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- **Uptake of new medicines in New Zealand: evidence of a waiting list**
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SUMMARIES

Uptake of new medicines in New Zealand: evidence of a waiting list

Jacqueline M Barber; Kevin P Sheehy

We reviewed all of the minutes of PHARMAC's clinical committee (The Pharmacology and Therapeutics Advisory Committee [PTAC]) between 2006 and September 2014, and identified all of the new medicines that have been recommended by them for funding but are yet to be funded by PHARMAC. These medicines make up a "waiting list" of 29 medicines that are indicated to treat 31 conditions that include diabetes, metastatic breast cancer and rheumatoid arthritis. The times taken between a positive PTAC recommendation and being listed by PHARMAC are between 4 months and 8.2 years with an average of 2.8 years.

Gestational diabetes mellitus screening, management and outcomes in the Cook Islands

Yin Yin May Aung, Martin Sowter, Timothy Kenealy, Josephine Herman, Alec Ekeroma

Diabetes is a major health problem in the Cook Islands and a high proportion of women have either pre-existing type two diabetes when they become pregnant or develop gestational diabetes during their pregnancy. There is currently no universally agreed protocol for screening for or diagnosing gestational diabetes. Countries need to balance the effectiveness of any screening and management programme for gestational diabetes against the resources available to them. Since its introduction screening for gestational diabetes has had an excellent uptake with nearly 100% of women in the Cook Islands now being screened for gestational diabetes. Pregnancy outcomes in women with gestational diabetes are very similar to women without gestational diabetes other than a significantly higher rate of delivery by caesarean section. Our current screening programme has not been detecting women with pre-existing type two diabetes and new modifications to our screening programme should pick up these women in early pregnancy improving their care. Our new screening programme does have resource implications and we plan to prospectively collect data on our screening programme in order to assess its cost-effectiveness in the near future.

Traumatic brain injury within Pacific people of New Zealand

Wesley Lagolago, Alice Theadom, Peggy Fairbairn-Dunlop, Shanthi Ameratunga, Anthony Dowell, Kathryn M McPherson, Braden Te Ao, Nicola J Starkey, Valery L Feigin; on behalf of the BIONIC Research Group

This study identified all brain injuries caused by an external force to the head (e.g. fall or being hit by an object) that occurred in the Hamilton and Waikato Districts of New Zealand over a 1-year period. Information on frequency of injury, type of injury, severity and health care access were compared between Pacific people and New Zealand Europeans.

Faculty of Radiation Oncology 2014 Workforce Census: a comparison of New Zealand and Australian responses

Melissa James, Philip L Munro, John Leung

The Faculty of Radiation Oncology undertake an online census of the New Zealand and Australian workforce every 4 years. Response rates are consistently >70%, providing the most representative and reliable data on the workforce. Results provided are the first directly comparing the New Zealand and Australian workforces, identifying similarities and differences in demographics and key measurements that will enable the monitoring of trends between each country.

Students' contribution to the New Zealand Medical Journal: a 14-year review

Ibrahim S Al-Busaidi, Sultan Z Al-Shaqsi

Little is known about the extent and pattern of students' contribution to mainstream medical literature in New Zealand. Findings from this, for the first time, showed that students have contributed greatly to the New Zealand based medical literature. This clearly suggests that students have the ability to conduct publishable research. Academic institutions, such as universities and colleges, should encourage such potential among students. Further future research is needed to better understand students' contribution to the New Zealand and worldwide medical literature.

When can I go home? A prospective case control study to improve communication with patients regarding their diagnosis, treatment plan and likely discharge date

David Murphy, Rebecca Crowley, Anthony Spencer, Mark Birch

Improving patients' knowledge of their diagnosis, management plan for the day, clinical criteria for safe discharge and estimated discharge date through additional written information.

EDITORIAL

Change is the law of life

Frank A Frizelle

The New Zealand Medical Journal (NZMJ) was first published in September 1887 by the New Zealand Branch of the British Medical Association. In the past 128 years the *Journal* has changed considerably, with many of the substantial changes driven by financial reasons.

Change is the law of life.

And those who look only to the past or present are certain to miss the future.

John F. Kennedy

When I took on the editorship of the *NZMJ* in 2002, the *Journal* was changing from the print format to an electronic format. In my first editorial I said “If the *Journal* is to survive we have to make the transition to the electronic medium. While this change will be a struggle for some, it allows us to develop and removes many of the restrictions of the printed version”.¹

When the *Journal* changed to an electronic format, many claimed that this would be the end of the *NZMJ*. This has not been the case; indeed we receive and publish more manuscripts now than before we changed to an electronic format. For instance in 2014 we published 20 editions, and we had 498 new submissions and several hundred resubmissions of which (following peer review) we published 115 original articles.

We have remained a scientific journal, not a magazine; we publish articles written by researchers, not reporters. This has created some limitations in attracting financial support from advertisers, however it also means that the *NZMJ* is New Zealand’s leading medical scientific publication.

Some of the changes that have occurred have been welcome. Many authors may remember the days when we used to post 7 to 12 printed copies of the manuscript to the editors and await the reply (many months later). Now with a few clicks of your mouse you can upload your manuscript into the manuscript handling software (Manuscript Manager) and off to the editing queue it goes. With the manuscript handling software, and the ability to automatically email reviewers and authors, the average manuscript handling time (to decide whether it will be published) is now about 3 weeks.

Not all the changes, however, were welcome and there was considerable outcry at the time the *NZMJ* became electronic in 2002; one of the main issues being that older members could not access the electronic edition of the *NZMJ*. Today many of these members are much more internet savvy. Due to the initial concerns raised, however, the New Zealand Medical Association (NZMA) decided to publish the printed *NZMJ Digest* 6 times per year, with each edition containing a small selection of the *NZMJ* articles, summaries of all other original articles, and all the much-wanted obituaries.

The *Digest* was partly funded by advertising; however this has never been sufficient to fully pay for the *Digest* and the NZMA members have had to fill the gap through their subscriptions. The *Digest* was only ever intended to be a temporary solution but has continued for some time. The economics are now such, however, that the *Digest* must change and become electronic as well and a new form will evolve.

We are evolving the *Journal* further in other ways, with recent and future changes as follows:

- The April print edition of the *NZMJ Digest* will be the last print edition, and the *Digest* will then change in form (electronic format) and in substance.
- The manuscript handling software Manuscript Manager has been upgraded with a new version, and, as seems disappointingly normal for all computer software upgrades, this has been a challenge.

- We will be developing an improved downloadable full contents PDF of each *NZMJ* edition.
- We will have a photo submission catalogue that will be used to select photos for the cover of each downloadable full contents PDF. It is hoped that a wide range of photographs will be submitted.
- Authors, after paying a charge, will be able to make their article free with ‘open access’ (i.e. not password protected) at the time of publication. At present, access to published articles for the first 6 months is restricted to NZMA members and *NZMJ* subscribers only.
- There have been changes to the *NZMJ* Editorial Board: *NZMJ* Subeditors Associate Professor Jim Reid and Professor Tim Buckingham finished their terms last year and Associate Professor Suzanne Pitama has started this year, with a further appointment pending. They join the present Editorial Board staff: Professors Lutz Beckert, Jennie Connor, and Roger Mulder.
- Brennan Edwardes, who has been the production editor since 2004, will be leaving in a few weeks, as the NZMA restructures *NZMJ* staffing and brings production in-house to Wellington. Brennan has done a marvellous job over the years and didn’t miss an edition, even the edition immediately (10 days) after the Christchurch February 2011 earthquake when the *NZMJ* Office (staffed by administrative assistant Sally Bagley at the time) experienced falling file cabinets and a cracked computer monitor.
- The ICMJE has indicated that at some as-yet-to-be-determined future time point there is a need for data sharing; specifically that data that is behind graphs and tables in published manuscripts will have to be made available to the readers for re-analysis and review.² Further details such as how and when exactly this will happen is yet to be determined, however it is coming.

Over the last 128 years the *Journal* has (and no doubt will continue to have) had moments of controversy over what is published, and even sometimes over what is not.

The *Journal* is not the same as what it was in 1887 under Dr Hocken. It fills a need and will continue to adapt to survive and stay viable and relevant in today’s times.

Competing interests: Nil.

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EDITORIAL

Gestational diabetes in the Cook Islands: universal screening needed on 'booking'

Gerhard Sundborn

Gestational diabetes mellitus (GDM) presents many risks to both new-born and mother. Risks for the new-born child include low blood glucose level soon after birth, prolonged jaundice, and low levels of blood calcium as well as higher risk of developing respiratory distress syndrome, and greater likelihood of becoming obese and developing type 2 diabetes in adulthood.

Mothers that have developed GDM are more likely to need a caesarean section delivery, are more likely to develop pregnancy-induced hypertension and protein in the urine and are also have greater risk of urinary tract infection following delivery and are more likely to develop type 2 diabetes.^{1,2}

In the Cook Islands, universal screening for GDM is offered at 24–28 weeks gestation where an initial test (50 gram glucose challenge test (GCT)) is presented to all expectant mothers. If positive, a 75 gram oral glucose tolerance test (OGTT) is then administered to determine GDM.

Aung and colleagues, in this issue of the *New Zealand Medical Journal (NZMJ)*, studied the Cook Islands Gestational Diabetes Screening Programme from January 2009 to December 2014, and found that GDM was present in 15% of expectant mothers.³ Of these mothers, one-third (5%) acquired type 2 diabetes post-delivery.

The level of GDM observed in the Cook Islands (15%) is internationally high, with usual accounts of GDM ranging from 5 to 9%.⁴ Furthermore, international trends show a steady increase of GDM over time thus adding to the concern.⁵

The authors of the *NZMJ* paper (Aung et al) propose an upgraded universal screening programme be adopted in the Cook Islands. Key changes include: screening started in the first trimester by measuring HbA1c at booking of antenatal blood tests of expectant mothers; providing treatment as required; and offering an oral glucose tolerance test (OGTT) at 16–20 weeks gestation to those identified as high risk.

I wholeheartedly agree that this approach is more appropriate and considering the prevalence of GDM in this population should be adopted urgently. Furthermore, Pacific people (including Cook Islanders) in New Zealand are 3.6 times more likely to report having previously diagnosed type 2 diabetes mellitus which warrants a more rigorous screening approach.⁵ It is likely that earlier identification of need and more timely treatment will mean better outcomes for both mother and infant on delivery.

In many parts of the world there is a steady increase of overweight and obese women of child-bearing ages⁶ which has repercussions for increasing rates of GDM. The article by Aung et al showed that Cook Islands mothers categorised as 'Normal', 'pIGT' (pregnancy impaired glucose tolerance) and 'GDM' (gestational diabetes mellitus) had body mass index (BMI) scores of 31 kg/m², 32 kg/m², and 34 kg/m² respectively. Clinical practice guidelines highlight that a BMI of ≥ 30 presents significant increased risk for expectant mothers to develop GDM.⁷

The link between BMI and the increased risk of diabetes should be given particular attention. For instance, a study of 4045 New Zealanders (1011 of whom were Pacific people) found that diabetes prevalence was 5.7% for NZ European, 15.8% for Māori and 23.5% for Pacific people.⁸ However, after adjusting for BMI, all ethnic difference in the prevalence of diabetes was eliminated. This highlights the importance of a targeted strategy to address obesity in the prevention of diabetes.

A failure to address the drivers of population overweight and obesity is likely to result in an increasing occurrence of GDM that will negatively impact on the health and development of mother and child.

Gestational diabetes mellitus presents an invisible threat to the health of mothers and new-born children. In populations where GDM is prevalent, more robust screening protocols are necessary. Considering the high prevalence of GDM in the Cook Islands population, as described by Aung et al in this issue of the *New Zealand Medical Journal*, the proposition of a more robust screening protocol is absolutely needed.

Competing interests: Nil.

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ORIGINAL ARTICLE

Uptake of new medicines in New Zealand: evidence of a waiting list

Jacqueline M Barber; Kevin P Sheehy

Abstract

Aims The Pharmacology and Therapeutics Advisory Committee (PTAC) advises the Pharmaceutical Management Agency (PHARMAC) which medicines should be listed on the New Zealand Pharmaceutical Schedule. This research analyses the PTAC recommendations from 2006 to September 2014 and aims to identify the composition of a waiting list of medicines, including levels of PTAC priority for positive recommendations and measure mean waiting times for these medicines to receive public funding.

Method Funding recommendations in the minutes of the New Zealand Pharmacology and Therapeutics Advisory Committee (PTAC) from 2006 to September 2014 were analysed and compared with the New Zealand Pharmaceutical Schedule for the same period. A list is developed, comprised of agents that received a positive funding recommendation from PTAC, but are still unlisted in the schedule. Waiting periods were measured from the time of the first positive PTAC recommendation to September 2014.

Results There are 29 medicines (for 31 indications) awaiting listing on the pharmaceutical schedule after receiving positive PTAC recommendations. Delays to listing of these medicines range between 0.3 years and 8.2 years. Somewhat surprisingly, mean waiting times did not differ substantially between different listing priorities assigned by PTAC.

Conclusions There are a substantial number of medicines awaiting funding in New Zealand after receiving positive recommendations from PTAC. We recommend that in the interest of transparent reporting, PHARMAC regularly publish a list of pharmaceuticals awaiting listing on the Pharmaceutical Schedule; their PTAC priority status; and the length of time they have been waiting.

Worldwide, the Health Technology Assessment (HTA) Agencies responsible for pharmaceutical funding share the common goal of maximising health benefits funded, while limiting financial costs. In New Zealand, this role is fulfilled by the Pharmaceutical Management Agency (PHARMAC).

Established in 1993, PHARMAC was charged with the responsibility of finding new ways to manage pharmaceutical expenditure while obtaining the best health outcomes for New Zealand. As a Crown entity, PHARMAC is relatively independent of Ministerial control, and reports only according to its legislated mandate.

The primary expert clinical committee that advises PHARMAC which medicines to fund, and with what priority, is the Pharmacology and Therapeutics Advisory Committee (PTAC). PTAC makes recommendations based on its evaluation of an HTA report and other data that is submitted by applicants and reviewed by the PHARMAC staff.¹ It makes investment recommendations according to predetermined decision criteria (Box 1). The cost-effectiveness of a new agent and its overall budgetary impact are included in the factors that PTAC take into consideration (see Box 1 below).²⁻⁴

The PHARMAC Board is the final decision-making body regarding funding decisions.⁵ Once a medicine has received a positive PTAC recommendation, the PHARMAC staff hold commercial negotiations with the applicant and if an agreeable provisional outcome is reached this is submitted to the Board for a final investment decision. Not all products that have been recommended for funding by PTAC, however, appear to progress through to a decision by the PHARMAC Board; and the Board's minutes are not publicly available.

Box 1. PHARMAC decision criteria⁴

- The health needs of all eligible people within New Zealand
- The particular health needs of Maori and Pacific peoples
- The availability and suitability of existing medicines, therapeutic medical devices and related products and related things
- The clinical benefits and risks of pharmaceuticals
- The cost-effectiveness of meeting health needs by funding pharmaceuticals rather than using other publicly funded health and disability support services
- The budgetary impact (in terms of the pharmaceutical budget and the Government's overall health budget) of any changes to the Pharmaceutical Schedule
- The direct cost to health service users
- The Government's priorities for health funding, as set out in any objectives notified by the Crown to PHARMAC, or in PHARMAC's Funding Agreement, or elsewhere
- Any other criteria that PTAC considers relevant

Despite the expert status of PTAC, PHARMAC are not bound to accept its advice or follow its recommendations, and PHARMAC may attach a different listing priority to a pharmaceutical, or make a decision that differs from PTAC's recommendations.^{2,5}

PHARMAC requires applicants to provide HTA information (usually Cost Effectiveness Analyses) in their applications for funding; it also frequently performs in-house economic evaluations comparing the medicine in an application with funded alternatives (see Box 2).⁶ The results of both the applicant and the PHARMAC HTAs are provided to PTAC to inform their decisions.

In many cases the PHARMAC HTA assessments are done in a rudimentary manner (see Box 2) in order to save time and resources.⁶ These so called "rapid" assessments are not independently reviewed.

Following a PTAC recommendation and PHARMAC in-house evaluation, an internal priority list of medicines is generated from which potential investment options are then chosen.^{7,8} PHARMAC do not publish this list, nor the process by which it is subsequently reprioritised for final funding decisions.

We contend that the PHARMAC list of medicines awaiting funding is effectively a waiting list for medicines in New Zealand. In the absence of PHARMAC publishing this list, it would be reasonable to assume that the waiting list would be comprised of those medicines that have been reviewed by PTAC and received a positive recommendation for funding based on HTA evaluation; but which have not yet been listed on the Pharmaceutical Schedule. We have based our assessment of the waiting list on reviewing PTAC recommendations from publicly available minutes⁹ and comparing these with the list of medicines funded by PHARMAC as published in its Pharmaceutical Schedule.¹⁰

We have not included PTAC recommendations for widened access (fund medicines with less restrictive special authority criteria, wider population coverage or new indications) to medicines that already have a listing on the schedule, so our waiting list will be an underestimate.

We recognise that no country in the world funds all medicines for all people, and accept that rationing is a necessary part of keeping public provision of healthcare sustainable. We believe though, that identifying the presence and composition of a medicines waiting list is an important contribution to meaningful discussion about budget setting priorities within health. It may also contribute to improved debate about the appropriate level of medicines rationing within a fixed budget and with rationing of other aspects of healthcare.¹¹⁻¹³

Box 2. Levels of PHARMAC cost-utility analysis (as reported by Grocott in 2009)⁶

Detailed

- Includes a detailed and systematic identification and synthesis of relative clinical effectiveness, prognosis, and health-related quality of life cost data. Evidence critically appraised using full GATE (Graphic Appraisal Tool for Epidemiology)
- Costs and saving to other Government organisations considered in the report in a qualitative manner
- Probabilistic sensitivity analysis undertaken
- Reviewed internally (clinical assumptions reviewed by the PTAC and externally)

Indicative

- Interim assessment using some opportunistic data but more detailed than a preliminary analysis
- Evidence critically appraised using GATE Lite
- Reviewed internally and by PTAC

Preliminary

- Rapid assessment largely using opportunistic data; evidence critically appraised using GATE Lite
- Statistically non-significant events and costs only included if they are likely to change the results of analysis
- Reviewed internally
- Rapid
- Very rapid assessment using opportunistic data

We aimed to identify the composition of a list of medicines that have been assessed by PTAC and received a positive recommendation for funding, but have yet to be funded by PHARMAC. We also aim to measure how long patients have been waiting for the medicines on such a list to receive public funding.

We also assess categories of priority as allocated by PTAC within the overall list and measure how long the groups of medicines in each priority category have been awaiting funding.

Methods

Minutes from quarterly PTAC meetings were assessed from February 2006 (the first year that these were reliably published online) till September 2014.⁹ A database was compiled of the therapeutic agents and the corresponding indications as recorded in the PTAC minutes.

The database included the following categories:

- PTAC meeting date for first positive recommendation
- PTAC meeting date for subsequent and latest meetings for products that were reviewed after a positive recommendation
- Therapeutic agent
- Intended indication
- PTAC first recommendation (decline, list, sub-committee referral etc)
- PTAC subsequent and latest recommendations for products that were reviewed by PTAC after any initial recommendation
- Priority Status (positive recommendations only)

Medicines that received a positive PTAC recommendation were cross-referenced with the current New Zealand Pharmaceutical Schedule (in September 2014) to establish their listing status. Those that had received a positive PTAC recommendation but no Schedule listing were recorded and sub-categorised by PTAC recommendation priority: “high”, “medium”, “low” or “if cost neutral”.

Individual waiting periods (years) were calculated from the date of their first positive PTAC recommendation to the date of our analysis (September 2014). Any subsequent PTAC recommendation was compared to the initial recommendation and the latest recommendation level was then used for the final categorisation into “high”, “medium”, “low” or “if cost neutral” groups. If a medicine received a different priority in a subsequent PTAC analysis then the date of new recommendation was used to calculate waiting time for that medicine.

Mean waiting periods were calculated for the four degrees of listing priority, and for all the unlisted medicines combined.

Where there is more than one positive recommendation for a medicine for different indications, the earliest positive recommendation is included in calculating mean waiting times.

Where a PTAC minute referred to a recommendation prior to 2006 we attempted to locate the earlier PTAC minute and if verified, included the earlier recommendation as the commencement date for waiting times calculation.

Vaccines were excluded from the analysis as these were not routinely assessed by PHARMAC or PTAC until recently. Applications and PTAC recommendations for widening of access to new indications of medicines that already had at least one funded indication; or to wider patient populations were not included in this research.

The PHARMAC application tracker¹⁴ was checked to identify any missed PTAC references, but where there was a discrepancy between information in the application tracker and the PTAC minutes, the PTAC minutes were relied upon as being accurate.

Results

Applications for over 210 individual therapeutic agents were considered in the quarterly meetings of PTAC from February 2006 through to September 2014. Of those, 29 medicines (14%) for 31 indications are awaiting a final PHARMAC decision on implementation of a positive PTAC recommendation. See Table 1.

The mean waiting period for all medicines with positive PTAC recommendations was 2.8 years, the longest being 8.2 years for the adrenalin autoinjector for anaphylaxis which received a medium priority. The second longest waiting period was 8.1 years for deferasirox for adults with transfusional chronic iron overload and children with chronic iron overload with a high priority.

The shortest waiting time is 0.3 years for three medicines: ceftaroline for salvage therapy in multiresistant infections; lixisenatide for type 2 diabetes and the combination HIV treatment elvitegravir, cobicistat, tenofovir disoproxil fumarate and emtricitabine. See Table 2.

There were six instances of PTAC reviews of the medicines on our list subsequent to their initial recommendation and in all but two cases the subsequent PTAC recommendation retained the same priority. In one case the priority was changed from low to “if cost neutral” (for Nab-Paclitaxel) and in the other it was changed from a combined “low to medium” priority, to a priority of medium (rosuvastatin).

Table 1. Medicines that received a positive PTAC recommendation but have yet to be listed on the New Zealand Pharmaceutical Schedule

Agent	Therapeutic indication in PTAC minutes	Month of recommendation	Priority	Waiting period (years)
GREATER THAN 4 YEARS WAIT				
Adrenalin Autoinjector	Anaphylaxis	Nov 2005	Medium	8.2
Deferasirox (Exjade)	Adults with transfusional chronic iron overload and children with chronic iron overload	Aug 2006	High	8.1
Fulvestrant (Faslodex)	Third-line treatment for locally advanced or metastatic breast cancer	Nov 2006	Low	7.8
Oxybutynin patches (Oxytrol)	Urinary incontinence	Jul 2008	Low	6.2
Rosuvastatin (Crestor)	Alternative third-line lipid modifying agent option to ezetimibe in high risk patients (following treatment failure with simvastatin and atorvastatin).	Feb 2009	Medium	5.6
Buprenorphine transdermal patch (Norspan)	Moderate-to-severe pain, restricting its use to patients who have not responded to other opioid analgesics.	May 2009	Low	5.3
Golimumab (Simponi)	Second-line TNF-inhibitor treatment of rheumatoid arthritis following adalimumab failure	May 2010	Low	4.3
Strontium ranelate (Protos)	Strontium ranelate be funded as a second-line treatment for osteoporosis subject to Special Authority criteria restricting its use to patients intolerant to all funded bisphosphonates	May 2010	Low	4.3
BETWEEN 3 AND 4 YEARS				
Miglustat (Zavesca)	Type 1 Gaucher disease via the Gaucher Panel, for patients who are refractory to imiglucerase or show toxicity to imiglucerase or who are unable to comply with imiglucerase regimen.	Nov 2010	Low	3.8
Rivastigmine patches (Exelon)	Alzheimer's disease	Nov 2010	Low	3.8
Cevimeline	Dry mouth (including Sjogren's syndrome): for patients with the dry mouth symptoms of diagnosed Sjogren's syndrome where patients have trialed and are intolerant to pilocarpine.	Aug 2011	Low	3.1
Pregabalin (Lyrica)	Refractory peripheral neuropathic pain associated with post herpetic neuralgia or diabetic peripheral neuropathy.	Aug 2011	Low	3.1
BETWEEN 2 AND 3 YEARS				
Saxagliptin	Type 2 diabetes mellitus	Nov 2011	Low	2.8
Linagliptin	Type 2 diabetes	Aug 2012	Low	2.1
Liraglutide	Type 2 diabetes	Aug 2012	Low	2.1
BETWEEN 1 AND 2 YEARS				

Everolimus	SEGAs (6 months) treatment prior to neurosurgery and for those not amenable to neurosurgical resection	Feb 2013	High	1.6
Renal multivitamin	Chronic kidney disease	Feb 2013	Medium	1.6
Abiraterone	Castrate-resistant metastatic prostate cancer	Aug 2013	Low	1.1
LESS THAN 1 YEAR				
Dapagliflozin	Type 2 diabetes	Nov 2013	Low	0.8
Omalizumab	Severe asthma	Nov 2013	Medium	0.8
Apixaban	Venous thromboembolus prophylaxis following major orthopaedic surgery (if cost neutral) Stroke prevention in non-valvular AF (low priority)	Nov 2013	If cost neutral/ Low	0.8
Nab-paclitaxel	Metastatic breast cancer	Feb 2014	If cost neutral	0.6
Natalizumab	Relapsing remitting multiple sclerosis	Feb 2014	Medium	0.6
Fingolimod	Relapsing remitting multiple sclerosis	Feb 2014	Medium	0.6
Pertuzumab	HER-2 positive metastatic breast cancer	Feb 2014	Low	0.6
Glycopyrronium bromide (inhaled)	COPD	Feb 2014	If cost neutral	0.6
Ceftaroline	Multi-resistant infection, salvage therapy	May 2014	High	0.3
Lixisenatide	Type 2 diabetes	May 2014	Low	0.3
Combination elvitegravir, cobicistat, tenofovir disoproxil fumarate, emtricitabine	HIV	May 2014	If cost neutral	0.3

Table 2. Waiting times by priority category

PTAC priority category	Number of medicines	Mean waiting time	Range of waiting times
High	3	3.3	0.3–8.1
Medium	6	2.9	0.6–8.2
Low	16	3.2	0.3–7.8
If cost neutral	4	0.6	0.3–0.8

Somewhat counter-intuitively, a higher priority recommendation (mean 3.3 years) does not seem to correlate to shorter waiting times, as those recommended with medium priority (mean 2.9 years) and low priority (mean 3.2 years) had been waiting for similar mean periods, although the low number of high priority medicines (3 in this category) makes the mean less reliable (range 0.3 to 8.1 years).

Discussion

Waiting lists for health treatments within a resource constrained environment are relatively common both locally and internationally, and are arguably a means of identifying bottlenecks in the system. We have developed evidence that a medicines waiting list does exist in New Zealand and tried to quantify it in terms of size and waiting times.

Our report is not specifically aimed at achieving listing of the therapeutic agents identified. Rather, our intention is to illuminate that there is in fact a New Zealand medicines waiting list and discuss the need for a transparent reporting of such a waiting list in the future.

PHARMAC is the only body within the New Zealand health sector that is legislated to work within the constraints of a fixed budget, set annually by the Minister of Health from within the overall Health Budget (“Vote Health”).¹⁵ Prior to PHARMAC’s inception, the rate of increase in New Zealand’s pharmaceutical expenditure had been deemed unsustainable at between 10 and 20% per year.^{6,16,17}

PHARMAC's success in generating savings is frequently stated by many stakeholders; although the actual size of these savings; any trade-offs in terms of delayed access; or the health consequences of them have not been adequately measured in a peer reviewed manner. Where PHARMAC quotes estimates of long term savings in its Annual Reports there is no methodology provided and no external review of how this has been calculated.¹⁸

Our work aims to identify a measurable and reproducible waiting list specific to New Zealand. Any such waiting list would change frequently, and require regular updating to be meaningful to policy considerations.

We note that there are a number of the medicines on our list that PHARMAC is currently consulting on funding, but believe that even if all of these are funded in the near future the waiting times prior to them being funded are important to recognise as a measure of PHARMAC's ability to perform its legislated mandate within the budget that is provided to it.

We recognise that medicines that receive a specific priority may have this priority changed over time, but without the PHARMAC priority list being made available publicly, it is not possible for such priorities to be monitored.

A benefit of our approach is that by relying on the expert clinical committee PTAC's positive recommendations for listing, we have included only medicines that may be deemed to have a meaningful positive benefit from being funded. The PTAC process can be expected to have declined any medicines that it considered to not add therapeutic value to the health system.

For some of the diseases that the medicines on the waiting list treat, there may already be funded medicines that are considered similar in efficacy, but we believe that for a medicine to be recommended by PTAC as any priority other than "if cost neutral", PTAC would have considered that there is additional benefit to be gained from providing access to the medicine.

A weakness of our methodology is that we have not included applications for additional indications or widened population group coverage and hence we underestimate of the size of the waiting list of potential investments that PHARMAC faces. The PHARMAC Annual Report 2013 (page 3)¹⁸ shows that for the majority of years between 2008 and 2013, the decisions to widen access have outnumbered those providing new listings, suggesting this area may be substantial if measured by the number of products or the number of patients affected.

PHARMAC is currently expanding its function to include hospital medicines, vaccines and medical devices, so it is timely to consider whether success in the area of financial constraint is acceptably balanced with availability of medicines to the public.

New Zealand's reputation for tight fiscal constraint when subsidising prescription drugs is well-recognised and has been largely attributed to limited resources imposed by strict budget-caps.¹⁹ PHARMAC claims to have saved an estimated NZ\$76.2 million on pharmaceutical expenditure in 2011²⁰ and NZ\$30 million of this saving was redirected to other areas of expenditure in the health system. We believe that in the absence of meaningful comparison of investment opportunities, a decision to redirect funding has the potential to work counter to the principle of efficiency on which HTA and PHARMAC are both based. In effect, redirecting funding away from a highly efficient organisation may be wasteful.

Redirecting funding away from PHARMAC needs to be particularly carefully scrutinised in the light of evidence that access to newer pharmaceuticals in New Zealand compared to other developed countries is lower,^{12,21,22} and the rate of uptake of new agents is slower.^{21,23}

PHARMAC put their legislated mandate into operation through applying the decision criteria, including a reliance on the cost effectiveness of new medicines and their projected impact on the

annual budget.⁶ Through these tools, PHARMAC manages new entrants to the pharmaceutical schedule in a way that is able to measure, predict and control the pharmaceutical budget.

The cost-effectiveness of a therapeutic agent is an important decision criterion in achieving the best health outcomes for the dollars being spent. One may argue that the cost-effectiveness of an agent should have little bearing on the delays observed between PTAC recommendations and PHARMAC listings as the PTAC recommendations have already taken into account the cost effectiveness as a decision criterion, and as such PHARMAC should implement a positive recommendation expeditiously. The question then is whether or not PHARMAC's funding is adequate to enable it to perform its role optimally.

It appears that the effectiveness of the listing priorities that PTAC places on recommendations is limited, particularly as the priorities do not appear to predict the speed with which agents are listed. Little difference is observed between the mean waiting periods for the different priority listings. Much of this may be due to PHARMAC's right to reprioritise PTAC's recommendations.

In order to minimise costs, one can accept the decision to fund a medicine with a lower cost per QALY (quality-adjusted life year) over another similarly prioritised intervention. It is difficult to understand, however, why in some instances medicines with a lower PTAC priority have been funded ahead of those with a high priority.²⁴

A recent comparison of the rate of access to new prescription medications in New Zealand and Australia found that between 2000 and 2009, 136 new prescription medicines were listed in the Australian Schedule of Pharmaceutical Benefits, of which 59 (43%) were listed in the New Zealand Pharmaceutical Schedule.²³ Listing in New Zealand also took an mean of 32.7 months longer, largely due to an extended wait period between regulatory approval and PHARMAC listing of 23.7 months. Those listed within Australia but not New Zealand covered a wide range of therapeutic indications, some of which had no alternative treatments available in New Zealand.

Recent improvements appear to have been made in New Zealand, and 2012/13 saw PHARMAC make 20 new investments,¹⁸ but most of these medicines had been registered in New Zealand for a long time with many of them having been registered in New Zealand prior to 1990.²⁵

Differences between pharmaceutical access in New Zealand and Australia in particular are largely due to the operational differences between PHARMAC and the Australian Pharmaceutical Benefits Scheme (PBS). Both entities have a value-for-money approach, however, while PHARMAC operates within strictly capped budgets, the Australian Government will expand PBS funding in order to accommodate new pharmaceuticals, which demonstrate clinical importance and cost-effectiveness among other qualities.^{23,26,27}

Specifically, while the Australian Government manages the price of each medicine on the PBS, the total cost of the PBS Scheme is uncapped and is able to increase as new drugs are added in response to clinical recommendations and the identification of new treatments that will deliver therapeutic benefits.²⁸

Such budget flexibility allows the Australian Pharmaceutical Benefits Advisory Committee (PBAC, analogous to PTAC in New Zealand) to judge treatments based on clinical and health economic merit and for recommendations to be implemented rapidly.²⁹

We note that patients in Australia also face the need to pay a larger co-payment. The affordability of such an approach from a patient's perspective would need to be considered if this were to be seen as a way of speeding up access to medicines in New Zealand.

We have assessed the medicines that have not been listed at all on the pharmaceutical schedule, in addition to these, there are a number of medicines currently listed for indications or populations that

may be narrower than warranted. Further research could look into the extent of these restrictions, possibly using a methodology similar to ours in considering PTAC recommendations and comparing these to schedule listings.

Concluding remarks

A pharmaceutical waiting list in New Zealand is evident, the extent of which we believe needs to be communicated to New Zealand clinicians and the public.

The study found that there are 29 medicines with positive recommendations from PTAC that are awaiting funding. Waiting times identified ranged from 0.3 to 8.2 years and there were only small differences in mean waiting times between the groups of medicines by PTAC priority.

We believe that a waiting list can be a useful tool in PHARMAC openly reporting on performance and providing input to government budget allocation decisions. For the sake of transparency it would be sensible for PHARMAC to publish a regularly updated list of pharmaceuticals awaiting listing on the Pharmaceutical Schedule, their PTAC priority status and the length of time they have been waiting (analogous to a DHB waiting list for various health interventions).

We consider that if New Zealand is truly to provide the best health outcomes that are reasonably achievable from pharmaceutical treatment, there should be a more open disclosure and debate about what investment options are available to PHARMAC.

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- Jacqueline M Barber was contracted to Medicines New Zealand, the trade association for the pharmaceutical industry in New Zealand for the purpose of conducting this research. She has no other relevant affiliations or financial involvement with any organisation or entity with a financial interest or conflict with the materials discussed in the manuscript apart from that disclosed.
- Kevin P Sheehy is a consultant in health innovation for Navigator, at the time of writing the manuscript, he was the General Manager of Medicines New Zealand. Medicines New Zealand is the association representing the originator pharmaceutical industry in New Zealand and is fully funded by these companies for policy and advocacy work.

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ORIGINAL ARTICLE

Gestational diabetes mellitus screening, management and outcomes in the Cook Islands

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Abstract

Aim To describe current practices for screening for gestational diabetes mellitus in the Cook Islands and consider the implications of alternative screening strategies.

Methods Eligible women had antenatal care from January 2009 to December 2012. A non-fasting 50 g glucose challenge between 24 and 28 weeks gestation (positive if 1-hour glucose ≥ 7.8 mmol/L) was followed by a 75 g oral glucose tolerance test (gestational diabetes mellitus diagnosed if fasting glucose ≥ 5.2 mmol/L or 2-hour glucose ≥ 8.0 mmol/L; pregnancy impaired glucose tolerance if positive screen and negative diagnostic test).

Results Uptake of the screening programme rose from 49.0% to 99.6% by the end of the study period. 646 women had a glucose challenge; for 186/646 (28.8%) the challenge was positive; 183 had an oral glucose tolerance test; 89/646 (13.8%) had pregnancy impaired glucose tolerance; 94/646 (13.9%) had gestational diabetes mellitus.

Median maternal weight gain was 6 kg (gestational diabetes mellitus) and 10 kg (normal glucose tolerance); caesarean section rates were 25% and 11% respectively; baby birthweights were not significantly different. 59 women with gestational diabetes mellitus had a post-natal glucose tolerance test at their 6-week check and 21 (35.6%) had diabetes confirmed.

Conclusion The gestational diabetes mellitus screening programme has a high uptake and current management appears effective in reducing maternal and fetal weight gain. A proposed new screening programme is outlined.

The Cook Islands consists of 15 islands and atolls with a resident population of about 15,000 at the 2011 Census, of whom 88% were Cook Island Māori and the remainder mostly New Zealand European.¹ There are 3655 female residents in the reproductive age group (15 to 49 years).¹ Obesity and diabetes represent a significant health challenge: 66% of adult women are obese and 21% have diabetes.² These rates are similar to other Pacific countries.^{3,4}

There is no universally agreed approach to screening for gestational diabetes (GDM) or even agreement on appropriate glucose thresholds at which gestational diabetes is diagnosed.⁵⁻⁷ Screening programmes inevitably need to balance the performance of different approaches to screening with the resources available.⁷⁻⁹ Universal screening for gestational diabetes has been offered to all eligible women in Rarotonga, the Southern Group Islands and some of the Northern Group Islands since January 2009.

The diagnosis of GDM in the Cook Islands has been made using a two-step approach late in the second trimester. An initial screening test involves a non-fasting 50 gram (g) glucose challenge test (GCT) at 24–28 weeks gestation. Women are subsequently offered a diagnostic 75 g oral glucose tolerance test (OGTT) if their 1-hour glucose concentration is ≥ 7.8 mmol/L.^{10,11}

GDM is diagnosed if the fasting sugar glucose (FBG) is ≥ 5.2 mmol/L and/ or the 2-hour glucose concentration is ≥ 8.0 mmol/L,^{7,11} (compared to the New Zealand criteria of FBG ≥ 5.5 , 2H ≥ 9.0 mmol/L). Pregnancy impaired glucose tolerance (pIGT) is diagnosed if the GCT is positive but the GDM test is negative.

Alternative screening strategies could include universal first trimester testing or enhanced first and second trimester screening for women at increased risk of gestational diabetes. Such approaches have been suggested by the International Association of Diabetes in Pregnancy Study Groups (IADPSG),^{7,11} the American Diabetes Association (ADA)¹² and the National Institute for Clinical Excellence (NICE) in the UK.¹³

The New Zealand Ministry of Health is also developing plans for a new screening programme for gestational diabetes. The aim of this study is to determine how many women are being diagnosed with GDM using the current screening criteria and to compare pregnancy outcomes in women with and without GDM using the current criteria.

Methods

The study population included all known deliveries in the Cook Islands, for the period January 2009 to December 2012 inclusive. Women who delivered but were not of Cook Islands descent were excluded from all analyses, and women delivered overseas were excluded from outcomes analysis as these data were not known. Women with twin pregnancies were included. For women who had more than one delivery during the study period, only the most recent delivery was included.

Ethics approval was granted by the Ministry of Health. Data on demographic, antenatal, delivery and perinatal outcome characteristics were collected retrospectively from the Rarotonga Hospital obstetric patient register, and patient records held in the electronic patient management system (Medtech32; www.medtech.co.nz). Data were extracted by clinical staff.

Outcomes—Antenatal outcomes included the proportion of women who were screened for GDM, and results of screening. Intra-partum and neonatal outcomes were reported for the proportion (by glucose tolerance category) who had caesarean sections; who had shoulder dystocia; birth weight ≥ 4.0 kg or were admitted to neonatal intensive care (NICU). Postnatal outcomes included the proportion of women with GDM who had an OGTT postnatally, and were diagnosed with diabetes.

Statistical analysis—The extracted data was exported for analysis to Microsoft® Excel (version 2010), and Stata (version 12.1) software. Statistical tests were ANOVA for continuous variables across categories, Chi-squared for proportions; statistical significance is cited at $p \leq 0.05$.

Results

Of the 1020 women who attended antenatal clinics between January 2009 and December 2012, 724 (71%) were offered screening for GDM and all accepted. After 78 women were excluded (13 were not Cook Islanders and 65 were having a second or third pregnancy in the study period), 646 (90%) were included in the analyses. Of these, 186 (29%) had a positive screening test, 89 (14%) had pIGT and 94 (15%) had GDM. Three women with a positive screening test declined an OGTT. Characteristics of the women and their screening test results are shown in Table 1.

The proportion of women offered GDM screening rose through the four years of the study period: 123 of 251 women (49%) in 2009, 145 of 257 women (56% in 2010), 199 of 254 (78%) women in 2011, and 257 of 258 women (100%) in 2012.

Table 1. Characteristics of women included in study and results of screening test. Results are n, n (%) or median (25th centile, 75th centile)

Characteristics	N=646
Age	29 (24–36)
youngest, oldest	15–48
Gravida	3 (1–4)
highest	13
Parity	1 (0–3)
highest	12
Booking gestation	15.6 (10.4–21.5)
number booked after 28 weeks	53 (8%)
Booking BMI	31.2 (26.2–36.1)
Smoking current	192 (30%)
never	436 (67%)
past	18 (3%)
Past GDM*	19 (3%)
Past birth weight $\geq 4000\text{g}^*$	70 (11%)
Family history of diabetes (1st degree relative)	237 (37%)
Polycose screening test	646 (100%)
gestation at polycose testing	27.1 (25.1–29)
1 hour glucose ≥ 7.8 mmol/L	186 (29%)
1 hour glucose ≥ 11.0 mmol/L (GDM confirmed)	1
Oral Glucose Tolerance Test	
women tested	183
fasting glucose ≥ 5.4 mmol/L (GDM confirmed)	64
2-hour glucose ≥ 8 mmol/L (GDM confirmed)	59
both fasting and two hour test positive	30
Total number of women with confirmed GDM	94 (15%)

*If not first baby/

Table 2 compares the characteristics of women with normal glucose tolerance, pIGT and GDM. There were statistically significant differences across the classifications for increasing age, gravida, parity, booking BMI, systolic and diastolic blood pressure and proportion with a family history of diabetes; and for proportions with previous GDM and a previous baby with a birth weight of 4 kg or more among women having second or subsequent babies.

Table 2. Characteristics of women at booking, by normal glucose tolerance, pIGT and GDM. Results are n, n (%) or median (25th centile, 75th centile)

Variables	Normal n=463 (71%)	pIGT n=89 (14%)	GDM n=94 (15%)	P value
Age	28 (23–34)	30 (24–37)	36 (28–40)	<0.001
Gravida	2 (1–4)	3 (2–4)	3 (2–5)	0.001
Parity	1 (0–2)	2 (0–3)	2 (1–4)	<0.001
Gestation	15 (10–21)	14 (11–21)	17 (12–24)	0.02
BMI	31 (26–36)	32 (27–37)	34 (30–39)	<0.001
Family history of diabetes	153/463 (33%)	37/89 (42%)	47/94 (50%)	0.007
Past GDM*	2/338 (1%)	1/67 (2%)	16/71 (23%)	<0.001
Past birth weight $\geq 4000\text{g}^*$	45/338 (13%)	7/67 (10%)	18/71 (25%)	0.02

*If not first baby.

All women with GDM were offered lifestyle and weight management advice. In addition 11 were given metformin, 2 were given insulin and 5 were given both. Table 3 shows the pregnancy outcomes for women who delivered in the Cook Islands.

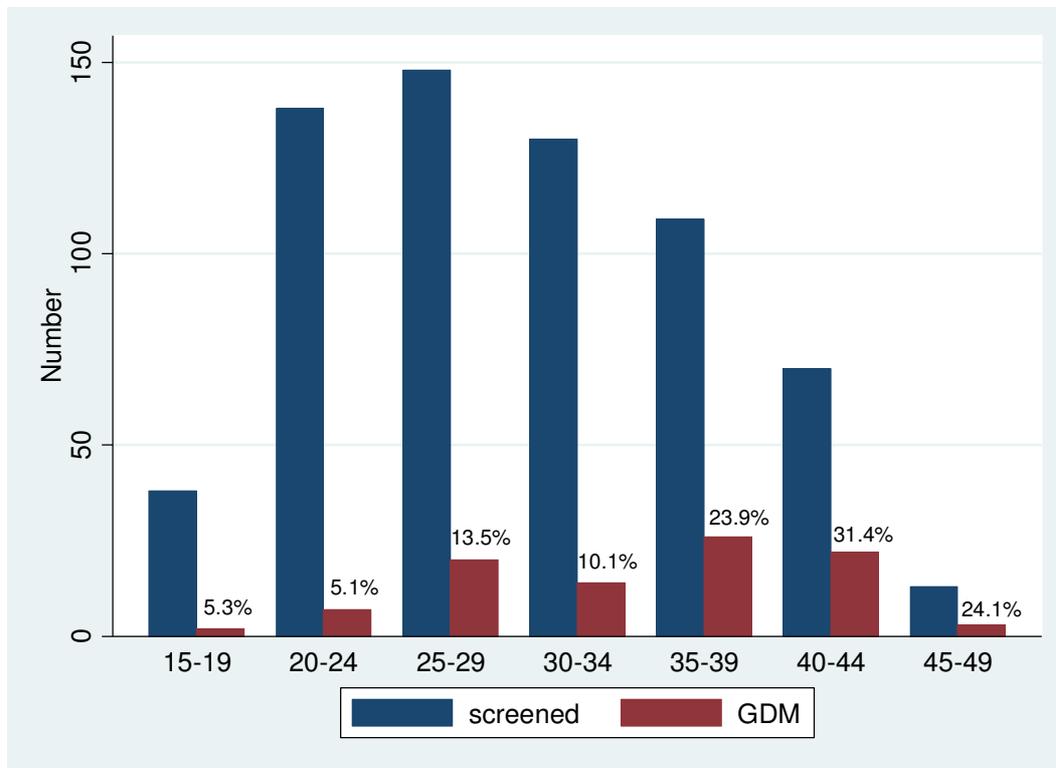
By increasing glucose category, there was a lower maternal weight gain (6 kg in GDM compared with 10 kg in normal glucose tolerance) and a small but non-significant gain in baby birthweight (90 g higher in GDM than normal glucose tolerance). There were no instances of shoulder dystocia. There was one intra-uterine death (no post-mortem) and one neonatal death (respiratory distress) in the GDM group.

Table 3. Outcomes for women delivered in the Cook Islands, by normal glucose tolerance, pIGT and GDM. Results are n, n (%) or median (25th centile, 75th centile)

Variables	Normal N=428	pIGT n=84	GDM n=92	P value
Pregnancy weight gain (kg)	10 (6–14)	9 (5–12)	6 (3–11)	<0.001
Mode of delivery				
Normal vaginal	376	75	67	0.002 across modes
Caesarean section	51 (11%)	8 (9%)	24 (25%)	
Ventouse	1	1	1	
Pre-term	6	2	2	0.74
Admitted NICU	22	6	8	0.38
Birth weight (g)	3430 (3120–3750)	3445 (3035–3765)	3520 (3220–3920)	0.14
Birth weight ≥4000g	58 (14%)	16 (19%)	19 (21%)	0.14

Postnatal OGTT testing at 6-12 weeks post-partum was offered to the 59 women with GDM according to the 2 hour criteria. Ten women (17%) had impaired glucose tolerance and 21 (36%) had diabetes confirmed, one of whom was later confirmed to have type 1 diabetes.

In Figure 1 the age distribution of women with GDM and the normal group are shown. This shows an increasing proportion of GDM in older women.

Figure 1. Percentage of women screened who have gestational diabetes mellitus (GDM), by age group

Discussion

This is the first study of the GDM screening programme and the prevalence and management of GDM among Cook Islands women since the introduction of universal screening in 2009 and to our knowledge, the first such study from any Pacific Island nation. The data represent more than 96% of all births in the Cook Islands during the study period.

The high uptake of screening and OGTT towards the latter half of the study period, together with the apparent effectiveness of the lifestyle programme, point to a high level of acceptance by Cook Island women of the need to detect and manage GDM and diabetes.

GDM management appears to have reduced maternal weight gain to less than women with normal glucose tolerance and pIGT, and restricted baby birthweights to a non-significant increase, with no increase in pre-term deliveries or NICU admissions.

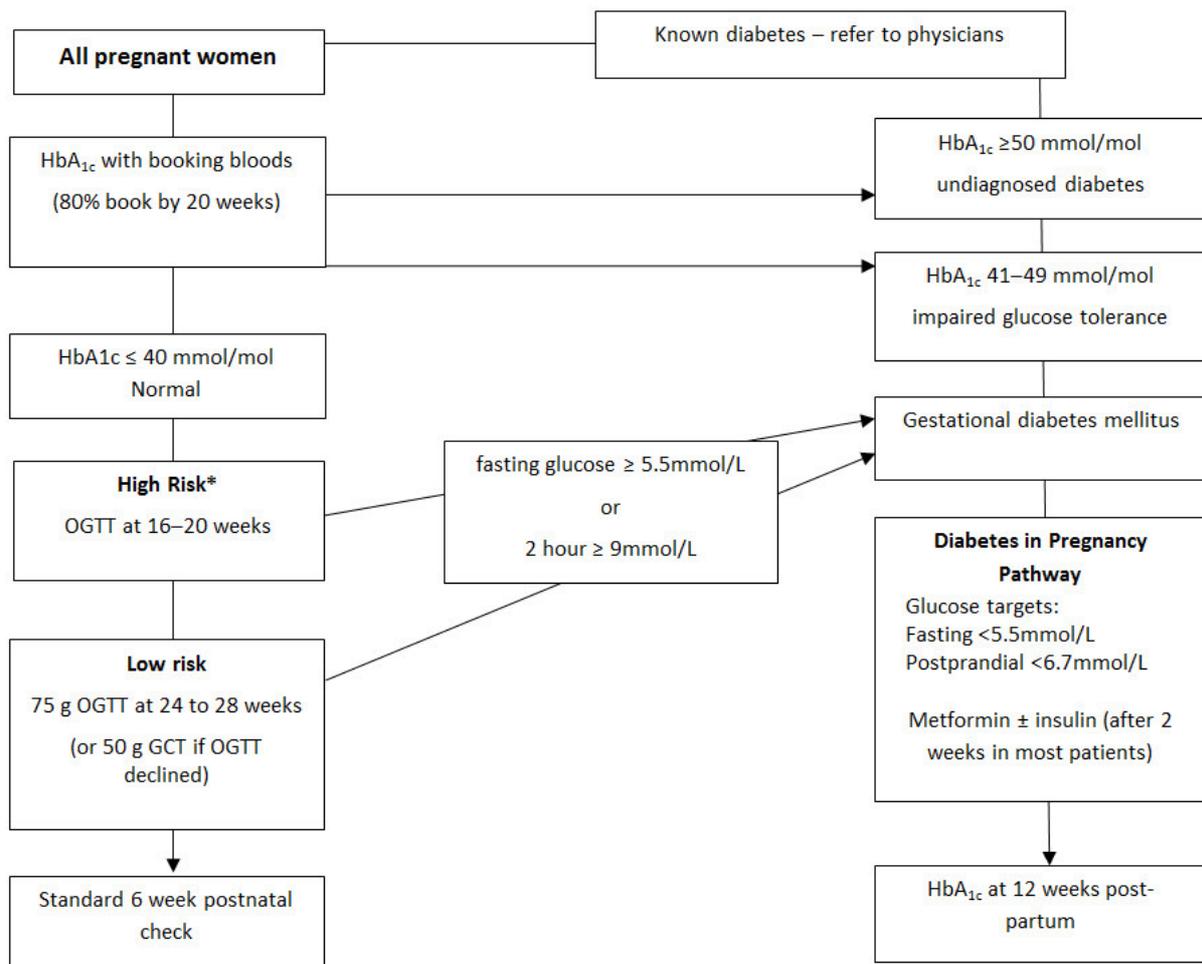
Limitations of this study include not having outcome data on the small number of women who delivered overseas (mostly in New Zealand). We have no detailed data on the lifestyle advice given and its uptake by women with GDM. We had no data to describe glucose control achieved by the women with GDM.

Women with GDM are at increased risk of developing type 2 diabetes in later life.^{14,15} Studies in non-European ethnic groups suggest that up to 60% of women with GDM will develop type 2 diabetes within 5 to 20 years and most of these will develop type 2 diabetes within 5 years.^{16,18} No such studies have been performed in Pacific Island women but high obesity rates and a high incidence of type 2

diabetes in this group suggest it is likely that Pacific island women are at a similar or higher risk. GDM screening in the Cook Islands is likely to identify women with a high chance of developing type 2 diabetes.

The current screening programme, testing at 24 weeks and later, will not detect women with pre-existing type 2 diabetes. In our study a third of the women with GDM, who had a post-natal OGTT, had type 2 diabetes. It is likely that most of these women had undiagnosed type 2 diabetes prior to pregnancy.

Figure 2. Proposed strategy for screening for diabetes in pregnancy in the Cook Islands



***Women considered to be at high risk of pre-existing diabetes**

- Age 35 years or older
- BMI ≥ 35
- one first degree relative with diabetes
- Glycosuria
- Previous gestational diabetes
- Previous baby ≥ 4 kg
- Polycystic ovarian syndrome

OGTT – oral glucose tolerance test; GCT – glucose challenge test.

Early detection of these women is a key part of recently described approaches to GDM screening such as the 2010 IADPSG consensus screening strategy for GDM.¹⁷ This approach measures HbA_{1c} or a fasting/random glucose test at booking in women at high risk of pre-existing diabetes. However, almost all women in our population would fall into an IADPSG high risk group¹⁸⁻²⁰ suggesting that in the Cook Islands universal first trimester testing would be appropriate. Measuring HbA_{1c} at a booking visit is convenient for women and the service.

Choosing the most appropriate fasting and two hour cut offs for the diagnosis of GDM in the Cook Islands is problematic. However, since Cook Island obstetric services work closely with New Zealand, and since most Cook Island women who deliver overseas do so in New Zealand, it is likely that new standards adopted by New Zealand will also be adopted in the Cook Islands.

Figure 2 shows a proposed new screening strategy for the Cook Islands incorporating universal first trimester screen, second trimester screening in higher risk women and a universal diagnostic test at 24–28 weeks. Almost all women in the Cook Islands deliver in Rarotonga, transferring from outlying islands in late pregnancy.

It is possible that future additional testing will significantly increase the resources needed to provide antenatal care in outlying islands. If this proposed approach is introduced it will be important that all screening, intervention, glucose control and outcome data are collected prospectively to assess its acceptability, cost and effectiveness.

Competing interests: Nil.

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ORIGINAL ARTICLE

Traumatic brain injury within Pacific people of New Zealand

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Abstract

Aims Previous research has suggested there are ethnic disparities in the incidence of traumatic brain injury (TBI). This study aimed to: identify the incidence of TBI for Pacific people; describe the injury profile in this population; and determine if there were disparities in healthcare service use.

Methods All TBI cases that occurred within a 1-year period in the Hamilton and Waikato regions of New Zealand were identified using multiple case ascertainment methods as part of a population-based incidence study.

Demographic and injury data from people who self-identified as a Pacific person (N=76) were extracted and compared to New Zealand (NZ) Europeans (N=794). Differences in injury severity, mechanism of injury and acute healthcare service use were explored between the two ethnic groups.

Results The total crude incidence of TBI in Pacific people was 1242 cases per 100,000 person-years, significantly higher than NZ Europeans (842 per 100,000). Peaks in incidence for Pacific people and NZ Europeans were observed between 0–4 and 15–24 years of age, with males at greater risk of injury than females. There were no statistically significant differences in TBI severity, mechanism of injury and acute healthcare use between the two groups.

Conclusion Pacific people are at a significantly higher risk of experiencing a TBI than NZ Europeans and targeted prevention efforts are needed.

Traumatic brain injury (TBI) is becoming a major global health issue.¹ Even mild TBI can impact on a person's quality of life, with many people experiencing persistent and multifaceted symptoms that can impact on community integration, social participation and ability to return to employment.²

Evidence from international studies reveals that people from ethnic minority groups have increased incidence and mortality rates following TBI.^{3,4} Additionally, ethnic minorities are more likely to have prolonged length of stay in hospital⁵ and be discharged home without community services following hospitalisation.³

One study has also revealed that ethnic minority groups receive fewer sessions and lower intensity of inpatient physiotherapy, occupational therapy, speech language therapy and psychotherapy in comparison to non-minority groups.⁴ Reduced access to health care may be linked to the findings that minority groups have poorer functional outcomes following TBI than non-minority groups.⁴

For Pacific people, a study in the US found that Pacific people had lower incidence of TBI than other ethnic groups⁶ with a rate of 239.6 per 100,000 person-years. A previous study based on a national database of hospital discharges in New Zealand (NZ) revealed that the incidence of TBI was higher than reported in the United States (US), with an incidence of 582.6 per 100,000 for males and 217.6 per 100,000 for females.⁷

The observed differences in incidence rates may be due to the different populations and types of TBI severity considered between the two studies as well as potential differences between the US and NZ. In accord with the wider literature on ethnic minority groups, it appears Pacific people sustain TBI at a younger age than other ethnic groups.^{3,8,9}

Disparities in health outcome following TBI have been observed, with Asian/Pacific people reported to have a 1.41 risk of mortality in comparison to other ethnic groups.³ This study also revealed that Asian/Pacific people were more likely to be discharged home than to a rehabilitation centre, although it remains unclear as to why this was the case.³ It is also difficult to ascertain the extent to which observed disparities reflect disparities specifically for Pacific people, as these this study combined Pacific people with Asian people within the same group.^{3,8,9}

The true impact of TBI for Pacific people may also be currently underestimated as incidence rates¹⁰ and healthcare expenditure¹¹ have previously been limited to those TBI cases who present to hospital or die from their injuries. This approach is problematic as many people who have experienced a TBI choose not to seek medical care¹² and a TBI can be missed if a person presents at hospital with multiple or complex injuries.¹³ Population-based prospective methods are needed to capture cases of TBI that occur in the community and who may not present to hospital following injury to ascertain the incidence of TBI for Pacific people.

To ensure resources are effectively allocated to healthcare services, an understanding of whom, and how, people are most affected by TBI in high-risk populations is essential. Pacific people are more likely to be living in low socioeconomic areas; are less likely to be well-educated; and more likely to have poor access to healthcare services.¹⁴ Each of these factors have been identified as predictors of poorer outcome following TBI.¹⁵

This study therefore aimed to determine the incidence of TBI in Pacific people, using a population-based sample, to describe the mechanisms and contexts of injury, and to explore healthcare use for Pacific people in comparison to NZ Europeans. This will provide insights into how to prevent future injuries and reduce the burden of TBI for Pacific people in NZ.

Methods

Participants—This study draws on data collected as part of a population based TBI incidence study (BIONIC).^{16,17} All TBI cases for people across all ages and TBI severities were identified over a one year period. For the purposes of this study, TBI was defined according to the World Health Organization (WHO) criteria which states that TBI is the result of an external physical force causing injury to the brain.¹⁸

Internal causes of injury such as strokes were excluded. To be included in the study, the TBI needed to have been sustained between 1 March 2010 to 28 February 2011 and the participant needed to be a resident of the Hamilton or Waikato districts.¹⁹ The study area encompassed both urban and rural areas and was of a feasible size to enable collaboration with multiple agencies to identify all TBI cases.

TBI cases were identified from multiples sources including community health services, sports clubs, schools, prisons, residential facilities, General practitioners (GPs) and hospital records before being included in the dataset. TBI participants did not need to have sought medical care following their TBI to be included in the study if there was evidence of the TBI being sustained—e.g. accident record.

Screening of the Accident and Compensation Corporation (ACC) database for people who experienced an injury to the upper half of their body was also conducted. This was to capture TBIs that may have been missed due to being overshadowed by other injuries and those who may not seek medical attention following injury.

Demographic and injury details were collected for all identified TBI cases based on self-report information and details of the injury in the person's medical records. The mechanism of injury was classified according to the International Classification of Diseases (ICD-10) Classification System. TBI severity was based on the Glasgow Coma Scale (score 3–8=severe, 9–12=moderate and mild=13–15) and Post-traumatic Amnesia score (7+ days=severe, 1–6 days moderate and <24 hours=mild). If there was a discrepancy between the GCS and PTA score the more severe category was assigned. As a substantial proportion of TBI cases are classified as mild, mild TBIs were sub-classified according to whether there was an increased risk of complications as proposed by Servadei et al.²⁰

After the removal of any duplicate cases, all those with a confirmed TBI were invited to participate in an assessment interview, which explored the healthcare services received and to assess participants everyday functioning. Interviews were conducted within the community, at participant's homes or at a public place where a quiet room was available such as at the university, public library or GP practice by a team of trained research assistants. An indepth description of the BIONIC study methodology has been published elsewhere.¹⁷

To explore the incidence and injury profile of TBI in Pacific people and to identify ethnic disparities, data relating to Pacific people and NZ European participants was extracted from the BIONIC dataset. People who self-identified as a Pacific person were included in the Pacific people group and those who identified as NZ European were included in the NZ European group. Other European ethnicities such as British, French or Dutch were excluded from the NZ European group to reduce variance within the comparison group.

If participants identified themselves as both NZ European and Pacific people, they were classified for the purpose of analysis as Pacific people. This approach was taken to prevent data being re-analysed across several groups if people identified as having multiple ethnicities and to enable a focus on people who self-identified as Pacific people for this analysis.

The classification of Pacific people included those who identified as Samoan, Tongan, Fijian, Niuean, Cook Islander, and Kiribati. TBI cases from other ethnic groups including Māori, Asian and Latin American were not included in this analysis due to limitations of analysing too diverse a sample of ethnicities with low numbers. Incidence rates for Māori were published as part of the main incidence paper.¹⁶

Data analysis—TBI incidence rates were calculated utilising 2006 Census data for the city of Hamilton and surrounding Waikato area as the population denominator (Statistics New Zealand, 2006). For each ethnic group the demographic, injury characteristics, risk factors and healthcare seeking following injury were described.

To identify if there were any statistically significant differences between the two ethnic groups, Fisher's exact, Chi-squared and the Mann Whitney U tests were used. Level of significance was set at 0.05. Statistical analyses were conducted using SPSS v20 software.²¹

Results

In total, 870 TBI cases met the study inclusion criteria: 76 identified as Pacific people, and 794 as NZ Europeans. Table 1 summarises the participant characteristics for the total sample and between the two ethnic groups. Males had a greater risk of injury than females for both Pacific people and NZ Europeans. There were no deaths reported in Pacific people and 5 deaths reported for NZ Europeans. Although it appeared that a greater proportion of Pacific people TBI cases were ascertained from Accident and Medical Clinics than NZ Europeans, the difference was not statistically significant.

There were no other significant differences observed between the ethnic groups in demographic or injury characteristics. Whilst there were no significant differences between the two groups for mechanism of injury, the proportion of TBIs due to motor vehicle crashes was lower among Pacific people.

Falls were the most common mechanism of injury for both Pacific people and NZ Europeans. Looking at the context within which TBIs were sustained, the highest proportion of TBIs in Pacific people were sustained during sports and recreational activities, with the majority of injuries (94.0%) classified as being of mild severity.

Table 1. Characteristics of TBI cases across the ethnic groups (*denotes P<0.05)

Variables	Pacific people N (%)	NZ European N (%)	Total N (%)	Statistical significance
Age (median, IQR)	18 (22.0)	22 (29.0)	21 (27.8)	U=35,139, P=0.01*
Gender				$\chi^2=0.01$, p=0.52
–Female	28 (36.8)	296 (37.3)	324 (37.52)	
–Male	48 (63.2)	498 (62.7)	546 (62.8)	
Case ascertainment				$\chi^2=7.55$, p=0.11
–ACC	5 (6.6)	106 (13.4)	111 (12.8)	
–Accident/Medical Clinic	14 (18.4)	95 (12.0)	109 (12.5)	
–Hospital/inpatient	50 (65.8)	484 (61.0)	534 (61.3)	
–GP	6 (7.9)	64 (8.1)	70 (8.0)	
–Other e.g. self-referral/support organisation	1 (1.3)	45 (5.7)	46 (5.3)	
TBI severity				$\chi^2=2.30$, p=0.68
–Mild low risk	12 (15.8)	152 (19.1)	164 (18.9)	
–Mild medium risk	24 (31.6)	210 (26.4)	234 (26.9)	
–Mild high risk	36 (47.4)	392 (49.4)	428 (49.2)	
–Moderate	3 (4.3)	19 (2.4)	22 (2.5)	
–Severe	1 (1.3)	21 (2.6)	22 (2.5)	
Prior TBI				$\chi^2=0.87$, p=0.65
–Yes	19 (25.0)	212 (26.7)	231 (26.6)	
–No	33 (43.4)	302 (38)	335 (38.5)	
–Unknown	24 (31.6)	280 (35.3)	304 (34.9)	
Additional injuries				$\chi^2=1.80$, p=0.41
–Yes	44 (57.9)	515 (64.9)	559 (64.3)	
–No	28 (36.8)	234 (29.5)	262 (30.1)	
–Unknown	4 (5.3)	45 (5.7)	49 (5.6)	
Intent				$\chi^2=2.62$, p=0.27
–Intentional	14 (18.4)	102 (12.9)	116 (13.3)	
–Unintentional	57 (75.0)	655 (82.5)	712 (81.8)	
–Unknown	5 (6.6)	37 (4.7)	42 (4.6)	
Mechanism of injury				$\chi^2=3.28$, p=0.51
–Assault	13 (17.1)	97 (12.2)	110 (12.6)	
–Exposure to mechanical force	18 (23.7)	178 (22.4)	196 (22.5)	
–Fall	28 (36.8)	313 (39.4)	341 (39.2)	
–Motor vehicle crash	12 (15.8)	171 (21.5)	183 (21.0)	
–Other	2 (2.6)	6 (0.8)	8 (0.9)	
–Unknown	3 (3.9)	29 (3.6)	31 (3.6)	
Context				$\chi^2=2.22$, p=0.70
–Sports and recreational	35 (46.1)	350 (44.1)	385 (44.3)	
–Occupational	3 (3.9)	46 (5.8)	49 (5.6)	
–Activities of daily living	23 (30.3)	267 (33.6)	290 (33.3)	
–Conflict situation	13 (17.1)	99 (12.5)	34 (3.9)	
–Other/Unknown	2 (2.6)	32 (4.0)	112 (12.9)	
High Alcohol Use				$\chi^2=2.34$, p=0.31
–Yes	6 (7.9)	102 (12.8)	108 (12.4)	
–No	42 (55.3)	451 (56.8)	493 (56.7)	
–Unknown	28 (36.8)	241 (30.4)	269 (30.9)	
Substance Use				$\chi^2=0.73$, p=0.70
–Yes	1 (1.3)	10 (1.3)	11 (1.3)	
–No	45 (59.2)	509 (64.1)	554 (63.7)	
–Unknown	30 (39.5)	275 (34.6)	305 (35.1)	

To account for differences in population characteristics, the incidence of TBI for Pacific people was compared to NZ census data on the Pacific population of the study region. As shown in Table 2, peaks in TBI incidence were observed for 0–4 and 15–24 year olds.

For young infants, injuries were sustained most commonly by falls (83.3%) and motor vehicle accidents (16.7%). For the 15–24 year olds the main mechanisms of injury were assaults (45.5%) and exposure to mechanical forces (27.3%), with a third of injuries sustained whilst engaged in sport or recreational activities. There was a higher incidence of TBI for Pacific people in those aged over 35 years in comparison to rates of NZ Europeans (Tables 2 and 3).

Table 2. TBI incidence rates by mid-decade age bands

Variables	Population (N)	TBI cases (N)	Incidence per 100,000 person-years (95% CI)
Pacific people			
0–4 years	915	12	1311 (678–2291)
5–14 years	1650	15	909 (509–1499)
15–24 years	1215	22	1811 (1135–2741)
25–34 years	918	11	1198 (598–2144)
35–44 years	678	7	1032 (415–2127)
>45 years	741	9	1215 (555–2306)
Total	6117	76	1242 (979–1555)
NZ Europeans			
0–4 years	5478	92	1679 (1354–2060)
5–14 years	11,712	123	1050 (873–1253)
15–24 years	14,445	222	1537(1341–1753)
25–34 years	11,844	95	802 (649–981)
35–44 years	13,581	74	545 (428–684)
>45 years	37,266	188	505 (435–582)
Total	94,326	794	842 (784–902)

Table 3 outlines the healthcare service use at the time of injury and discharge location. There were no statistically significant differences in this data between the two groups. No TBI cases in Pacific people were ascertained from community support organisations such as the brain injury associations. The majority of TBI cases for all ethnicities were discharged home following medical consultation.

Table 3. Healthcare service use following TBI

Variables	Pacific people (N=76)	NZ European (N=794)	Total (N=870)	Test of difference
Medical consultation within 24hrs				
–Yes	69 (90.8)	645 (81.2)	714 (82.1)	$\chi^2=4.35$, p=0.11
–No	6 (7.9)	133 (16.8)	139 (16.0)	
–Unknown	1 (1.3)	16 (2)	17 (2.0)	
Outcome of medical consultation (at any time following injury)				
–Discharged home	50 (65.8)	547 (68.9)	597 (68.6)	$\chi^2=7.38$, p=0.12
–Hospitalised	18 (23.7)	122 (15.4)	140 (13.1)	
–Referred	1 (1.3)	32 (4.0)	33 (3.8)	
–Patient left against advice	3 (3.9)	15 (1.9)	18 (2.1)	
–Other/unknown	4 (5.2)	78 (9.8)	82 (9.4)	
CT scan received				
Unknown	60 (78.9)	672 (84.6)	732 (84.1)	$\chi^2=1.68$, p=0.19
Yes	16 (21.1)	122 (15.4)	138 (15.9)	

* denotes P<0.05

Discussion

Pacific people have a significantly greater incidence of TBI than NZ Europeans. The incidence rates of TBI for Pacific people found in this study are higher than previous incidence rates in New Zealand.

The increased TBI incidence may reflect the intensive recruitment approaches in this study methodology which utilised hot pursuit methods¹⁷ and inclusion of people with mild TBI who did not seek medical treatment (medical treatment is a requirement for inclusion in most previous studies).^{7,22}

The increased incidence of TBI for Pacific people highlights not only the need for additional population-based studies to provide a true indication of the scale of the problem of TBI, but also confirms the findings of previous studies revealing that ethnic minority groups are at higher risk of TBI.^{3,4,7,9,22–25}

Indeed, the finding that a quarter of the Pacific people group had experienced a previous TBI highlights a need for an increased focus on TBI prevention. The findings suggest that a targeted, rather than universal approach to prevention and management addressing both the mechanism and context of injuries may be needed.

A high proportion of injuries for both Pacific people and NZ Europeans were classified as being in the mild range which is comparable with incidence data for NZ Europeans. Although classified as mild in severity, it is now clear that many people experience persistent symptoms for many years following a mild TBI.² Therefore it is important that mild injuries, including those in people who do not seek medical treatment, are included within incidence estimates, a key strength of this study.

Similar to the findings for NZ Europeans, peaks in TBI incidence in the Pacific population were observed in very young children (0–4 years) and young adults (15–24 years). Falls are common in young children as they develop their gross motor skills and balance. For young adults, the most common mechanisms of injury were different, with a third of injuries were sustained through engagement in sports and recreation activities and 46% sustained through intentional assault.

In comparison to incidence rates for NZ Europeans across the age groups, incidence rates were higher for Pacific people in adults aged over 35 years, however this finding may well be reflective of the low number of TBI cases in this age range.

Whilst the findings in Table 1 suggest that injuries may be sustained at a younger age in for Pacific people, this may reflect the younger age of the Pacific people population within the study region. Reference to peaks in incidence identified against population census data are therefore more likely to reflect the nature of injuries within the Pacific population.

Pacific males were found to be at higher risk of sustaining a TBI than females, a trend also observed in NZ Europeans and consistent with the international literature on the epidemiology of TBI¹⁶ and risk factors identified in ethnic minority groups.¹⁶

In a Fijian study based on data from a trauma registry (including hospital admissions and deaths),²⁶ similar trends in the age and gender profile of TBI for Pacific people were identified. Males were three times more likely to sustain a head injury than females and the majority of head injuries occurred between the ages of 0–24 years.

In terms of the context where TBIs were sustained, sport and recreational activities were the main activities engaged in at the time of injury among Pacific people and NZ European people. There is little research available in ethnic minorities to compare the context of injury. However, recent studies of the general population^{27,28} have revealed that 38.6% and 6.4% respectively of head injuries admitted to emergency department or hospital were sports and recreation related.

Whilst rates of injury from sport and recreational activities is toward the higher end of the range found in previous research into TBI, the levels of sports-related injuries in this current analysis albeit high, were lower than in Canada as reported by Harris et al.²⁷

It is unclear if these disparities reflect differences in the culture of the different populations studied. There are many well-known benefits to engaging in physical activity including improved physical and mental wellbeing.²⁹ These findings suggest the need for engagement with Pacific communities to develop strategies to promote safety and the prevention of head injuries within the context of sport and activities of daily living to reduce the risk of TBI.

There are inherent challenges in classifying ethnicity into groups as people frequently associate themselves with several ethnicities. Prioritising ethnicity according to the study aims is a useful strategy to facilitate comparisons, however this approach is limited as it may not necessarily reflect how people would classify themselves. In previous studies, it was often unclear as to how ethnicity was defined, for example, whether ethnicity has been self-reported or how ethnicity was prioritised.

Providing details of how ethnicity is defined will be important in future research to facilitate comparisons between studies. It is acknowledged that the low case numbers for Pacific people have resulted in high confidence intervals particularly for older adults and the findings should therefore be interpreted with caution. Additionally the low TBI case numbers for Pacific people precluded the exploration of potential risk factors through regression modelling such as the influence of socioeconomic status on TBI incidence.

It should also be acknowledged that the Pacific population of the Hamilton and Waikato regions of NZ may not be representative of the national Pacific population. However the focus on TBI in Pacific people using a population based sample has assisted in identifying who and how people are at risk of TBI to inform prevention efforts.

This study revealed that there appears to be good awareness of the need to seek medical attention following injury in Pacific people, with higher rates of seeking medical advice in comparison to NZ Europeans. However, despite the extensive case ascertainment procedures used to identify all TBI cases from a range of acute care and community based sources, it is acknowledged that there may be some cases of TBI who did not seek medical attention or who sought advice from other sources that were not captured within this study.

Whilst the difference did not reach statistical significance, it appeared there was a trend towards increased use of accident and medical clinics in comparison to NZ Europeans which suggests that Pacific people prefer to seek medical advice through such facilities.³⁰

There is consensus that people should always seek medical attention following a brain injury (however mild) due to the risk delayed symptom onset and possible secondary injury. However, there is no defined pathway as to which services should be accessed in mild TBI where the risk of complications is low (e.g. people experiencing no or few early symptoms or symptoms that resolve within hours).

There is an argument that some mild brain injuries can be managed well within the community, reducing the burden on hospital services, increasing patient choice and facilitating access to culturally specific services if preferred. However, there is currently a lack of accuracy in predicting those who will go on to experience persistent difficulties over time. The observed ethnic differences in regard to 'where' people seek medical attention following TBI could inform the development of the most 'accessible' services to specific groups and therefore effective pathways for the management of mild TBI that responds to cultural needs.

Future research needs to investigate if there are any ethnic disparities in long-term health outcome for Pacific people to ensure current services are culturally appropriate and meeting the needs of Pacific people.

Conclusion

This is the first population-based study to describe TBI in the Pacific population of New Zealand. Pacific people were found to have significantly increased incidence of TBI in comparison to NZ Europeans. TBIs for Pacific people were most commonly sustained through falls or exposure to mechanical forces, with a high proportion of injuries sustained whilst engaging in sport and recreational activities. This study highlights the need for TBI prevention programmes that engage with, and focus on the Pacific community to reduce the risk of TBI.

Competing interests: Nil.

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ORIGINAL ARTICLE

Faculty of Radiation Oncology 2014 Workforce Census: a comparison of New Zealand and Australian responses

Melissa James, Philip L Munro, John Leung

Abstract

Aim This paper outlines the key results of the Royal Australian and New Zealand College of Radiologists (RANZCR) Faculty of Radiation Oncology (FRO) 2014 workforce census, and compares the results of New Zealand and Australian responses in order to identify similarities and differences in workforce characteristics.

Methods The workforce census was conducted online in mid-2014. The census was distributed to all radiation oncologists (Fellows, life members, educational affiliates, retired) and radiation oncology trainees on the RANZCR membership database. Six weekly reminders were sent to non-respondents and all responses were aggregated for analysis. This paper addresses only consultant radiation oncologist responses.

Results The combined response rate for New Zealand radiation oncologists was 85.7% (compared with 76% from Australian respondents). The census found that the demographic characteristics of New Zealand and Australian radiation oncologists are similar. Points of difference include (i) the role of educational affiliates in New Zealand, (ii) New Zealand radiation oncologists reporting higher hours spent at work, (iii) New Zealand radiation oncologists spending a higher proportion of time on clinical duties, (iv) A lower proportion of New Zealand radiation oncologists with higher degrees, and (v) private/ public workplace mix.

Conclusion A comparison by country would suggest that there are many similarities, but also some important differences that may affect workforce issues in New Zealand. Separate datasets are useful for RANZCR to better inform members, governments and other key stakeholders in each country. Separate datasets also provide a basis for comparison with future surveys to facilitate the monitoring of trends.

Radiation oncology is an integral specialty in cancer medicine. There are not a large number of radiation oncologists in Australia and New Zealand, but the numbers have steadily increased from 138 in 1996 to around 439 in 2014.¹⁻³ The specialty is a dynamic one with oncologists facing rapid advances in cancer knowledge and also rapid changes in technology.

The Royal Australian and New Zealand College of Radiologists (RANZCR) Faculty of Radiation Oncology (FRO) has seen the performance of workforce surveys as a priority to provide information for a workforce database to monitor trends and inform workforce planning.

FRO has undertaken its fifth survey of practising radiation oncologists in 2014 with previous surveys undertaken in 1996, 2000, 2006, and 2010.¹⁻³ The 2014 Census (called a census for the first time to reflect that all members considered by RANZCR as being active were invited to participate) builds upon earlier surveys, creating a workforce database to identify key workforce parameters, analyse trends and use this information as a basis for modelling of future staffing and training requirements.

This paper is unique as previous analyses have grouped New Zealand and Australian data.¹⁻³ Therefore, it has been difficult to extract the relevant New Zealand-specific information and use it for planning and resource purposes. This is the first time data have been analysed by individual country.

Appendix 1 contains the census (view at <http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2015/vol-128-no-1412/6494/Appendix.pdf>).

Methods

The workforce census was conducted in July–September 2014. Questions were discussed and piloted by members of the FRO Economic and Workforce Committee. There were no New Zealand members of this committee at the time. Radiation oncologists, comprised of RANZCR Fellows and international medical graduates (IMGs), and trainees were identified using the RANZCR membership database.

IMGs refer to specialists who obtained their specialist qualifications outside of Australia and New Zealand, and have not yet obtained Fellowship of RANZCR (FRANZCR). IMGs working in New Zealand are required by the Medical Council of New Zealand (MCNZ) to be members of a specialist medical college and are educational affiliate members of RANZCR.

Using SurveyMonkey™, the census was emailed to participants in July 2014, with each participant being sent a unique link. Hard copies of the census were posted to those without a valid email address and those who requested a preference for such. Non-respondents received weekly email reminders for 6 weeks.

The online census closed in August and further hard copy census papers were posted to all non-respondents at this time. Hard copy census papers were individually printed with the member's unique RANZCR membership number to preclude double data entry, and were anonymised upon entry into the dataset.

Responses were analysed to highlight known and emerging workforce trends. Statistical analyses using independent samples t-tests, Chi-squared, and Mann-Whitney U tests were performed where appropriate using IBM SPSS Statistics v19 software (Armonk, NY: IBM Corp).

Results

Eligible study sample—All radiation oncologists and trainees registered with the RANZCR were invited to participate. This paper addresses results from radiation oncologists only. The completed response rate for the surveyed population (New Zealand and Australia) was 77% ($n=317$).

Forty-eight (48) responses were received from New Zealand radiation oncologists and educational affiliates from the registered 56 members giving a response rate of 85.7%. For the purpose of analysis, the term radiation oncologists to refer to members who can practice at the consultant/specialist level (i.e. Fellows, educational affiliates, and IMGs working in Australian areas of need).

Membership numbers in New Zealand are much smaller than those in Australia. The RANZCR membership database identified 47 Fellows and 9 educational affiliates (Table 1). Two retired members were identified; however, retired members were not asked questions relating to current practice.

The proportions of New Zealand members within each category in the membership database were: Fellow 84% and Educational Affiliate 16%. The proportions amongst the survey respondents were 83%, 17%, respectively. These are very similar and thus the results were not thought to be influenced by non-responder bias within any one category.

Personal and demographic data—Demographic data reported in the census is compared with the membership database in Table 1.

Table 1. Demographics of New Zealand and Australian radiation oncologists

VARIABLES	NEW ZEALAND			AUSTRALIA		
	Respondent (%)	Non-respondent	Total	Respondent (%)	Non-respondent	Total
<i>N</i>	48 (85.7)	8	56	269 (75.8)	86	355
Gender						
Male	32 (82.1)	7	39	163 (74.8)	55	218
Female	16 (94.1)	1	17	106 (77.4)	31	137
Age (years)	50.6	52.8	50.9	48.7	51.1	49.3
30–39 years	3 (75.0)	1	4	71 (76.3)	22	93
40–49 years	21 (91.3)	2	23	86 (77.5)	25	111
50–59 years	15 (88.2)	2	17	67 (79.8)	17	84
60–69 years	7 (70.0)	3	10	30 (76.9)	9	39
>70 years	1 (100.0)	–	1	13 (56.5)	10	23
Unknown	1 (100.0)	–	–	–	–	–
Member type						
Fellows (incl. Life)	40 (85.1)	7	47	268 (75.9)	85	353
Educational Affiliate/IMG	8 (88.9)	1	9	1 (50.0)	1	2
Member category						
Full time	44 (86.3)	7	51	233 (76.1)	73	306
Part time	2 (100.0)	–	2	20 (87.0)	3	23
Retired	1 (50.0)	1	2	15 (60.0)	10	25
Other (AON, Temp Inactive)	1 (100.0)	–	1	1 (100.0)	–	1

The average age of New Zealand radiation oncologists was 50.9 years (median 50.2). This was very similar to the Australian data where the mean age was 49.3 years (median 46.7). No significant statistical difference in the ages of radiation oncologists between the two workforces was found. Similarly, no significant differences were observed between the ages of respondents and non-respondents in either New Zealand or Australia.

One-third (33%) of New Zealand respondents were female, which is consistent with the membership database (30%). This is similar to the Australian data with 39% of respondents and 39% of the Australian members in the database female.

Educational affiliates/IMGs comprise 16% of the New Zealand radiation oncologist workforce, as compared with <1% of the Australian workforce.

In New Zealand, the median year of graduation from medical school for radiation oncologists was 1990 (range: 1975–1999). Five of the New Zealand respondents (10%) reported holding higher academic qualifications (excluding specialist qualifications), including masters (4) and doctorate (1). Sixty-one (61) Australian respondents (17%) reported holding higher academic qualifications. Where respondents reported holding more than one postgraduate qualification, the highest was recorded.

Work type and location—The majority of New Zealand radiation oncologists (91%) are recorded as full-time with RANZCR (defined for subscription purposes as working >0.4 full-time equivalent [FTE]), 4% part-time (≤ 0.4 FTE), and 5% retired or temporarily inactive. When asked to report their contracted FTE status, all respondents indicated they worked 0.5 FTE or more (range 0.5–1.2).

Participants were asked to report the number of hospital departments or practices they worked in, including the number of outreach clinics. Radiation oncologists in both New Zealand and Australia reported working at between 1 and 7 sites (median 2), with 71% of New Zealand respondents and 72% of Australian respondents working at one or two sites.

For each site respondents reported working at, they were asked to identify whether the site was public, private or a combination of the two. Sites were then aggregated to identify whether the respondent worked exclusively public, private or a combination of public and private.

Three-quarters of New Zealand radiation oncologists who answered this question (72%, n=31) worked exclusively in the public sector; one (2%) worked exclusively in the private sector, and the remainder working in combination public/private sites. The proportion of Australian radiation oncologists working exclusively in the public sector was lower (44%); however, there were greater proportions in exclusive private sites (16%) and mixed practice (39%).

Work hours and overtime—The census asked participants to report the contracted hours (paid hours), the actual work hours and the hours spent exclusively on clinical work.

A comparison of the New Zealand and Australian results is provided in Table 2. Data indicate that New Zealand radiation oncologists work longer hours per week than their Australian colleagues (medians 50.0 and 41.3 respectively, $P<0.01$) although their contracted hours are similar (median 40.0 for each country). New Zealand respondents also reported spending more time on clinical practice than Australian respondents (medians 40.0 and 33.0, respectively; $P<0.05$).

There were no significant differences in the reported FTE, hours worked, or clinical hours between genders in New Zealand.

Table 2. Radiation oncologists' hours of practice per week

Variables	Reported hours per week across all practices		
	New Zealand	Australia	<i>P</i> value (Mann-Whitney U)
Contracted paid hours. Median (range)	40.0 (20–48)	40.0 (8–48)	0.021**
Actual hours worked. Median (range)	50.0 (24–60)	41.3 (6–80)	0.001*
Clinical hours worked. Median (range)	40.0 (15–50)	33.0 (4–58)	0.048**
Number working >50 hours (%)	22 (51.2)	54 (23.9)	0.001*
Number working \geq 10 overtime hours (%)	13 (35.1)	47 (36.0)	0.63

*Significant at $P<0.01$; **Significant at $P<0.05$.

The breakdown of the clinical and non-clinical duties performed by respondents can be seen in Table 3. These figures show a similar breakdown of the nature of radiation oncology practice in New Zealand and Australia.

New Zealand radiation oncologists spend significantly less time in on treatment reviews ($P<0.01$) and research and trials ($P<0.01$) than their Australian colleagues; however, New Zealand radiation oncologists spend more time per case on new patient assessment (new cases) ($P<0.01$) and follow up assessments ($P<0.01$).

Table 3. Hours per week spent on clinical and non-clinical duties by radiation oncologists

Activity	New Zealand Median (range)	Australia Median (range)	P value (Mann-Whitney U)
New cases hours per week	6.0 (3–20)	6.0 (1–20)	0.680
New cases minutes per case	60 (30–90)	45 (1–90)	0.001*
Follow-ups hours per week	7.0 (2–25)	8.0 (1–30)	0.768
Follow-ups minutes per case	20 (15–30)	15 (1–30)	<0.001*
Treatment reviews hours per week	3.0 (1–15)	4.0 (1–20)	<0.001*
Treatment reviews minutes per case	10 (5–20)	10 (4–20)	0.258
Planning hours per week	7.0 (2–17)	6.0 (1–21)	0.539
Supervision of Registrars hours per week	2.0 (1–7)	3.0 (1–40)	0.218
Research and Trials hours per week	1.0 (1–2)	2.0 (1–24)	<0.001*
Department Practice Management hours per week	2.5 (1–20)	2.0 (1–40)	0.346
Academic Teaching hours per week	1.0 (1–3)	1.0 (1–8)	0.157
Jurisdiction/Quality Committees hours per week	2.0 (1–10)	2.0 (1–12)	0.479
Other hours per week	4.5 (1–16)	4.0 (1–17)	0.330

* Significant at $P < 0.01$

Other non-clinical activities reported by respondents, as noted in Table 3, included multidisciplinary team meetings, College activities, administration, external advising/committees, reading/filing patient reports/results, ward activities, continuing medical education, on calls, Director of Training responsibilities, and responding to emails.

Patterns of practice—New Zealand radiation oncologists reported seeing a median of 245 new patients per year (range 120–400). The median new patients seen by Australian radiation oncologists was 250 (20–600), indicating a similar number of new patients seen in New Zealand and Australia.

Although one-third of New Zealand radiation oncologists (34%) identified as generalist compared with 41% of Australian radiation oncologists, this difference was not statistically significant. Participants were asked whether they believed more emphasis should be placed on facilitating subspecialty practice. No significant difference was observed between New Zealand and Australia, with two-thirds of respondents in each country believing that there should be more emphasis.

Plans—Almost three-quarters of New Zealand respondents (71%, $n=29$) reported that they do not intend to change their hours of work in the next 3 years (Table 4). Of the 12 (30%) who wished to change their hours, the majority ($n=11$) intend to decrease the hours worked and one increase. This is similar to the Australian data.

In terms of retirement plans, half of the New Zealand respondents (51%, $n=21$) reported having no plans for retirement in the foreseeable future, similar to their Australian counterparts. One-third (32%; $n=14$) indicated an intention to retire in the next 10 years and 52% within 15 years. In Australia 50% ($n=14$) report an intention to retire within the next 15 years.

Table 4. Intended future plans of radiation oncologists

Variables	New Zealand (%)	Australia (%)
Change hours of work		
No change	29 (71)	158 (75)
Reduce hours	11 (27)	36 (17)
Increase hours	1 (2)	17 (8)
Retirement		
5 years	3 (7)	25 (10)
10 years	11(25)	39 (16)
15 years	9 (20)	50 (20)
Not in foreseeable future	21 (48)	116 (55)

Discussion

The analysis of data unique to New Zealand is useful as the number of New Zealand radiation oncologists is much smaller than in Australia, thus differences in the New Zealand workforce may be masked when workforce data from the two countries are analysed together. Analysis of the data separately may highlight important factors that should be considered by FRO in decision making.

Analysis of the New Zealand data also provides governments with an understanding of the demographics, workload and future plans of New Zealand radiation oncologists in order to determine the needs of the New Zealand radiation oncology workforce and to be able to plan future staffing and training needs. It allows a review of the practices of radiation oncologists in New Zealand and Australia to understand the potential differences and similarities.

This analysis presented in this paper helps FRO have a greater understanding of the workforce in New Zealand, with respect to age, gender, full time equivalence, public/private practice, utilisation of work time and retirement plans.

There are many similarities between the New Zealand and Australian radiation oncology workforces in terms of age of the respondents, gender, work practices and future plans. There are, however, some important differences.

One interesting point of difference is the role of IMGs. IMGs in Australia are unable to act in a supervisory role until they have obtained full specialist recognition (usually through completion of the Phase 2 radiation oncology examinations), whereas in New Zealand they function more as radiation oncologists.

Educational affiliates/IMGs comprise 16% of the New Zealand radiation oncologist workforce, as compared with <1% of the Australian workforce.

The radiation oncology situation is consistent with the national trend. Over the last ten years, IMGs made up 49% of all specialist registrations in New Zealand and in 2012/2013, 56% of newly registered specialists were IMGs.⁴

Another similarity in the workforce census is the proportion of female radiation oncologists. One-third (33%) of New Zealand respondents were female; a similar figure to the Australian data, with 39% of respondents female. The situation in radiation oncology matches the national statistics, with females comprising 30% of the specialist workforce in New Zealand compared with 19% in 2000.⁴

The average ages reported by New Zealand and Australian radiation oncologists are very similar. In New Zealand, this is 50.9 years. This figure is similar to the average age of all specialists within New Zealand of 50.5 years.⁴

Medical Council of New Zealand national census data indicate that women specialists tend to work fewer hours than men.⁴ This trend was not reflected in the FRO census, which found no significant differences in the reported FTE, hours worked or clinical hours between the genders in New Zealand radiation oncologists. This may be because the numbers are small and do not detect small differences in hours between the genders.

Similarities were noted when the hours spent in tasks performed by radiation oncologists in the two nations were compared. An important point to note is the low time spent on research in both New Zealand (median 1 hour per week) and Australia (median 2). This issue was noted in the 2010 survey, with radiation oncologists then desiring more time for research.³

Differences were noted in the workplace mix with more radiation oncologists in Australia working in private practice or combined public/private practice and fewer in exclusive public practice. There was only one radiation oncologist in New Zealand in exclusive private practice. This would reflect the developing private practice model in New Zealand compared with the more established private practice setting in Australia. Reasons for the lower numbers of private practices in New Zealand may be due to the large capital costs involved in setting up a private practice and developing radiation oncology cover by the private health insurance companies.

Data indicate that New Zealand radiation oncologists report working longer hours per week than their Australian colleagues (medians 50.0 and 41.3 respectively, $P < 0.01$) although their contracted hours are similar (median 40.0 for each country). New Zealand respondents also report spending more time on clinical practice than the Australian respondents (medians 40.0 and 33.0, respectively, $P < 0.05$). This trend was also noted in the previous census analysis. Retrospective analysis of the 2010 data indicated there was a median difference of an additional 5 hours per week between New Zealand radiation oncologists and their Australian counterparts, with 12% more radiation oncologists in New Zealand reporting working between 50–63 hours per week and 10% more in New Zealand reporting working over 10 overtime hours per week.

Despite the difference in working hours between the countries, the numbers of new patients seen by radiation oncologists in New Zealand and Australia in the 2010 and the 2014 census are remarkably similar, with medians of 250 and 260 respectively in 2010 and 245 and 250 in 2014. The increased time spent on new patient assessments may partially explain the increased hours worked by New Zealand radiation oncologists. It is difficult to completely explain this difference, however. There may be differences between the nations with regards to infrastructure, such as administrative and resident doctor support which were not assessed by the census.

Similarities are also seen in the numbers of radiation oncologists in New Zealand planning to decrease their hours of practice in the next three years, and intending to retire within the next 15 years. In New Zealand, one half of the workforce intends to retire within 15 years. This is coupled with the fact that 27% of the respondents to the question reported they wished to decrease their hours.

The potential for up to half of the workforce to retire within 15 years may result in a shortage of radiation oncologists in New Zealand. This may be exacerbated by a tendency for New Zealand graduates to often seek work offshore and compounded by potential difficulties with recruiting to positions in the smaller New Zealand centres. New Zealand Ministry of health figures describe New Zealand producing four radiation oncology consultants per year with on average one graduate migrating per year, often to Australia.⁶

Recently, the Association of Salaried Medical Specialists published a paper on the medical specialist workforce, which included radiation oncology on the long-term skills shortage list, highlighting the fact that radiation oncologist numbers were well below those estimated by the Ministry of Health to be required for New Zealand.

This paper also highlighted the fact that 21% of the specialist workforce in New Zealand was aged 55 and over⁵—consistent with the data from the 2014 census, which found the mean and median ages of radiation oncologists to be close to 50 years and one-third (36%) of respondents aged 55 years or older.

The FRO workforce census used a self-reported method to collect data. Limitations of this method could be that some responders may have exaggerated responses, whilst others may have under reported. There is also the possibility of non-responder bias affecting the results. Some respondents may have inaccurately recorded information. There is also social desirability bias where respondents answer questions in a manner that will be viewed favourably by others; however, the use of statistical analyses with the use of means and medians may overcome some of these problems. The response rate from New Zealand was high at 86% and comparable to the entire census response (including radiation oncologists, retired and trainees) at 77%.

The solid response rates and similarities of characteristics between the responding sample and the population lend credence to the results presented.

The survey data indicates many similarities in the workforce between New Zealand and Australia but also highlight some potential differences that should be monitored and trends assessed to inform workforce planning decisions and future RANZCR activities.

Competing interests: Nil.

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ORIGINAL ARTICLE

Students' contribution to the New Zealand Medical Journal: a 14-year review

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Abstract

Aims Little is known about students' contribution to mainstream New Zealand (NZ) medical literature. This study aimed to analyse the pattern of students' contributions to the New Zealand Medical Journal (NZMJ).

Methods A retrospective review of all articles authored or co-authored by students, and published in the NZMJ from November 1999 to December 2013. Author and article related information were collected and analysed.

Results There were 288 issues and 4205 articles published between November 1999 and December 2013. Students authored or co-authored 376 (8.9%) articles during this time period. There is an increased trend in the number of articles published during the study period in that students published three times more in 2013 when compared to 2000. Senior medical students and postgraduate students contributed the most with 41.2% and 40.3% of the total student publications respectively. Original articles constituted the most common type of students' publications (67.6%).

Conclusion Students contributed substantially to mainstream published NZ medical literature. Students' contribution continues to increase and this reflects the increased participation in research activities. Academic institutions should harness this potential and encourage students to publish their research findings.

Students have made substantial intellectual contributions to the medical literature.¹ Furthermore, students have been instrumental in major medical advances such as the discovery of insulin, heparin and the sinoatrial node of the heart.² Such discoveries are constant reminders that students, regardless of their level of study, have the potential to significantly contribute to the medical knowledge. Institutions strive to support and guide student research efforts. Many universities incorporate research components in their courses in order to equip students with essential tools to conduct scientific research.^{3,4}

Publishing scientific articles is part of any knowledge communication and dissemination of research. The number of peer-reviewed scientific publications are used as a proxy measure of the quality and quantity of research activities in many research-based funding programs.³ New Zealand (NZ) medical schools encourage student-led medical research and provide specific programs that combine research with clinical training such as Bachelor of Medical Sciences (Honours), summer studentships, and in some cases doctorate level degrees. In addition, many professional medical colleges require candidates to have conducted scientific research and bonus points are allocated for publications.

Internationally, there has been an increased recognition of a need to provide students of health sciences background with a medium to share their scientific work in mainstream medical journals.⁵ For this reason, several journals have introduced student sections such as the *British Medical Journal (BMJ)* which has launched a student-specific journal known as *Journal of Postgraduate Medicine*.⁶ Furthermore, other journals were specifically conceived to act as a platform for students to publish their research work and ideas, and include *Student British Medical Journal*, *Australian Medical Student Journal*, and *New Zealand Medical Student Journal (NZMSJ)*. The NZMSJ is a biannual student-led journal that publishes student academic writings. There are 18 issues published so far.⁷

There is little known about the extent of students' contribution to mainstream medical literature in NZ. Therefore, this study aimed to assess the pattern of students' contribution to the NZ medical literature

by examining articles published in the *New Zealand Medical Journal (NZMJ)*. The *NZMJ* is a peer-reviewed medical forum for scientific publication. It is the official journal of the New Zealand Medical Association, and is indexed in PubMed. It publishes 20 issues annually with a focus on New Zealand healthcare.⁸

Methods

This study was a retrospective review of all articles published in the *NZMJ* from November 1999 to December 2013. The issue of 12 November 1999 (Volume 112, Issue 1099) is the oldest archived issue available online on the *NZMJ* website.⁸ A total of 288 issues are available online from November 1999 (Volume 112, Issue 1099) to December 2013 (Volume 126, Issue 1387), and were reviewed in this study. The tables of contents and author information/affiliations sections of each issue were assessed to identify possible students among authors. Articles with student contributors were assessed and several variables collected.

This included article-related information such as year, month, issue and type of publication. Further data pertaining to student authors such as reported level of university study, order of authorship and institutional affiliation were also collected. The data was entered into a pre-designed Statistical Package for Social Sciences (SPSS) datasheet. The results are presented in a descriptive format (frequencies and percentages) and calculated for all variables collected. All statistical analyses were performed using the Statistical Package for Social Sciences software (version 19, release 19.0.0, copyright SPSS Inc. 1989–2010).

Results

From November 1999 to December 2013, 288 issues of the *NZMJ* were published containing 4205 articles (which include editorials, letters, clinical correspondence [medical images, case reports] as well as reviews, viewpoints, and original articles; see Table 2) of which 376 articles (8.9%) featured a student among the authors.

Table 1 below shows the characteristics of articles reviewed. Medical students in their early years of training (second- and third-year students) featured in 27.7% of published articles. Furthermore, clinical medical students contributed 41.2% of total student articles. Postgraduate students contributed a similar proportion to those of clinical medical students (40.3%). Other undergraduate health sciences students featured in 7 articles only.

Of all the 376 articles, students were the first author in 65.2%, and New Zealand-based students contributed around 90% of articles (Table 1).

Table 1. Characteristics of students' contribution in the *NZMJ* between Nov 1999 and Dec 2013

Variables	Characteristics	N (%)
Stage of study	Preclinical medical course (second and third year medical students)	104 (27.7)
	Clinical medical course (fourth, fifth and trainee intern year medical students)	151 (40.2)
	Other undergraduate health sciences professional and restricted-entry programmes (for e.g.: medical laboratory science, physiotherapy, pharmacy, and dentistry, dental technology etc)	7 (1.9)
	Postgraduate programme (for e.g. masters, PhDs and other postgraduate degrees)	114 (30.3)
Order of authorship	First author	245 (65.2)
	Co-author	128 (34.8)
Institutional affiliation	NZ-based institution	338 (89.9)
	Overseas-based institution	38 (10.1)

Table 2. Type of publication contributed by students in the *NZMJ* from Nov 1999 to Dec 2013

Type of publication	N (%)
Original article	254 (67.6)
Review	8 (2.1)
Clinical correspondence*	25 (6.6)
Letter	46 (12.2)
Viewpoint	30 (8.0)
Case note/Case report	5 (1.3)
Medical image	1 (0.3)
Editorial	7 (1.9)
Total	376

*This section includes medical images and case reports; before the introduction of this section (in the late 2000s) medical images and case reports were in separate sections “Medical images” and “Case reports”.

As outlined in Table 2, original articles constituted the main form (67.6%) of student publication in the *NZMJ* in the last 14 years. Letters are the second most common form (12.2%) followed by viewpoint articles (8.0%).

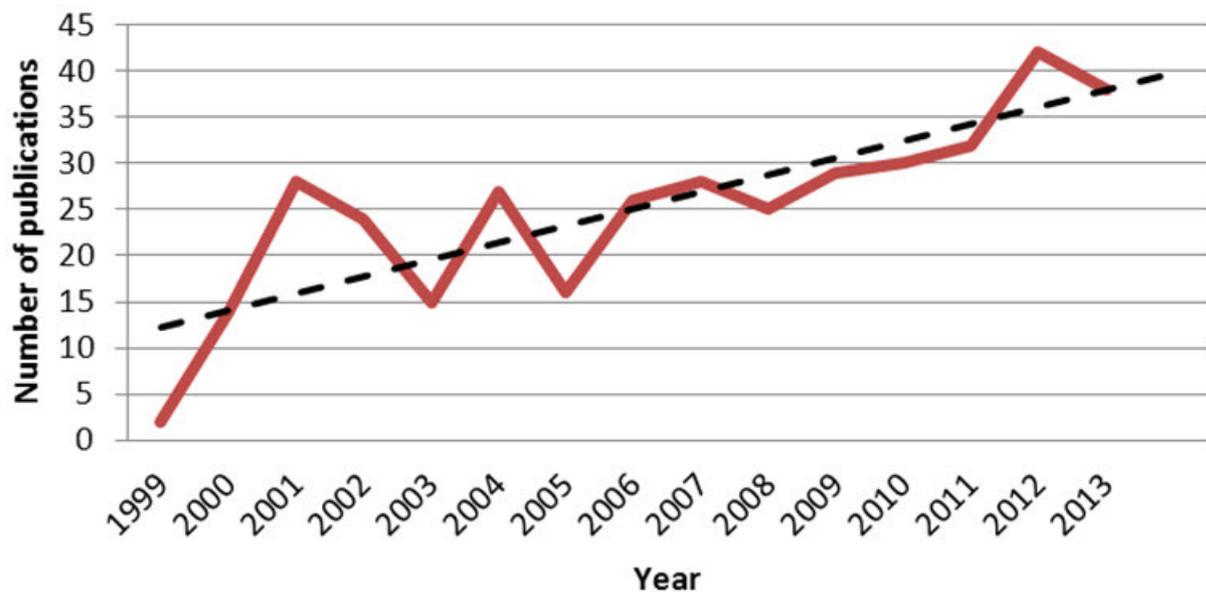
Figure 1. The number of students' publications in the *NZMJ* each year (1999–2013)

Figure 1 shows the trend of students' publications in the *NZMJ* between 1999 and 2013. There is a gradual increase in the number of student-authored or co-authored articles during the study period. The highest number of student publications was in 2012 (42 publications).

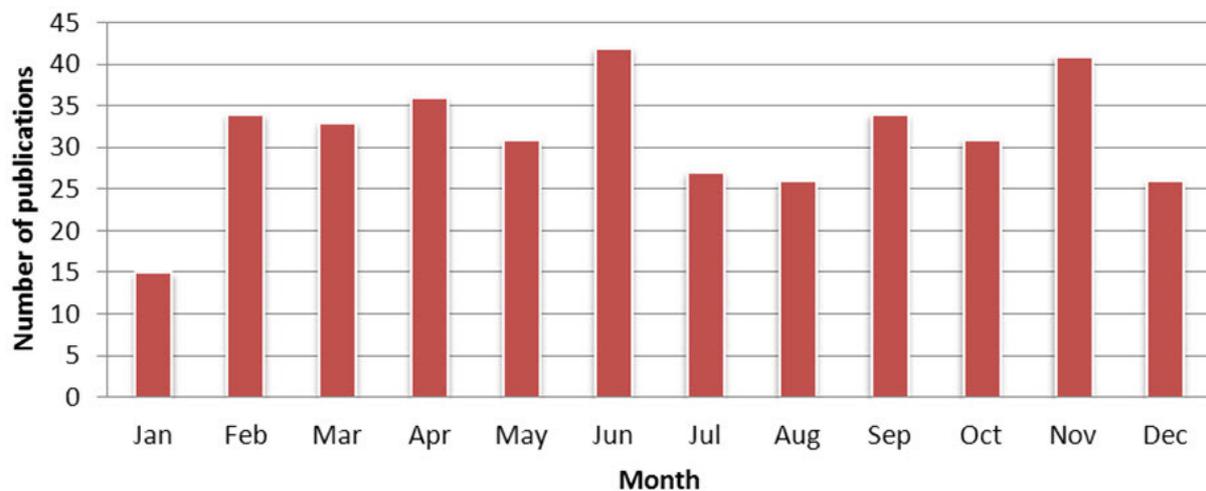
Figure 2. Numbers of students' publications published by month of *NZMJ* edition (1999–2013)

Figure 2 depicts students' publications in the *NZMJ* during the months of the year for the study period (1999–2013). Students' publications—on average—featured significantly more in the June and November issues than other issues during the year (P value < 0.05).

Discussion

This study attempted to estimate students' contribution to scientific publications in the *NZMJ* in the last 14 years. Students have contributed to a significant 8.9% of the total publications in different types during the study period. The trend of publications continues to increase annually. In 2013, the number of students' publications was three times that of 2000. This increasing trend could reflect students' interest in medical research and its value in the overall learning experience. Moreover, it could also indicate an increased emphasis by academic institutions in encouraging students to be more involved in research in order to develop sound understanding of critical thinking skills.

A survey from Auckland University estimated that 25% of medical students have had exposure to medical research mainly in the form of summer studentship (70%). Our study found that June and November issues have higher student contribution than other issues. This could reflect the academic year timing in that research conducted during summer and first semester of the academic year gets published at the end of the first semester (June) and research conducted during second semester gets published in November. However, it is difficult to assess the monthly variation without controlling for submission and acceptance rates of the *NZMJ* during such months.

The results of our review are similar to those from other countries. A cross-sectional survey of 515 British medical students reported that 149 articles produced by 72 students were submitted to scientific journals and meetings.⁹ The main motivation for publication being “career progression”.⁹ Another study from the Netherlands reviewed the output of six medical schools and found that 14.7% of their 2793 graduates in years 2006 and 2007 have published at least one scientific article in an indexed journal.¹⁰

A similar study from Germany conducted by Cursiefen and Althubas found that at least 28% of their total academic institution's publications featured a student as an author or a co-author.¹¹ Furthermore, Salmi and colleagues reviewed the publications of final-year students from 36 French medical

universities found that 17% of final-year research projects conducted by students resulted in a PubMed indexed journal publication.¹²

Moreover, a study from a Peruvian medical school found 17.6% of their university publications were contributed by students.¹³ Therefore, such studies clearly demonstrate that students are capable of conducting publishable research and there is an increased emphasis in students' participation in research. Nevertheless, the quality of published students' research has not been investigated.

There are several strengths to our study. To our knowledge, this is the first study that attempted to estimate the contribution of students in mainstream medical literature in NZ. Furthermore, the number of issues included are inclusive of a large volume of current literature. However, there are potential limitations to this study.

Firstly, this study included only one main journal. There are a few other journals, such as *Journal of Primary Health Care* in which students could have published and were not captured in this study. Another limitation is that it is possible that students who conduct significant research in their final years of study but publish after graduation are not identified as student authors because they would have different job description or title. Therefore, the results in this study might be an underestimate of student-authored or co-authored publications. Unfortunately, this study was not able to control for the number of enrolled students over the study period as a factor for the observed increase in annual students publication.

There is a multitude of published literature about methods of enhancing research and scientific writing among medical students. Mabvuure¹⁴ and McLean et al¹⁵ reported 12 essential tips for medical educators to consider in order to promote academic writing and research among medical students. Therefore, it will be useful to incorporate such suggestions into the current research models of medical curriculum in New Zealand. Such frameworks will equip medical students with important skills required in many professional careers.

Finally, it might be an incentive to students if the *NZMJ* dictates a section in which student-led research is published. This will highlight the value and contribution of student-led research in the medical literature in New Zealand.

Conclusions

This paper presents, to our knowledge, the first attempt to estimate the contribution of students to a mainstream medical journal in New Zealand, the *NZMJ*. Clearly, students are capable and have the potential to publish quality research. Further measures to harness and encourage such potential are required. Future research to better assess students' contribution to the medical literature is imperative.

Competing interests: Nil.

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ORIGINAL ARTICLE

When can I go home? A prospective case control study to improve communication with patients regarding their diagnosis, treatment plan and likely discharge date

David Murphy, Rebecca Crowley, Anthony Spencer, Mark Birch

Abstract

Aim This study aimed to improve our ability to communicate with patients with regard to four key issues. Their diagnosis, treatment plan, clinical criteria for discharge and estimated discharge date.

Methods This was a prospective case control study. It involved 200 general medical patients admitted to Christchurch Public Hospital. Each day there were two general medical admitting teams. One team formed the control group and the other team the intervention group. The 100 patients in the control group had their consultant ward round as normal. The 100 patients in the intervention group had a consultant ward round and were provided with additional written information answering the following four points: (1) their diagnosis (2) management plan for the day (3) clinical criteria for discharge and (4) estimated date of discharge. This was a laminated sheet that remained attached to their bedside locker. At four or more hours after the ward round every new patient would undergo a questionnaire based interview addressing their ability to correctly answer the points listed above. A comparison was then made between the intervention and control groups. A subgroup (n=30) were selected to obtain feedback on the initiative.

Results 90% of respondents from the intervention group knew their diagnosis versus 59% of the control group ($p<0.01$). 76% knew their treatment plan for the day versus 41% ($p<0.01$). 76% knew some of the clinical criteria for safe discharge versus 25% ($p<0.01$) and 83% of the intervention group knew their estimated discharge date versus 52% of the control group ($p<0.01$). The median age of the patients in the intervention group was 78 years of age and 74 for the control group ($p>0.05$). Of those that gave feedback 70% believed the intervention was helpful in helping them understand their diagnosis and 70% believed knowing their likely discharge date was useful.

Conclusion The use of a card with written information for the patient regarding their diagnosis, treatment plan, clinical criteria for safe discharge and estimated discharge date at the bedside helped improve the patients understanding of their care and aided effective communication.

Consumers of our health service have a number of rights under the Code of Health and Disability Services.¹ Two of which have particular relevance to this paper. Patients have a fundamental right to understand their working diagnosis. They are equally entitled to information regarding a proposed management plan and all investigative techniques required.

For a variety of reasons however our patients understanding of these issues remains poor. For example Horwitz et al² enrolled 395 patients of which only 59.6% were able to describe their diagnosis at the time of discharge. Amgad et al³ found 41.9% of their patients were able to accurately describe their diagnosis with a smaller study number.

Coleman et al⁴ undertook a randomised controlled trial into the usefulness of providing dedicated information to patients on discharge regarding their diagnosis, medications and follow up. They found a statistically significant difference in readmission rates at 30, 90 and 180 days post discharge. Discharge from hospital therefore should be a planned event with clear lines of communication between doctor and patient. Horwitz et al² reported 30% of inpatients in their study receiving less than 1 day's notice of their impending discharge.

Clearly improved communication has a role to play. There is a large body of research that has looked at methodology designed to improve doctor patient communication skills.

Patients in hospital often experience many hours of inactivity. Meanwhile there are severe time constraints on the medical staff. District Health Boards must find a solution to engage the patient and improve their understanding through written communication tools as an adjunct to the pre-existing verbal communication. Greysen et al⁵ embraced this concept recently with a pilot study into the use of tablet computers to engage patients in their care through access to their health record as well as a safety video about the hospital.

Given the importance of inpatient communication, how do we improve our strategy? We focused on four important questions regarding patients care and implemented a tool to try and improve the patients understanding of them. It is the patient's right to know the answer to these but also understanding them may have a role in reducing readmission rates.

Methods

This was a prospective case control study carried out in the General Medicine Department at Christchurch Public Hospital.

The department has a total of 12 general medical teams. Each team consists of a consultant physician, a registrar, a house officer and a trainee intern. Each day there are two admitting medical teams. As patients present to hospital during any 24 hour period they are assigned alternately to each team. On average each team has between 14 and 22 patients to see on the consultant ward round the following day.

One admitting team formed the control group of the study whilst the other formed the intervention group of the study. Both the control and intervention groups were therefore similar in terms of patient numbers and staffing. The intervention groups were led by nominated consultants and so there was no cross over between the control and the intervention group.

The intervention tool took the form of a laminated sheet with four key points explained for the patient. (1) Their diagnosis/diagnoses, (2) treatment plan, (3) the clinical criteria for safe discharge and (4) their estimated discharge date. These four points were generated from internal departmental agreement with significant insight from Dr Sturgess. For both teams the post-acute consultant led ward round continued as normal. For the patients in the intervention group, a completed laminated information sheet, following the clinical encounter, was provided. Details were completed by the medical team on the round and placed at the patient's bedside. Those patients under the care of the control group would have the normal clinical encounter without any intervention.

Following the ward round, the first and second authors conducted an interview with all patients under the care of both the intervention and control groups respectively of the study. The interviewing physicians were independent of the two teams. Verbal informed consent was obtained prior to the interview. These commenced at approximately 1200 each day and started with the patients who had been seen first on the post-acute ward round at approximately 0800 that morning.

Only patients who had been admitted to the ward were included. Each patient had their clinical records assessed for any evidence of an exclusion criterion. This included delirium, cognitive impairment, communication difficulties, visual impairment, inability to read or a clinical state that would have made a research based interview inappropriate. These patients were omitted from the study.

Each patient was asked to answer each question based on a questionnaire (Figure 1). Their responses were then compared to the information on the laminated sheet (intervention group) or in the patients' medical notes (control group).

The number of correct answers for both the control group and intervention group were then compared using chi square testing. P-value less than 0.05 was considered statistically significant. The analysis was carried out using SPSS v17 software.

Figure 1. Questionnaire assessing patient level of understanding

<p>Ward Questionnaire</p> <p>Do you know what is wrong with you? (Do you know your diagnosis?)</p> <p>What is your treatment plan today/tomorrow?</p> <p>What do you have to achieve to get home?</p> <p>When are you going home?</p>
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Figure 2. Post discharge questionnaire

<p>Follow up Questionnaire</p> <p>1. Do you remember a piece of paper/laminated sheet beside your bed about your diagnosis and hospital stay?</p> <p>2. Did it help you to understand what was wrong with you and what had to happen to get you better and home?</p> <p>3. Did being told when you were likely to go home help? If so, how did it help?</p> <p>4. What else could we have added or done that you think would have helped with your understanding of what was wrong with you ?</p>
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The final aspect of the study was to obtain feedback from patients regarding the intervention tool. This was done via subset analysis. The first day of the study 30 patients were enrolled in the intervention group. A follow up phone call was placed to these patients (3 were not contactable) within 24 hours of their discharge. They were asked the questions based on a second questionnaire (Figure 2).

Results

The study included 200 patients (100 in the control group and 100 in the intervention group). 53% were female. Median age was 76 years and the most common diagnosis was pneumonia. Median length of inpatient stay at the time of interview was 1 day.

The control group consisted of 47% female patients. This compares to the intervention group where 58% were female. The median inpatient length of stay for both groups was 1 day with a range of 0-14 for the control group and 0-10 for the intervention group. The most common diagnosis for both groups was pneumonia. The median age for the control group was 74 years of age (17-94) younger in comparison to the intervention arm of 78 years of age (31-97). This age difference was not found to be statistically significant.

Of the 100 patients in the control group 59% knew their diagnosis, 41% knew their management plan for the day, 25% knew the clinical criteria for their safe discharge and 52% knew their estimated discharge date. This compared to the intervention group where 90% knew their diagnosis 76% understood the management plan, 76% knew the obstacles for their safe discharge and 83% knew their likely discharge date. This is approximately a 30% improvement in all areas targeted by the

intervention tool. Indeed there was a statistical difference noted between both groups of the study with a comparative table given below (Table 1) with p-values included.

Table 1. Comparative table of both patient groups

Question	Correct (%) intervention group	Correct (%) control group	P value
Do you know what is wrong with you?	90	59	<0.01
Whats your treatment plan for today/tomorrow?	76	41	<0.01
What do you have to achieve to get home?	76	25	<0.01
When are you going home?	83	52	<0.01

The admitting teams changed every day which meant that both the control group and the intervention group of the study had a different consultant and different team members daily. Given that some teams may have possessed more effective communication skills or had more time with their patients, the data has been presented for all the different teams combined.

Patient feedback—The final aspect of the study was to ascertain if the patients found the tool useful and for any feedback/suggestions that they felt would be helpful. This was accomplished as discussed above through a follow up phone call 24 hours post discharge from the hospital and the use of a further questionnaire (Figure 2). The results are enclosed below in Table 2.

Table 2. Patient feedback to inteventional tool used

Question	Percentage positive responses (n)
Do you remember a white piece of paper beside your bed about your hospital stay?	93(25)
Did it help you understand what was wrong with you and what had to happen to get you better and home?	70 (19)
Did being told when you were likely to go home help?	70 (19)

Interestingly 2 patients did not remember the intervention tool by their bedside so one could assume this was not useful for them which would make the other questions suitable for only 25 patients. Of those that remembered the laminated sheet, 76% found it useful. “The ability to plan” was the most frequently quoted reason why the potential discharge date was helpful. Other responses included “the psychological impact” and “having something to aim for.” Only 1 patient suggested an addition to the information sheet. They suggested adding the times at which doctors rounds would occur during the morning.

Some if not all of the issues featured on the laminated card are addressed commonly by patients and their family. Feedback from the nursing staff indicated that the intervention tool was useful for providing family members with accurate information when the doctors were not there. The current format may provide an ideal mechanism to both improve patient knowledge and autonomy and also to ease pressure on nursing and medical staff to provide updates to multiple family members.

Discussion

This paper had a number of limitations. It did not take into account the added resource required to fill in an explain the intervention tool. If it was time consuming or a hindrance this may impact on its usefulness going forward and further research may be indicated here.

The control teams were not blinded to the study, as the intervention tool was clearly visible on the ward, however they were not given any instructions to specifically address each of the components of the intervention e.g. to tell the patient their diagnosis, plan for the day, clinical criteria for discharge and estimated discharge date during their normal clinical encounter. Had this been the case and the intervention tool retained its statistical difference then the case for the tool would have been stronger. However we felt that we wanted to compare the intervention tool with current practise.

It could be that the extra time spent by the intervention group explaining the content and process of the intervention tool had a significant affect in improving the patients understanding of their diagnosis and plan, rather than simply the tool itself. For this to be excluded as an effect one would need to measure how much time was spent explaining the diagnoses and plan with each group of patients. In this study patients who were confused for any reason were excluded due to the difficulty in obtaining information for comparative purposes. Clearly if the intervention tool was to be implemented throughout the hospital then these patients would also receive a copy. These are the patients for whom written information may have the greatest benefit in providing a reminder for the patient and as a useful piece of information for the family and next of kin. This could be studied seperately.

This paper did not address whether the intervenion tool had any effect on patient length of stay, failed discharges or readmission rates. This too couldbe studied seperately.

The intervention tool was well received with positive feedback from the follow up calls. The lack of additional suggestions from these calls supports the current content of the information sheet. With this in mind the fundamental pieces of information that patients are requesting are small in number and relatively straight forward to answer. Indeed most should be formulated normally during each patient encounter with the obstacle being simply the effective communication of this information to the patients. Many factors make this interaction difficult and are not all due to poor physician communication skills. People require time to assimilate information. Given the relative complexity of medical matters and the short interaction with a medical team on rounds, the information sheet seems an appropriate inclusion at the bedside, referenced to as needed throughout the day by both patient and family.

The introduction of the information sheet clearly helped to improve our patients knowledge across the issues targeted by the intervention tool with a 30% improvement across each issue and a statistical difference between the intervention and the control group. The 59% of people knowing their diagnosis in the control group is consistent with the figure found by Horwitz et al³ which is reassuring from a methods point of view but overall unsettling from the patients perspective.

The intervention tool has now been expanded to all teams in the general medical department in an effort to improve communication with our patients. It will be the subject of further study to try and determine its generalisability to other departments.

Competing interests: Nil.

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CASE REPORT

Hyoid bone fracture: an unrecognised complication of intubation or transoesophageal echocardiogram?

Hwa Ian Ong, Nikola Lilic, Nicholas J M Agar

Abstract

A 55-year-old man sustained a compound hyoid fracture in the perioperative period surrounding coronary artery bypass surgery. The two most likely mechanisms of injury were external laryngeal pressure sustained either during transoesophageal echocardiogram (TOE) or intubation. He was managed operatively and made an uneventful recovery. The procedure that led to the hyoid fracture was not determined. Of note, this has not been previously described as a complication of either procedure.

The hyoid is a horseshoe-shaped bone, consisting of a central body and a greater and lesser horn on each side. Functionally the hyoid provides a movable base for the tongue, attachment points for the middle portion of the pharynx and maintains patency of the pharynx, required during swallowing and respiration.¹

The hyoid bone lies in the anterior neck at the level of the C3 vertebra inferior to the protruding mandible bone, superior to thyroid cartilage, and anterior to the cervical spine. These structures protect the hyoid from a direct-impact injury.^{1,2} The hyoid is suspended by the stylohyoid ligaments as well as muscles attaching to the mandible, styloid processes, thyroid cartilage, manubrium and scapulae.¹

Injuries to the hyoid bone are uncommon and are reported to require a significant amount of, usually direct, force. Hyoid injuries are therefore reported more frequently in forensic investigations; and typical mechanisms of injury include manual strangulation, hanging, assault, road traffic accidents, athletic injuries and falls.^{1,6}

Case report

A 55-year-old man was referred to the Otolaryngology Head and Neck Surgery (ORLHNS) Service 14 days following a coronary artery bypass graft with a persistent cough, hoarse voice and odynophagia.

His preoperative comorbidities included ischaemic heart disease, paroxysmal atrial fibrillation for which he was anticoagulated on warfarin, hyperventilation syndrome and unconfirmed obstructive sleep apnoea. Incidentally he had suffered a fall 3 months prior to his operation, sustaining three broken ribs. There was no trauma to the neck during this incident. He weighed 75 kg and had a BMI of 24 kg/m².

Intubation for his coronary artery bypass graft was performed by an experienced consultant anaesthetist. It was achieved using a MAC 3 bladed laryngoscope, and a Cormack-Lehane grade 2 view was described, with no immediate complications following intubation. During the surgery the transoesophageal echocardiogram (TOE) probe was passed to monitor cardiac function. This was achieved with no technical difficulty, and no blood was noted on the probe on removal.

Postoperatively he had a prolonged period of intubation and was monitored in an intensive care unit for 3 days. Day 1 postoperatively he had a repeat TOE to investigate for potential postoperative bleeding because of persistent hypotension. This was technically routine, once again with no blood noted on probe.

He was extubated on day 3, which is longer than usual, secondary to persistent hypotension. He was subsequently noted to be coughing up copious greenish-brown sputum and treated for a presumed aspiration pneumonia. During this period, he had been off sedation for 24 hours prior to extubation. On review by a speech language therapist he was found to be aspirating thin fluids. He was diagnosed with aspiration pneumonia and resumed treatment with intravenous antibiotics.

The patient had ongoing hoarseness, a persistent cough, and odynophagia that was worse with solids. A repeat speech and language therapy review was sought. A fiberoptic endoscopic evaluation of swallowing was performed that raised a question of ulceration at the right pyriform fossa and this prompted assessment by the ORLHNS Service.

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2015/vol-128-no-1412/6498>

On examination, the patient was tender over the area of his left thyroid cartilage, with restricted left neck rotation secondary to pain. No neck swelling or masses were noted, and he had been afebrile for more than 24 hours prior to review. On flexible nasal endoscopy the greater cornu of his hyoid bone was protruding through a mucosal laceration in the left pyriform fossa, with associated oedema and exudate. This was exquisitely tender to endoscopic palpation.

A computed tomography of his neck was requested, showing an undisplaced hyoid fracture. His symptoms had not improved with conservative measures (antibiotics and a fluid only diet) therefore we elected for operative management.

Intraoperatively, a mucosal laceration was seen on the left lateral wall of his hypopharynx with surrounding granulation tissue. An additional laceration was present on the posterior hypopharyngeal wall presumably due to repetitive trauma from the intraluminal bone. The greater cornu was grasped and pulled into the lumen of the hypopharynx and debrided using endoscopic shears until no further bony prominence was palpable.

The mucosa was left to heal by secondary intention. Postoperatively he had an uncomplicated recovery with resolution of his symptoms. When reviewed in the outpatient setting 2 weeks later, he presented with a normal voice, was tolerating a full diet and had no residual morbidity from the injury.

Figure 1. Intraoperative photo showing the greater horn of the hyoid bone exposed within the pharynx



Figure 2. Axial CT showing the undisplaced left hyoid fracture

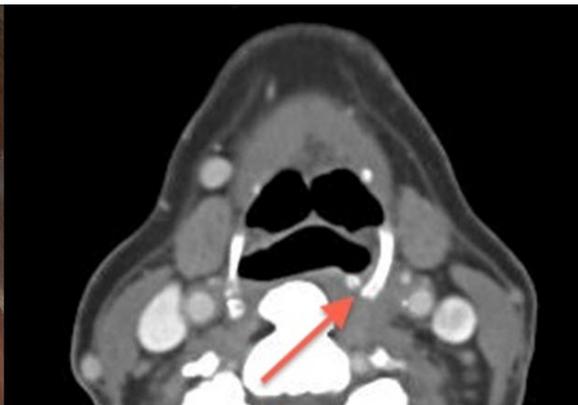


Figure 3. Photo showing the portion of greater horn of the hyoid bone that was debrided intraoperatively



Discussion

Traumatic fractures of the hyoid bone are a rare entity, with potentially life threatening complications and are often missed without a high index of suspicion. Common presenting symptoms are dysphagia, change in voice and stiffness secondary to pain. Most frequent presenting signs include anterior neck tenderness and swelling. Diagnosis is typically made using clinical findings along with a radiograph, CT scan, direct laryngoscopy, flexible nasal endoscopy or surgical inspection.

Conservative management with ice and analgesia is preferred when there is no evidence of perforation. A liquid diet can also be instituted until dysphagia subsides, or a feeding tube inserted.²

Symptomatic hyoid fractures associated with pharyngeal lacerations may require surgical repair or partial hyoid excision, as was the case with our patient.² With any respiratory compromise, there should be rapid intervention to secure the airway, either with endotracheal intubation or surgical tracheostomy.² At the time of writing, there are no randomised controlled trials regarding treatment of hyoid fractures.³

Mechanisms of hyoid injury have been most commonly reported and examined in the forensic literature.⁶ Studies have shown that the force required for fracture in the setting of manual strangulation is approximately 3.11kg. This is very much within an individual man or woman's one-handed grip strength.¹ Most commonly, the areas of the hyoid fractured during laboratory testing were between the body and the greater horn (48%), and the greater horn itself (49%).¹ This was in keeping with our case, where the greater horn was fractured, as shown in Image 3 above.

Other mechanisms reported include blunt force trauma secondary to sporting injuries, road traffic accidents, and falls.² Thus, injuries are usually preceded by notable events, usually obtained via history prior to physical examination; and are accompanied by other associated injuries such as fractures to facial and/or cervical bones. There has been a case report of hyoid fracture from hyperextension injury in the context of whiplash from a car accident, with no other associated injuries.³

In the case presented here, the mechanism of hyoid fracture was not able to be determined. The timing of symptoms however, point to an injury occurring perioperatively.

A known, although uncommon risk of direct laryngoscopy is pharyngeal laceration. During the intubation process, hyperextension of the neck, jaw thrust and cricoid pressure are common techniques used to improve visualisation. A possible explanation is that weakness in the wall caused by laceration, combined with hyperextension and pressure on the neck during intubation could be sufficient to cause fracture and subsequent protrusion of the hyoid bone into the hypopharynx, as seen on flexible nasal endoscopy.

An alternative explanation is that this could have happened during TOE. In total he underwent TOE on two occasions—once intraoperatively and once postoperatively. A rare complication arising from TOE is pharyngeal laceration and/or perforation.⁴

A common technique to increase the ease of scope insertion is the chin lift, where the mandible is manipulated with one hand in order to lift the tongue base forward. Grasping the larynx to distract it anteriorly and open the post cricoid region is a technique also described, and perhaps of all the manoeuvres this one would pose the greatest chance of hyoid bone fracture.⁵ As we have noted previously, the grip strength of a single person is sufficient to cause injury to the hyoid, and repeated handling of the neck may have been the cause for hyoid fracture in this case. However, we were unable to ascertain if this technique was used during our patient's procedure.

Hyoid fractures are rare, and not currently a recognised complication of either laryngoscopy, intubation, or TOE. Clinicians need to be mindful of the amount of force exerted on a patient's laryngeal skeleton during such procedures. Furthermore, patients with symptoms of neck swelling, stiffness and dysphagia after having these procedures should be treated with a high index of suspicion, and the appropriate investigations ordered to confirm the diagnosis.

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MEDICAL IMAGE

Leukaemic hypopyon

Ali Mahdavi Fard, Leili Pourafkari, Nader D. Nader

A 15-year-old girl presented with pain, photophobia, and white discoloration of the right eye for 2 weeks. She was diagnosed with acute lymphoblastic leukaemia and was in remission for 1 year with chemotherapy.

On examination, there was a marked ciliary injection with whitish fluid collection in the anterior chamber of the right eye (Figure 1). Visual acuity was 20/60 and the pupil response to light was blunted. Intraocular pressure was 40 mmHg. The left eye was normal on examination with a visual acuity of 60/60 and intact pupillary reflexes.

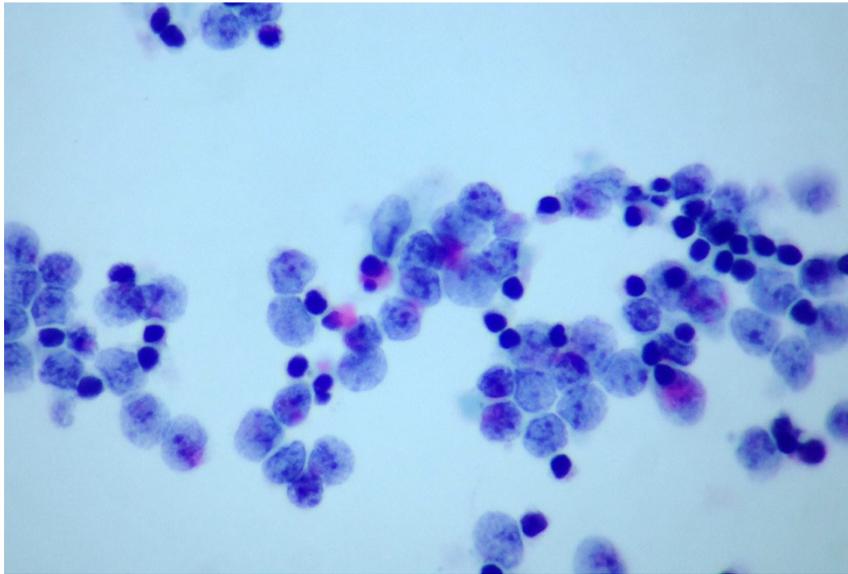
Figure 1. Image of the right eye showing white hypopyon and ciliary injection



Anterior chamber aspirate showed immature lymphoid cells with large nuclei and multiple nucleoli (Figure 2). Peripheral blood smear, bone marrow biopsy and cerebrospinal fluid were all normal. The patient was diagnosed with isolated unilateral leukemic relapse in the anterior segment.

Another course of chemotherapy was started immediately. The hypopyon resolved and visual acuity returned to normal within 1 month of therapy.

Figure 2. Microscopic evaluation of the fluid from anterior chamber paracentesis showing blasts with large nuclei and multiple nucleoli



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LETTER

HealthPathways: some clarification

Graham McGeoch, Brett Shand

Dear Sir

We wish to respond to several points raised by Kenealy, Sheridan and Connolly in their thoughtful and encouraging editorial on HealthPathways in the 30 January 2015 issue of the *Journal*.¹ The statement that the “patient voice is not obvious in the HealthPathways process” is a fair comment, although it needs some clarification.

HealthPathways evolved after a period of intense consumer consultation in Health Services Planning and fulfilled many of the desires to see more transparent and available information for both clinicians and patients. We have presented and discussed HealthPathways with many consumer groups in Canterbury and their usual response is amazement that information on health services was not already available to general practice. The development of the clinical pathways can lead to robust debate and whether this would be stifled or be inappropriate with consumers in the room is a point that needs to be considered.

While HealthPathways is written primarily for general practice teams, the main consideration when developing the clinical pathways is the impact on the patient of any proposed change in healthcare delivery. As pointed out in our papers, this safeguarding of the patient is backed-up by biannual review of the pathways and regular clinical audit of those in which non-adherence may result in serious adverse events.

The apparent lack of discussion on the ‘patient voice’ in our two papers may reflect the fact that patients do not have access to the website and in many cases may not even be aware their general practitioner is using the website during a consultation. A survey of patients on their perceptions of HealthPathways as suggested in the editorial would therefore not provide relevant or meaningful data. However it is comforting to know that previous studies have shown patients generally have a positive attitude towards clinicians’ use of computers during a consultation,^{2,3} with reservations mainly concerning depersonalisation and loss of efficiency of the doctor-patient relationship.⁴

The editorial interpreted our comments on HealthPathways increasing the length of consultations as a negative. However, we are unsure whether this is a positive or a negative as longer consultations may be a consequence of the time required to obtain the relevant clinical information, but result in more thorough and focused examination of the patient.

The importance of patients having access to accurate healthcare information led to the introduction, in 2011, immediately after the Christchurch earthquakes, of a parallel website called HealthInfo. This open-access site contains easy-to-read information on common medical conditions and the details of locally available healthcare services. We are currently planning a survey of patients on their use and opinions of HealthInfo that may go some way to answering the questions raised by Kenealy and coauthors.

The concern raised in the editorial that ‘medical dominance poses an obstacle to interprofessional cooperation’ and that “best care is provided by teams” is acknowledged. While the “team approach” used to develop the clinical pathways undoubtedly has been successful, unpublished data from our online survey showed that acceptance and use of HealthPathways by allied health professionals has not been as great as that of general practice teams. This finding confirms the viewpoint of the editorial that a greater degree of linkage of health, social and community services is necessary for further successful implementation of the website. With this aim in mind, nurses and allied health professionals have recently become more involved in the development of the pathways. Incorporating

the input of these groups into the pathways has been hard work but has led to greater depth of the pathways and increased use of allied health services by general practice. For example, the falls prevention programme was led by allied health and is showing very good results since its dissemination on HealthPathways.

We agree with the viewpoint of the editorial on the importance of continued integration of health into social determinants of health and hope HealthPathways can assist to reflect and implement this. In this regard, we have already included information on diverse topics such as home heating and land contamination as well as links to social services and public health. The ability of HealthPathways to provide links with a diverse range of healthcare organisations and community groups represents a major challenge for the future, but would go a long-way to establishing the website as “the right thing to do” for both patients and general practice teams.

We also acknowledge the difficulties of assessing unmet need raised by Kenealy and coauthors. Unmet need is a much discussed and neglected issue and we are concerned that access criteria can leave need unmeasured. For this reason we are currently exploring opportunities to measure unmet need in both referred and unreferred groups of patients.

Lastly, we agree with the editorial that more evaluation of HealthPathways is required to support our conclusions. We consider that the enthusiasm that was apparent in our perspective paper was a reflection of the impact of the website in Canterbury and its scale of dissemination in New Zealand and Australia, but that this enthusiasm needs to be supported by evidence of effectiveness and lack of unexpected negative consequences, not just increased use of the website.

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LETTER

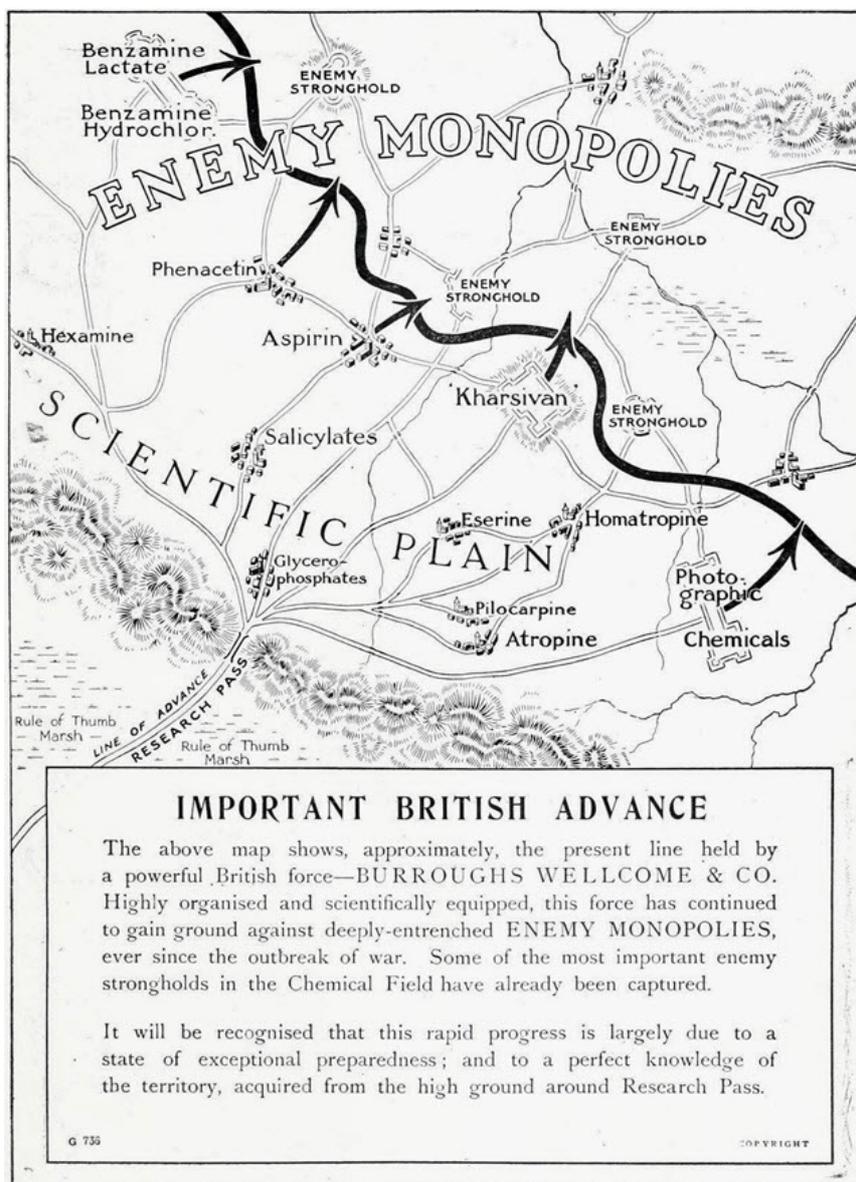
World War One and the prices of drugs

John Holmes

Thank you for highlighting the effects of the First World War on the prices of drugs 100 years ago.¹

The effects of war and civil unrest on essential medical supplies remains a major problem.

In 1916, in England, Burroughs Wellcome published a series of advertisements highlighting their commercial achievements.² The picture below gives an interesting insight into therapeutic agents of 100 years ago.



Source and acknowledgement: From *The Chemist and Druggist* 30 September 1916. Wellcome Library Digitised Collections and the Internet Archive.

<http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2015/vol-128-no-1412/6506>

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100 YEARS AGO

With the New Zealand Medical Corps at the Dardanelles

Published in NZMJ 1915;12(45):187–188.

The following extracts are taken from correspondence to the Editor from a medical officer:—
Gallipoli, 18th June, 1915.

I am afraid I have not let you know how things were going so often as I might, but better late than never. To sum up the whole thing, for the last two months we have had a hell of a time. I cannot give you full details, but owing to the nature of the country here (very like the country behind Paekakariki) we have had to be within half a mile of the firing line the whole time, and for the last two months we have done all our work under continuous fire. Rifle bullets and machine guns whistle over us, shrapnel and lyddite from field guns have played on us the whole time, and occasionally 10-inch and 12-inch melinite shells from the forts in the Dardanelles burst around us.

Our operating tent is a most amusing sight; it is more like a sieve than a tent, and yesterday I had my sterilising orderly knocked over by a bullet while at work. I have made dug-outs for the patients that are fairly secure—only one of them has been killed, though several have been wounded. I have lost five killed and 15 wounded of my own men. The first day of the landing here all the bearers were sent ashore under O'Neill, and the tent divisions were on the transports to attend to the wounded, who were brought off in barges. The men did wonderfully, and were the talk of the beach. We had all the wounded who could be got at evacuated to the ships by midnight the first day. O'Neill, I am glad to see, got the D.S.O. I will never forget the beach when I arrived on it—dead men lying everywhere in heaps, just as they had fallen. The shrapnel and fire were terrific, and it is marvellous how our men hung on at all.

I am afraid the casualty list will be a big shock in New Zealand. We are now acting as a clearing station on the beach, where we do all necessary operations. We have done scores of trephinations and laparotomies with suturing and resections of gut. No abdominal wounds survive if not operated on. There are always multiple perforations, and very often the gut is torn completely across. When the Turk bullet lodges in the tissues it is always reversed with the point backwards, and the wounds are often worse than a dum-dum. All carriage of wounded is by hand, and it is very hard work for the bearers. We managed to capture a dozen little donkeys from the Turks, and most leg wounds come down riding the donkeys. They often ride right on alongside the operating table.

We have advanced dressing stations along each flank, but it is usually impossible to bring the wounded in till dark, as the country is full of Turkish snipers. I recommended one of the bearers for the D.C.M., and he got it for bringing a man in from in front of the trenches. I have been very lucky myself, and though I have been hit twice—once by shrapnel and once by the fuse of a shell—I have only been bruised.

I had men killed all round here, and it is very curious the way they spin round and round before they fall, just like rabbits. Well, as I write this—which, I fear, is rather disconnected, being interrupted by the crack of bursting shrapnel and the roar of our own guns—I am in a dug-out looking out over the Aegean Sea. It is calm as a lake and very blue. Just in front is the island of Imbros and to the right Samothrace. Beyond over the horizon we can see Mount Athos and the mountains of Bulgaria. It is an ideal place for a holiday but for the Turks.

The beach is a wild confusion of swearing men, bucking mules, and falling biscuit boxes. Pinnacles from the warships (which are in hiding somewhere) bustle round bringing in barges of supplies and taking of I wounded to the hospital ship in the offing. All water has to be brought ashore and carried up the hills. Since we have been here we have seen all varieties of warfare concentrated on a very small area. We have had greater naval bombardments than the world has ever seen; we have seen a big battleship sunk before our eyes; we have seen an enemy submarine sunk; we have seen aeroplanes (both enemy and our own) drop bombs and fight in the air, a German one being brought down smash.

We have fought with shell, shrapnel of all sizes, rifles, machine guns, howitzers, hand grenades, saps and mines. We have sprung mines under the Turks, and have had their mines sprung under us—and all in an area of a few square miles. Well, the mail is just closing, so I will close this. I am censor of letters to the company, and it is a devil of a job.

METHUSELAH**Financial incentives for smoking cessation in pregnancy**

Does the offer of up to £400 of shopping vouchers added to routine UK National Health Service specialist pregnancy stop smoking services help pregnant smokers quit compared with routine support alone? To evaluate this proposition a randomised trial was conducted in the west of Scotland between December 2011 and February 2013.

612 pregnant smokers were randomised. Both trial groups were offered routine care from a specialist stop smoking service. The intervention group received up to £400 in shopping vouchers during their pregnancy. The primary outcome was cotinine verified cessation at 34–38 weeks' gestation towards the end of pregnancy.

The offer of financial incentives, added to specialist pregnancy stop smoking services, more than doubled the quit rate among pregnant smokers, from 9% to 23%. An editorial commentator noted that the trial was well designed. She also noted that barely half of the quitters remained abstinent at 6 months post-partum.

BMJ 2015;350:h134 & h297.

Treatment of hyperkalaemia with sodium zirconium cyclosilicate

Hyperkalaemia (serum potassium level, >5.0 mmol per liter) is a common electrolyte disorder that is associated with serious cardiac dysrhythmias and increased mortality. Treatment with polymer resins (e.g., sodium polystyrene sulfonate) has a poor side-effect profile and uncertain efficacy. This is a report of a study which investigated whether zirconium cyclosilicate (ZS-9), a novel selective cation exchanger, could lower serum potassium levels in patients with hyperkalaemia.

753 hyperkalaemic patients were randomised to receive varying doses of ZS-9 or placebo 3 times daily for 48 hours. Those who were normokalaemic at 48 hours were then randomised to either ZS-9 or placebo once daily on days 3–14.

The conclusions were that patients with hyperkalaemia who received ZS-9, as compared with those who received placebo, had a significant reduction in potassium levels at 48 hours, with normokalaemia maintained during 12 days of maintenance therapy. Adverse effects were similar in ZS-9 and placebo groups. Diarrhoea was the most common complication in both groups.

N Engl J Med 2015;372:222–31.

Do tumour necrosis factor-alpha inhibitors increase the risk for herpes zoster in rheumatoid arthritis patients?

The aim of this study was to determine whether exposure to tumour necrosis factor (TNF)-alpha inhibitors increases the risk of herpes zoster (HZ) among patients with rheumatoid arthritis (RA). People with RA are known to have an increased risk of HZ compared with the general population. This increased risk may in part be due to treatment with steroids and other antirheumatic drugs. Methotrexate has not been incriminated.

This cohort study involved 2157 RA patients of whom 249 (11.5%) had doctor-verified HZ. The researchers report an increased risk of HZ (hazard ratio 1.71) for all TNF-alpha inhibitors except etanercept. They speculate that further research is needed to explore the safety, efficacy and cost-effectiveness of HZ vaccinations in RA patients and in patients commencing TNF-alpha inhibitors.

Internal Medicine Journal 2015;45:310–318.

PROCEEDINGS

Proceedings of the Otago Medical School Research Society / Otago Postgraduate Medical Society, March 2015

Using blood glucose meter downloads to improve the accuracy of verbal self-reported blood glucose in teenagers with type I diabetes at ski camp

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Despite advances in diabetes management, self-monitoring of blood glucose (SMBG) remains fundamental. A number of studies have confirmed that logbook entries of SMBG are prone to common errors. A single recent study reveals similar findings for verbally reported SMBG. As verbal SMBG is crucial for safety at diabetes camps worldwide, we aimed to assess whether adolescent awareness of a planned meter download at diabetes ski camp conclusion, would improve the overall accuracy of camp verbal SMBG.

Twenty-six adolescents with diabetes attended a three-day ski camp. Verbally reported SMBG values were reported to, and recorded by, camp supervisors at multiple time points throughout the camp, as per safety protocols. The intervention involved ensuring all participants (at camp commencement) were aware of a planned meter download and SMBG review at camp conclusion. This data was then compared with historical camp data from 2012, collected using identical methodology, as part of a prior research study, in which participants were unaware of the planned meter download. Blood glucose (BGL) data was classified as: accurate, absent/phantom, or modified – verbally reported value > / < meter downloaded value.

Dual-data from verbal SMBG and download was obtained for 527 instances of BGL testing. This was compared to dual-data for 394 historical tests. Following intervention, error rate was 4.5%, over 34% of participants. There was a statistically significant improvement in accuracy compared to historical non-intervention data, in which the error rate was 13.5% over 70% of participants ($P < 0.001$). There was also a significant decrease in phantom readings at 2%, from 8.6% in 2012 ($P < 0.001$).

This study demonstrates an improvement in accuracy and reliability in verbally reported SMBG, following a simple intervention. Meter download could be easily incorporated into camp safety protocols worldwide, and may provide an easy, low cost way of improving safety on camp.

Predicting outcomes in acute severe Ulcerative Colitis; comparison of the Travis and Ho severity scores

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Patients with severe Ulcerative Colitis (UC) are commonly identified using the Truelove and Witts criteria. The Travis and Ho scores are subsequently used to identify patients with severe UC who are at high risk of failing medical therapy and needing second line therapy or colectomy. There has been no direct comparison between Travis and Ho scores to determine which is superior.

We analysed data from 3049 patients with UC collected during the national UK Inflammatory Bowel Disease audit. Those with acute severe UC that failed steroid therapy were scored using both Travis and Ho criteria and

allocated into either a Travis “high” or “low” risk group and either a Ho “high”, “medium” or “low” risk group. We assessed whether further medical or surgical intervention varied between groups.

Patients requiring surgery did not differ between the high risk groups (Travis 51%, n = 88 and Ho 50%, n = 63, respectively). However, only 33% (n = 39) in the medium risk Ho group, 34% (n = 16) in the low risk Ho group and 25% (n = 30) in the low risk Travis group underwent surgery. A similar trend was seen in patients receiving second line treatment with ciclosporin. Resistance to ciclosporin correlated with increasing risk stratification, although this failed to reach statistical significance for all groups. The use of anti-TNFs was the same across all three groups, although like ciclosporin, the tendency to TNF resistance also increased with increasing risk group.

The Travis and Ho scores are equally able to identify patients who are at high risk of failing medical therapy and needing colectomy or second line medical therapy. The Ho score also has an intermediate response to second line therapy. Both scores are useful tools to aid clinical decision making but do not replace timely multidisciplinary care for these patients.