VIII</td>
<td>GSK (full)²</td>
<td>218</td>
<td>152</td>
<td>23</td>
<td>43</td>
<td>42</td>
<td>260</td>
<td>66</td>
<td>10, 12</td>
</tr>
<tr>
<td>VII</td>
<td>GSK/IMAC (disc.)²</td>
<td>152</td>
<td>95</td>
<td>14</td>
<td>43</td>
<td>42</td>
<td>194</td>
<td>0</td>
<td>11, 12</td>
</tr>
<tr>
<td>XII_a</td>
<td>Vademecum (full)²</td>
<td>300</td>
<td>241</td>
<td>10</td>
<td>25</td>
<td>24</td>
<td>300</td>
<td>106</td>
<td>7, 12, 13</td>
</tr>
<tr>
<td>XII_b</td>
<td>Vademecum (grm.)</td>
<td>243</td>
<td>186</td>
<td>7</td>
<td>25</td>
<td>24</td>
<td>243</td>
<td>49</td>
<td>7, 12, 14</td>
</tr>
</tbody>
</table>
The costs quoted on the Web were made in different years (2009, 2011, 2012) and may not be representative of costs in 2013. Therefore, all costs are standardised to 2010 referential dollars (r$),\(^1\) with 2013 nominal values ($) within parentheses where appropriate.

The standard quote for comparison is number VII, the still running discounted vaccine* as described in GSK’s ‘Patient Access Programme for Rotarix®',\(^2\) and intended to bring about a reduction of r$66 ($69) to the final cost of the vaccine.

**Considerations**

- This initial quote was the first “firm” quote paid for. Afterwards, and prior to ordering, the provider realised it had not charged the vaccine correctly, nor GST, delivery costs and nurse’s costs.
- The initial quote turned out to be for one dose.
- Hidden costs suspected after reading the provider’s website.
- Hidden costs not provided but clarified upon questioning.
- It does not customarily pass delivery fees as a separate cost.
- It explicitly quoted the full charge for the dual vaccine as applying to each dose separately.
- It explicitly quoted two delivery fees (yet the two-doses are delivered bundled together).
- Final price, including vaccine, delivery and service.
- It explicitly quoted the vaccine as being ‘on special’.
- Quote after asking the provider whether GSK's 2012 programme\(^2\) was still running.
- Rotarix®’s estimated full cost based on information from GSK.\(^2\)
- Rotarix®’s estimated discounted cost based on information from GSK.\(^2\)
- There was a chance this information was outdated.
- Final price as reflected on the Spanish Vademecum in 2011,\(^3\) including vaccine, delivery and service.
- Simulation of the cost of Rotarix® in Spain had it been discounted as in New Zealand.

**Discussion**—Rotavirus gastroenteritis is quite common, and most children will get infected by the age of 5 years.\(^4\) Of these, 3% will need hospitalisation, 6% will be seen by emergency departments, and 20% will be managed at primary care levels.\(^7\) The worst cases will course with severe diarrhoea, vomiting, dehydration, electrolyte disturbance,\(^4\) brain damage, disability, even death.\(^5\) Yet gastroenteritis is preventable\(^5\)
and the recommended immunisation, \(^4,8-10\) although not funded, \(^4\) may protect up to 90\% of children against subsequent severe infections. \(^6\)

The number of parents opting for non-funded vaccinations is probably low, yet this number may drop further due to the mismatch between actual costs to providers and final costs to parents. Most of the quotes I got in my quest for vaccination largely surpassed the discounted costs intended by GSK by an average of r$97 ($102).

Unreasonable practices among providers were quoting the price of the two doses as applicable to each dose individually, as well as quoting two delivery fees, effectively overcharging both. All-in-all, GSK’s intention of improving patients’ access to Rotarix\(^2\) by bringing about a reduction in the final price of the vaccine to about r$194 ($204)\(^\#\) seems not to be realised, with the consequent detrimental effects on children’s health and future costs to District Health Boards.

Footnotes:
* GSK’s ‘Patient Access Programme for Rotarix®’ will run until at least the end of 2013 (personal communication with Melissa Rich, vaccine product manager for GlaxoSmithKline NZ).
\# A well-organised provider could bring the total cost down to r$173 ($182) by ordering two sets of vaccines at once and passing on the savings in delivery fees.

Jose D Perezgonzalez
Lecturer, Massey University
Palmerston North, New Zealand

References:
The uptake rates of influenza vaccine in pregnant women in the Nelson region of New Zealand

Pregnant women were particularly vulnerable during the 2009 H1N1 pandemic. H1N1 was the leading cause of indirect maternal death in New Zealand in 2009. Given the safety of influenza vaccination in pregnancy and the risks of infection, the RANZCOG advises recommendation of the influenza vaccine to all pregnant women regardless of gestation; it is also free of charge to this group.

Two years since the H1N1 pandemic, a survey of pregnant women was carried out in order to determine whether the events of that year had impacted on behaviours with regards to vaccination of pregnant women against influenza.

Pregnant women who attended antenatal clinic or delivery suite at Nelson hospital during October and November 2011 were surveyed on their influenza vaccination status. They were asked whether they had been recommended the influenza vaccination and their reasons for not being vaccinated.

110 of 131 eligible women (84%) participated in the survey. Only 12 (11%) had received the influenza vaccine in 2011. Twenty-two women (20%) had been recommended the vaccine, however many of these were for reasons other than pregnancy. Disappointingly, five women had been advised against the influenza vaccine by a health professional. The main reason stated for not being vaccinated was an unawareness of the recommendation that pregnant women should be vaccinated against influenza.

Despite guidelines recommending influenza vaccination for all pregnant women, uptake was low in this local population. Health practitioners caring for pregnant women should be educated on the benefits of influenza vaccination in pregnant women and advocate its use. This may improve uptake rates in New Zealand in this high-risk group.

Sylvia Ross¹; Judy Ormandy²; Bia Jungji Kim¹

1. Trainee Intern, Christchurch School of Medicine, University of Otago, Christchurch, New Zealand
2. Obstetrics & Gynaecology Senior Registrar, Nelson Hospital, Nelson, New Zealand

References:


Chiropractic manipulation of the neck

A recent judgement in the district Court of Auckland\(^1\) found that upper cervical manipulation carried out by a New Zealand chiropractor in 2006, for the purpose of treating a patient’s arm pain, caused a carotid artery dissection and occlusion, which subsequently led to a stroke. This legal finding confirms the many reports in the medical literature of serious harm or even death resulting from this practice.\(^2,3\) Given that chiropractic manipulations of the neck involve a high velocity thrust, it is not surprising that the manoeuvre could damage important structures in the neck.\(^4\)

Even though these adverse events seem to be rare, given their severity, they must be considered alongside the expected benefits from the practice. Here, the medical literature shows that there is no good quality evidence that chiropractic manipulation is effective for the treatment of any indication other than possibly low back pain.\(^5\) Therefore consideration of the benefits and risks indicates that there is no place for chiropractic manipulation of the neck for any reason.

Despite this, in a recent article published in the (NZ) *Sunday Star Times* (24 Feb 2013)\(^6\) about the above judgement, the president of the New Zealand Chiropractors’ Association, Corrian Poelsma, is quoted as saying, “[t]his case is rare....all health care carries some risks”, and he cited a study which found no serious adverse events from chiropractic neck manipulations.

We therefore suggest that, at the very least, the Chiropractors’ Association inform its members that they should obtain full informed consent before undertaking a potentially fatal procedure, something that is an ethical imperative in any area of health care.

We believe that failing to obtain informed consent, would be consistent with other ethical concerns around the chiropractic profession that we have previously highlighted, including stifling free speech, unsupported claims that they can treat non-musculoskeletal diseases such as asthma, treating children for any reason, use of the title "Doctor" and overuse of X-rays.\(^7\)

Therefore we advise that anyone considering upper cervical manipulation by a chiropractor should also consider conventional treatment options offered by their GP or a physiotherapist. Anyone who does receive chiropractic manipulation and afterwards experiences pain, discomfort or illness is advised to immediately seek attention from either their GP or a hospital outpatient department.

Andrew Gilbey
Palmerston North, NZ

Shaun Holt
Tauranga, NZ

Edzard Ernst
Exeter, UK
References:


Organisation

*Editorial published in the NZMJ 1914 July issue*

AT the risk of being thought tedious, we revert to this subject, for at no time more than at present is cohesion required in the medical profession in New Zealand. Many questions affecting doctors are reaching the acute, stage—for example, medical registration, and our relations with Friendly Societies, and a proposed system of State aid for sickness and invalidity.

There is little fear that the medical profession will ever become, deeply imbued with the aggressive principles of trade unionism, but if we are to maintain our status, we must adhere to one principle of unionism, and that its essence, namely, that individuals must combine, and sink all minor differences of opinion, for the good of our class.

In any conceivable state of society there will always be room for kindness and benevolence on the part of the doctor, so that we can never become entirely commercial in our attitude to the public. Among ourselves competition is becoming more keen, and the cost of living is rapidly and steadily increasing; but we believe that, on the whole, medical fees have not increased, but have rather declined.

The competition of public hospitals is undoubtedly a menace to legitimate private practice. The hospitals are being increasingly taken advantage of—oh, excellent and pregnant phrase!—not, as we are sometimes told, because the wily public has increased confidence in the skill of the hospital staffs, but really because the wily public is fond of getting something cheap.

Again, is the contract payment for lodge work to be like the laws of the Modes and Persians which altereth not, or is it to be correlated with the cost of living, and the world-wide tendency to increase wages in every field of industry? It is obvious that we must act on the advice of George Washington, who said to his friends: "Gentlemen, we must all hang together, or we shall hang separately".

The organisation of the British Medical Association in New Zealand has recently been vastly improved, but requires further improvement before, if it should be necessary, we may fight to win. We suffer now from having gone into fights with faint-hearted recruits and discomfited allies, and require still both discipline and enthusiasm. Our legal friends are in a position to resist pressure from the State and the community, and can control their own affairs; but lawyers, of course, are all officers of the Supreme Court, and are well represented in the Cabinet and in Parliament. They could make themselves heard if it were proposed to establish a free law bureau in connection with, for instance, the Public Trust Office.

If the state of the primary industries in New Zealand, and of trade generally, is in the highly satisfactory condition shown in Government statistics, we shall not err on the side of harshness if we, as a profession, cease to countenance further schemes of medical charity, and conserve our energies to maintain our profession in a well-paid and contented condition, thereby adding largely to the public weal.
Botulinum Toxin versus Botulinum Toxin with Low Dose GTN for Healing of Chronic Anal Fissure: Prospective, Randomised Trial

Muhammad Asim, Neil Lowrie, Joanna Stewart*, Simi Lolohea, Ralph Van Dalen**

* Biostatistician, School of Population Health, University of Auckland
** Colorectal surgeon and clinical director of general surgery, Waikato Hospital, Hamilton.

Background: Chronic anal fissure (CAF) is perpetuated by high sphincter pressures and secondary local ischemia. Pharmacological approaches include topical nitrates and botulinum toxin (BT) both help to decrease the sphincter pressure.

Aims & Objectives: The aims of the present study were to assess the efficacy and safety of BT injection and combined treatment with BT injection and lowered dose Glycerlytrinitrate (GTN) cream for the treatment of CAF. We hypothesised that combined treatment would have a synergistic effect on healing & low dose GTN would cause less headaches.

Methods: Forty one consecutive patients with CAF were randomly assigned to receive one of the following treatments; Group A, injection of BT (20 U into internal anal sphincter) and group B, BT injection (20 units) and subsequent thrice daily topical applications of half dose 0.2% GTN cream for six weeks. Patients were followed up at 6 and 12 weeks & were assessed for; healing of anal fissure, by means of visual inspection using fissure grades; for faecal incontinence, using Cleveland Clinic incontinence scores and for fissure pain & headache using a numeric pain rating scale.

Results: Fissure healing was similar in the two groups at 6 and 12 weeks (66% in both groups). Neither the change in pain score from 6 to 12 weeks, nor the overall level of pain was significantly different in the 2 groups. Headaches were suffered by 46% of patients using GTN.

Conclusion: Single agent treatment by means of BT injection alone is well tolerated with no significant differences in healing of CAF.
Initial Experience of Ambulatory Hemi-thyroid Surgery at a New Zealand Tertiary Hospital

J Marnewick\(^1\) MBChB; MS Elston\(^2\) FRACP, PhD; JV Conaglen\(^2\) FRACP, MD; GY Meyer-Rochow\(^1\) FRACS, PhD

\(^1\)Dept of General Surgery, Waikato Hospital, Hamilton, New Zealand
\(^2\)Dept of Endocrinology, Waikato Hospital, Hamilton, New Zealand

**Introduction:** The feasibility of ambulatory thyroid surgery (discharge on the day of surgery without overnight stay) has been reported internationally, but does not appear to be practised in Australasia. We report our early experience with ambulatory hemi-thyroid procedures including selection criteria and suggested guidelines for safe practice within a New Zealand tertiary hospital setting.

**Methods:** A retrospective review of prospectively collected data on all partial and hemi-thyroidectomy patients between 1 November 2009 and 31 December 2012, who were operated on by a single, high-volume endocrine surgeon was performed.

Patients considered suitable for ambulatory surgery were identified and the rates of successful ambulatory surgery, post-operative complications and readmission rates assessed.

**Results:** 82 partial/hemi-thyroidectomy patients were identified, 35 of which were considered suitable for ambulatory surgery based on selection criteria used. A further 45 were discharged the day following surgery, of which 23 had been admitted overnight only due to the distance of residence from a 24-hour medical facility. The remaining 22 were considered unsuitable for ambulatory surgery, however all 22 were discharged from hospital within 24 hours from the time of admission. The remaining two patients required a hospital stay longer than one night, which was expected in both cases. One patient re-presented with an infected seroma. There were no other postoperative complications or readmissions.

**Discussion:** Our early experience suggests that in well-selected patients, using specific exclusion and discharge criteria, ambulatory hemi-thyroid surgery can be safely achieved and is feasible within an Australasian tertiary hospital setting.

Comparison of Maori and Pakeha of Patients Hospitalised for Heart Failure

K Sree Raman\(^1\)*, V Pera\(^1\), R Troughton\(^2\), M Lund\(^3\), R Doughty\(^4\) and G Devlin\(^1\) on behalf of the NZHFR Investigators

\(^1\)Waikato Hospital, Hamilton. \(^2\)Christchurch Hospital Christchurch. \(^3\)Middlemore Hospital, Auckland. \(^4\)Auckland City Hospital, Auckland.

**Background:** Previous reviews of the New Zealand Heart Failure Registry (NZHFR) showed that Maori present at a younger age with heart failure and have higher prevalence of LV systolic dysfunction. We aim to revisit and compare outcomes for Maori and Pakeha, based on updated NZHFR data.
Methods: NZHFR is a national, prospective, observational, web-based registry. All hospitals in New Zealand admitting patients with acute heart failure have been invited to participate.

Results: A total of 1757 patients are enrolled from Jul 2006 to Feb 2013, and 90-day follow up data is available in 91.9% (1616/1757). There are 400 Maori (mean-age 61.8 years, 69% males) and 1027 Pakeha (mean-age 78.7 years, 60% males). Severe valvular disease, hypertension and AF are the major aetiological factors for heart failure in both groups, with higher prevalence of diabetes in Maori (44% vs. 29.5%, \( p < 0.0001 \)) and IHD more prevalent in Pakeha (23% vs. 11%, \( p < 0.0001 \)). Predisposing factors for hospital admission for Maori are uncontrolled hypertension (10.8% vs. 4.5%, \( p < 0.0001 \)) and non-compliance with medication (16% vs. 3%, \( p < 0.0001 \)), and diet (6.8% vs. 3.7%, \( p < 0.0161 \)). Maori have high prevalence of impaired left ventricular systolic function (LVEF < 50%, 85% vs. 67%, \( p < 0.0001 \)). Medications and Outcomes are as shown in table.

<table>
<thead>
<tr>
<th>Discharge medications</th>
<th>Pakeha</th>
<th>Maori</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>96.7% (943/975)</td>
<td>98.4% (383/389)</td>
<td>0.09</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>76.5% (746/975)</td>
<td>79.6% (310/389)</td>
<td>0.22</td>
</tr>
<tr>
<td>ACE-i/ARBs</td>
<td>78.4% (765/975)</td>
<td>87.6% (341/389)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Aldosterone antagonist</td>
<td>28.7% (280/975)</td>
<td>40.6% (158/389)</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcomes</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Median length of stay</td>
<td>6 days</td>
<td>7 days</td>
<td></td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>5.1% (52/1027)</td>
<td>2.8% (11/400)</td>
<td>0.06</td>
</tr>
<tr>
<td>Mortality at 90-day follow up</td>
<td>12.8% (119/929)</td>
<td>8.5% (32/377)</td>
<td>0.028*</td>
</tr>
<tr>
<td>Hospital readmission at 90-days</td>
<td>17.1% (159/929)</td>
<td>15.6% (59/377)</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Conclusions: Maori present at a much younger age with HF and are more likely to have systolic dysfunction and increased use of ACE-i/ARBs and Aldosterone antagonists. There is no difference in in-hospital mortality and 90-day readmission but Pakeha have higher 90-day mortality.

Ketamine Esters: Teaching an Old Drug New Tricks

James W. Sleigh, Jiney Jose, Swarna A. Gamage, Martyn G. Harvey, Logan J. Voss, William A Denny.

Auckland Cancer Society Research Centre, School of Medical Sciences and Waikato Clinical School, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand

Background: Ketamine has been used as a dissociative anaesthetic drug for almost fifty years. Its main advantages are that it does not depress the cardiovascular or respiratory systems, and is a strong non-opioid analgesic. Its most significant
disadvantage – which has resulted in its use being restricted to extreme situations – is that it results in delirium and distressing hallucinations in a large proportion of patients during the recovery period. Because these effects are caused at low plasma concentrations of the drug, they often persist for some hours.

**Aims and Objectives:** Over the last decade a new ultrafast offset opioid (remifentanil) has been developed; in which an ester side chain has been linked to the parent opioid molecule. When this ester is hydrolysed, the resultant water-soluble drug metabolite is rendered inactive. The half life of the drug in the presence of the blood and tissue esterases is only a few minutes. This enables high doses of the drug to be given, but the patient still has a rapid recovery after the anaesthesia. We applied the same principle to the drug ketamine, with the aim of reducing the period of recovery delirium.

**Methods:** A number of different esters were developed at the Auckland Cancer Society Research Centre and their anaesthetic effects tested in animal models, using the loss-of-righting reflex as the end point.

**Results:** We found that the animals given the ester analogues regained their righting-reflex between 10 and 20 times faster than when given the parent compound - ketamine. There also appears to be some differences between the compounds as regards their relative analgesic versus hypnotic potencies.

**Conclusion:** It is possible to dramatically reduce the recovery time for ketamine anaesthesia by using an ester analogue of the drug.

**Differential Effects of Selenium (Se) on Normal and Malignant Cells Treated with Chemotherapy and Radiation.**

Michael B. Jameson\(^1\), Richard J Lobb\(^2\), Gregory M Jacobson\(^2\), Ray T Cursons\(^2\)

\(^1\)Waikato District Health Board, Hamilton, New Zealand
\(^2\)The University of Waikato, Hamilton, New Zealand

**Background:** Preclinical work has demonstrated that Se compounds potentiate anticancer effects of chemotherapy (CT) and radiation (RT) while reducing normal tissue toxicities. The molecular basis for the therapeutic selectivity has yet to be fully elucidated but includes modulation of intracellular glutathione (GSH) concentrations, endoplasmic reticulum (ER) stress responses, DNA repair, induction of apoptosis and cellular resistance to CT and RT. Our aim was to evaluate the dose-response relationship of the Se compound methylseleninic acid (MSA) on molecular pathways involved in the response of normal and malignant cells to CT and RT.

**Methods:** Peripheral blood mononuclear cells (PBMC) obtained from healthy blood donors and malignant THP-1 human monocytic leukaemia cells were exposed \textit{in vitro} to MSA 2.5, 5 or 15 µM in varying combinations with MSA, RT, cisplatin (Pt), doxorubicin (Dox) and cytosine arabinoside (Ara-C). GSH concentration was measured by ELISA, DNA damage and repair by COMET assay and cell viability by the MTT assay.
Results: MSA was selectively toxic to THP-1 cells and induced a protective increase in GSH in PBMC but a decrease in high concentrations within THP-1 cells. DNA damage induced by Ara-C or Dox in the COMET assay was significantly reduced by MSA in PBMC but increased in THP-1 cells. Cell death after 2 Gy RT was increased by all doses of MSA in THP-1 cells but only by the highest dose in PBMC. The cytotoxicity of Pt, Dox and Ara-C at sublethal doses was significantly enhanced by MSA only in THP-1 cells. The dose-dependence of the Se effect varied between malignant and normal cells.

Conclusions: MSA at clinically-relevant concentrations had a differential effect on cell survival and death responses to RT and CT with relative protection of PBMC and enhanced death of THP-1 cells. Several mechanisms mediate this therapeutic selectivity and these assays could potentially be used in clinical trials to evaluate pharmacodynamic markers of Se effects in conjunction with CT and/or RT.

Economic Analysis of Prostate Cancer Screening

Chunhuan Lao, Charis Brown, Zuzana Obertová, Richard Edlin, Paul Rouse, Fraser Hodgson, Michael Holmes, Peter Gilling, Ross Lawrenson

Introduction: Prostate cancer (PCa) is the most frequently diagnosed cancer for men in New Zealand, accounting for 30.2% of all cancer registrations [1]. Screening for PCa using the prostate specific antigen (PSA) test is common in New Zealand [2], even though it is not recommended by the Ministry of Health [3]. This study estimates the costs of identifying a new case of PCa by screening asymptomatic men in general practice.

Methods: Asymptomatic men aged 40+ who underwent one or more PSA tests in 31 general practices in Midland region in 2010 were identified. A Decision Tree was constructed to map the screening pathway and to document the associated costs. After the medical resources associated with PCa screening were identified, they were multiplied with the unit cost of each type of resource to estimate the total cost. The costs per PCa detected were generated from the total cost and the number of cancer identified. Sensitivity analysis was conducted to assess the uncertainty of the costs.

Results: 7936 men were included in this study, with 29 new cases of PCa identified. We estimated the costs of GP consultations ($119,620), PSA tests ($90,387), first specialist assessment ($18,547), follow-up specialist consultations ($18,864), prostate biopsies ($19,686), pathology report of prostate biopsy ($32,661) and hospitalization due to complications after prostate biopsy ($1,818). The costs per cancer detected were $10,399. The results of sensitivity analysis indicated the number of new cancers, the unit cost/ the volume of GP consultation and the unit cost/ the volume of PSA tests could significantly influence the costs per PCa detected.

Discussion: The costs of detecting a new PCa by screening asymptomatic men were substantial. Most of these costs were attributed to activities in general practice, including GP consultations and PSA tests ordered by GPs. Additional input from GP providing informed consent will significantly increase the costs of identifying a new case of PCa.
References

A Fast Diagnostic test to Identify the *Mycobacterium Tuberculosis* Rangipo Strain

Ali Ruthe¹, Ray Cursons¹, Noel Karalus², James Bower³, Roberto Colangeli⁴, David Alland⁴ and Vic Arcus¹

¹The University of Waikato, ²Waikato District Health Board, ³LabPLUS, Auckland City Hospital, ⁴New Jersey Medical School, The University of Medicine and Dentistry, New Jersey

**Background:** Tuberculosis (TB) is the second greatest killer worldwide due to a single infectious agent after HIV/AIDS. The incidence of TB disease in New Zealand was seven per 100,000 in 2010 which is higher than the rates for Australia, the United States, and Canada. Infection is usually curable with antimicrobial drugs, but relies upon strict adherence to the antibiotic regime. The Rangipo strain of *Mycobacterium tuberculosis* is responsible for the largest cluster of tuberculosis infections within New Zealand.

This cluster has been active for over twenty years and its control has proved difficult owing to its high transmissibility and lack of a rapid test to identify the strain. Molecular typing is used to find and link source cases to contacts, discriminate between endogenous reactivation and exogenous re-infection, and to type strains allowing prompt identification and tracking of specific strains spreading through the population.

**Aims & Objectives:** To develop a fast diagnostic test to identify the Rangipo strain of *Mycobacterium tuberculosis*

**Methods:** Rangipo specific single nucleotide polymorphisms (SNPs) were identified through whole genome sequencing and database analysis. PCR amplification and restriction enzyme digests are used to differentiate between Rangipo and non-Rangipo *Mycobacterium tuberculosis* strains.

**Results:** Whole genome sequencing of 7 clinical isolates has allowed us to identify many Rangipo specific SNPs. Differing nucleotides at SNP positions between Rangipo and non-Rangipo strains are exploited and a triplex PCR/restriction enzyme digest differentiates the strains.

**Conclusion:** I am developing a rapid PCR based diagnostic test to quickly identify this virulent strain, based on Rangipo specific SNPs identified through whole genome sequencing, to aid in the diagnosis and treatment of this disease and limit its spread.
Risk Factors Associated with Mortality from Breast Cancer in Waikato – A Case Control Study

SA Seneviratne, R Lawrenson, N Scott, ID Campbell.

Waikato Clinical School, University of Auckland.

Introduction: New Zealand (NZ) has the 7th highest age standardized breast cancer mortality in the world. Maori women fare even worse with a 60% higher mortality rate compared to NZ European women.

We performed a case control study to identify key characteristics associated with death from breast cancer among women diagnosed with breast cancer in the Waikato between 2002 and 2010.

Methods: All women diagnosed with breast cancer between 2002 and 2010 in the Waikato were identified from the Waikato Breast Cancer Register and NZ Cancer Registry.

Cases – All women who died of breast cancer between 2002 and 2012 with a primary breast cancer diagnosis between 2002 and 2010.

Controls – Age (+/- 1 year) and year of diagnosis matched controls (up to 3 controls per each case) that were alive on the date of death of the case to which they were being matched were identified.

Results: A total of 258 women who died of breast cancer over the study period were identified and 652 age and diagnosis year matched women with breast cancer were identified as controls. Mean age at death among cases was 63.9 years (SD 14.3).

Mean age at diagnosis was 61 years (SD 15.5) for cases and 60.6 years (SD 13.8) for controls. Proportion of Maori women among cases was higher compared to controls (17.4% vs 13.3%). A higher proportion of cases (84.5%) were diagnosed through symptomatic presentation compared to (59.2%) controls. Symptomatic cases had a significantly longer mean duration of symptoms (14.5 weeks) compared to symptomatic controls (mean10.1 weeks, p<0.01). Sixty-one percent of cases had advanced cancers (stage III and IV) compared to only 14.2% for controls. Just over half (50.7%) of cases were found to have poorly differentiated (grade 3) cancers while this degree of undifferentiation was found in only 17.5% controls. Significantly higher (p<0.05) proportion of cases were found to be oestrogen / progesterone receptor negative (27.3% vs. 9.6%) and HER-2 positive compared to controls (30.1% vs. 14.8%). Among cases, compared to NZ Europeans Maori women had more advanced staged (p<0.01), less poorly differentiated (p=0.02), more ER/PR negative (p=0.26) and more HER-2 positive (p<0.01) cancers. Multivariate analysis identified tumour stage, grade and ER/PR status as tumour factors significantly associated with mortality from breast cancer among Waikato women.

Conclusions: Tumour related factors including advanced stage, higher grade, ER/PR negativity and HER-2 positivity were found to be significantly higher among cases compared to controls. Among cases, compared to NZ Europeans, Maori women had more advanced, more ER/PR negative and more HER-2 positive, but less poorly differentiated cancers. Further studies with a bigger sample sizes are needed to
identify the full impact of all factors including tumour related, comorbidities and
treatment on ethnic inequities in breast cancer mortality in NZ.

Getting The Message Across: How Effective Is PHARMAC’s
Communication About Generic Medicine Switches?

Ragupathy R\textsuperscript{1,2}, Babar Z\textsuperscript{3}, Amerasinghe N\textsuperscript{3}, Wei Kan S\textsuperscript{3}, McCarthy S\textsuperscript{3}, Polwin A\textsuperscript{3}, Rasheed F\textsuperscript{3}.

\textsuperscript{1}School of Pharmacy, University of Otago, New Zealand
\textsuperscript{2}Pharmacy Services, Waikato District Health Board, New Zealand
\textsuperscript{3}School of Pharmacy, University of Auckland, New Zealand

\textbf{Background:} Generic medicines play an important role in New Zealand’s public
health system. Generic medicine switches offer the proven benefits of on-patent
innovator medicines at a much lower cost. PHARMAC uses generic medicines
switches as part of its pharmaceutical cost containment strategy, and carries out
educational campaigns to promote use of generics [1]. The effectiveness of these
campaigns have not been evaluated.

\textbf{Methods:} The study consisted of two parts. In the first part, an anonymous
questionnaire sent to 500 randomly selected pharmacists to evaluate the effectiveness
of PHARMAC’s messaging on pharmacists.

In the second part, prescription records from five pharmacies were examined, and five
selected medicines analysed to determine how many patients were on the generic
brand. This was supplemented by interviews of pharmacists from these five
pharmacies.

\textbf{Results:} There was a fair (37.4\%) response rate to the questionnaires. 68\% of
pharmacists supported generic switches, and over 98\% believed it was PHARMAC’s
responsibility to inform them of switches. However, less than 40\% of pharmacists
were satisfied by PHARMAC’s information about brand switches, and less than 50\%
felt they had enough time to prepare. Just over 50\% found PHARMAC’s current
campaigns effective. Analysis of prescription records found that most patients were
on the generic brand. Pharmacists believed that those patients who opted to pay for
innovator brands did so because patients believed these to more effective or had fewer
side-effects than the generics.

\textbf{Conclusion:} While pharmacists are supportive of generic medicine switches, they
believe PHARMAC’s communication around these switches could be improved.

\textbf{Reference:}

   on drugs. BMJ 340:c2441
Interactive effects of fitness and statin treatment on mortality risk in veterans with dyslipidaemia

Statins are commonly prescribed for management of dyslipidaemia and cardiovascular disease. Increased fitness is also associated with low mortality and is recommended as an essential part of promoting health. This prospective cohort study examines the interaction of the benefits of statins and fitness in respect to all-cause mortality in such patients. They report on outcomes in over 10,000 participants (mean age 58.8 years) followed over a 10-year period. Their data enables the researchers to conclude that statin treatment and increased fitness are independently associated with low mortality among dyslipidaemic individuals.

The combination of statin treatment and increased fitness resulted in substantially lower mortality risk than either alone, reinforcing the importance of physical activity for patients with dyslipidaemia.


Ondansetron in pregnancy—any risk of adverse fetal outcomes?

Among the drugs available for the treatment of nausea and vomiting during pregnancy, the 5-hydroxytryptamine type 3 receptor agonist ondansetron has become the most frequently used prescription antiemetic in the United States. As with all drugs used during pregnancy the question of possible adverse effects on the fetus has to be considered. This very large historical cohort study from Denmark involves over 600,000 pregnancies and compares outcomes between those in which ondansetron was prescribed and those in which the drug was not used.

The adverse outcomes documented and compared were spontaneous abortion, stillbirth, major birth defects, preterm delivery and babies small for gestational age. And the conclusions of this very valuable study were that “ondansetron taken during pregnancy was not associated with a significantly increased risk of adverse fetal outcomes.”


Incidence of pulmonary and venous thromboembolism in pregnancies after in vitro fertilisation

This study involved 23,498 Swedish women who had given birth after in vitro fertilisation between 1990 and 2008 and 116,960 individually matched women with natural pregnancies.

The researchers report that venous thromboembolism occurred in 4.2/1000 (n=99) women after in vitro fertilisation compared with 2.5/1000 (n=291) matched women. This significant increase (p<0.001) applied to the whole pregnancy but was more
marked in the first trimester. The risk of pulmonary embolism also increased in the first trimester.

Multivariate analysis taking parity, single or multiple births, smoking, education, maternal age, country of birth, calendar period, and marital status into account was carried out. This did not alter the significance of the findings. 