The projected burden of hearing loss in New Zealand (2011-2061) and the implications for the hearing health workforce

The sharp end of cardiovascular disease in New Zealand: A review of acute type A aortic dissections of the Waikato

The role of medical generalism in the New Zealand health system into the future

| New Zealand's neurologist workforce: a pragmatic analysis of demand, supply and future projections |
| Meeting the challenges of interpreting variants of unknown clinical significance in BRCA testing |
| A lack of anaesthetic clinical attachments for emergency medicine advanced trainees in New Zealand: perceptions of directors of emergency medicine training |
Subscription to the New Zealand Medical Journal is free and automatic to NZMA members. Private subscription is available to institutions, to people who are not medical practitioners, and to medical practitioners who live outside New Zealand. Subscription rates are below. All access to the NZMJ is by login and password, but IP access is available to some subscribers.

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

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

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

Subscription rates for 2015

<table>
<thead>
<tr>
<th>New Zealand subscription rates</th>
<th>Overseas subscription rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals*</td>
<td>Individual</td>
</tr>
<tr>
<td>$290</td>
<td>$402</td>
</tr>
<tr>
<td>Individual article</td>
<td>Institutions</td>
</tr>
<tr>
<td>$25</td>
<td>$543</td>
</tr>
<tr>
<td>Individual article</td>
<td>Individual article</td>
</tr>
</tbody>
</table>

*NZ individual subscribers must not be doctors (access is via NZMA Membership)

New Zealand rates include GST. No GST is included in international rates.

Note, subscription for part of a year is available at pro rata rates.

Please email julie@nzma.org.nz for more information.

Individual articles are available for purchase by emailing nzmj@nzma.org.nz
EDITORIAL

6
Hearing loss in New Zealand—planning for the future
Philip A Bird, Greg A O’Beirne

9
Recent changes in the management of aortic dissection
Adib Khanafer, Manar Khashram, Dana Mann

ARTICLES

12
The projected burden of hearing loss in New Zealand (2011-2061) and the implications for the hearing health workforce
Daniel J Exeter, Billy Wu, Arier C Lee, Grant D Searchfield

22
The sharp end of cardiovascular disease in New Zealand: A review of acute type A aortic dissections of the Waikato
AK Gupta, P Subramaniam, K Hulme, T Vasudevan

29
Treatment of octogenarians with lung cancer: A single centre audit of treatments and outcomes
Irina Baimatova, Catherine Smith, Lutz Beckert, Harsh Singh

35
New Zealand’s neurologist workforce: a pragmatic analysis of demand, supply and future projections
Annemarei Ranta, Priyesh Tiwari, John Mottershead, David Abernethy, Mark Simpson, Kiri Brickell, Christopher Lynch, Elizabeth Walker, Richard Frith

45
A lack of anaesthetic clinical attachments for emergency medicine advanced trainees in New Zealand: perceptions of directors of emergency medicine training
Alexander Browne

VIEWPOINT

50
The role of medical generalism in the New Zealand health system into the future
Carol Atmore

56
Meeting the challenges of interpreting variants of unknown clinical significance in BRCA testing
Vanessa Lattimore, Margaret Currie, Caroline Lintott, Jan Sullivan, Bridget A Robinson, Logan C Walker

CLINICAL CORRESPONDENCE

62
Huge palatal mass
Toshihiro Inagaki, Makoto Adachi, Munehiro Azuma, Yasunori Muramatsu

LETTER

63
May we at least have a civilised discussion about primary aldosteronsism in New Zealand?
Walter van der Merwe, Veronica van der Merwe

65
Methuselah

66
100 Years Ago: A Legal Opinion
The projected burden of hearing loss in New Zealand (2011-2061) and the implications for the hearing health workforce
Daniel J Exeter, Billy Wu, Arier C Lee, Grant D Searchfield
Like many countries around the world, New Zealand's population is ageing. While much is known about the health implications of population ageing, no study has explored the impacts an ageing population will have on hearing health in New Zealand. The population aged ≥14 years with hearing loss is projected to increase from 330,269 in 2011 to 449,453 in 2061. Given the projected growth of elderly residents in rural regions, the hearing health workforce planners need to consider both the development of additional audiologists and ear, nose and throat specialists in the medium-long term and their geographical location.

The sharp end of cardiovascular disease in New Zealand: A review of acute type A aortic dissections of the Waikato
AK Gupta, P Subramaniam, K Hulme, T Vasudevan
Type A acute aortic dissections are deadly, mimic more common heart attacks and require complex emergency surgery. It is likely to increase as the New Zealand population becomes older and the younger Maori population is particularly vulnerable; especially women. Those with this condition deteriorate rapidly and chances of survival depend on operating before this occurs. It calls for effective collaboration between GPs and specialists for timely diagnosis and transfer to hospitals that perform such surgery. It asks patients to join this collaboration by participating in the lifestyle measures needed to make an impact on this disease for themselves, their families and our community.

Treatment of octogenarians with lung cancer: A single centre audit of treatments and outcomes
Irina Baimatova, Catherine Smith, Lutz Beckert, Harsh Singh
This study looked into the outcomes of elderly patients between the ages of 80-89 and compared their outcomes with patients under 80. It showed that the older group did just as well as the younger group and their survival was similar at 1 year. The study also demonstrates that there would be potentially more patients over the age of 80 who could benefit from surgery if their lung cancer was diagnosed at an earlier stage.

New Zealand's neurologist workforce: a pragmatic analysis of demand, supply and future projections
Annemarei Ranta, Priyesh Tiwari, John Mottershead, David Abernethy, Mark Simpson, Kiri Brickell, Christopher Lynch, Elizabeth Walker, Richard Frith
The current supply of neurologists in New Zealand is less than half of what would be required to meet current demand. Demand will grow over time and if status quo is maintained the gap will widen. Pressures on healthcare dollars are ever increasing and we cannot expect to address the identified service gap by immediately doubling the number of neurologists. Instead we propose a 12-year strategic approach with investments to enhance service productivity, strengthen collaborative efforts between specialists and general service providers, moderately increase the number of neurologists and neurology training positions, and develop highly skilled non-specialists including trained neurology nurses, physician assistants, and/or general practitioners with a special interest in neurology.
A lack of anaesthetic clinical attachments for emergency medicine advanced trainees in New Zealand: perceptions of directors of emergency medicine training
Alexander Browne

Some DEMTs report a lack of collegiality as a significant barrier to getting training positions. Disestablishment of these positions remains a concern for some departments, and the lack of availability in some hospitals means that trainees are lost to these institutions, as they have to relocate to maintain training momentum. Based on DEMT opinion, ACEM, ANZCA, anaesthetic departments, Health Workforce New Zealand and DHBs need to collaboratively address the paucity of anaesthetic training positions available for emergency trainees.

The role of medical generalism in the New Zealand health system into the future
Carol Atmore

The population is ageing with increasingly complex health problems, and there is a doctor shortage outside of the major centres. To meet these challenges more doctors are needed with broad based expertise (generalists) to work with those doctors with highly skilled expertise in a narrow area (sub-specialists). This requires more generalist doctors working within specialty fields, such as general medicine and general surgery, and generalist doctors working across specialty areas in hospitals, as well as general practitioners. The West Coast and Canterbury District Health Boards have an example of this working, called the Transalpine health service, to provide better health care closer to home for people in one area of provincial New Zealand. Changes are needed in how doctors are trained, how they work together across different hospitals and how outcomes of the health system are measured to encourage a better balanced doctor workforce that is fit for the future.

Meeting the challenges of interpreting variants of unknown clinical significance in BRCA testing
Vanessa Lattimore, Margaret Currie, Caroline Lintott, Jan Sullivan, Bridget A Robinson, Logan C Walker

Identification of cancer-causing mutations in the breast cancer susceptibility genes \textit{BRCA1} and \textit{BRCA2}, has well-defined and actionable implications for preventing disease. Recent advances in genomic technologies will allow more breast cancer susceptibility genes to be screened in an increasing number of individuals and at an ever decreasing cost. This will result in the identification of a huge number of genetic variants with unknown clinical significance. Interpreting the clinical meaning of such variants will be one of the major challenges of genomic medicine. We believe that oncologists, genetic counsellors and general practitioners need to be aware of current classification tools, and resourced sufficiently to take advantage of these tools as they evolve to incorporate genes other than \textit{BRCA1} and \textit{BRCA2}.
EDITORIAL

Hearing loss in New Zealand—planning for the future

Philip A Bird, Greg A O’Beirne

Hearing loss is the most prevalent disability affecting mankind. It is under-reported, under-diagnosed and generally underrated by society. Whilst a large proportion of the estimated 360 million people with disabling hearing loss live in low- and middle-income countries, it still represents a significant issue in New Zealand, and is likely to become more so. In high- and middle-income countries worldwide, adult-onset hearing loss is projected to move into the top ten causes of burden of disease by 2030, ahead of HIV/AIDS and diabetes according to World Health Organization estimates.

In their paper in this issue of the Journal, Exeter et al present an estimate of the projected number of New Zealanders with hearing loss over the next 50 years using survey information stratified for age and then applied to future population projections. As our population progressively ages, it is expected that a much higher proportion of it will experience hearing loss. The principal survey was conducted via telephone and asked a simple yes/no question about the presence or absence of hearing loss, so there is certainly more detailed information required to get a clearer picture. Their data probably underestimate the prevalence of hearing loss, as people with slowly progressive, mild, or even moderate, hearing loss often fail to recognise their activity limitations and participation restrictions. The authors of the paper then estimate the projected additional numbers of otolaryngologists and audiologists that might be required, based on current levels of these practitioners in New Zealand and the projected increase in the population of people with hearing loss.

The authors’ predictions of the increase in the number of New Zealanders with hearing impairment is equivalent to growth of around 15.7% per decade over the 50 years to 2061—a value similar to growth estimates of 15.1% per decade for the US for the 25 years to 2034,4 and 14% per decade for the UK for the 25 years to 2031 attributed to the Medical Research Council.5

At present, approximately one-third of the population over 65 years are affected by disabling hearing loss.2 Exeter et al1 show that the increasing prevalence of hearing loss in those aged over 70 years and changes in population distribution will result in a three-fold increase in the numbers of individuals with hearing loss in that age group by 2061. Hearing loss is a major issue in the elderly, and is associated with depression, social isolation, and cognitive decline. Lin et al6 found significantly increased cognitive decline over a 6-year period in rest home residents in their seventies in a cohort with hearing loss, in comparison to a cohort without. Further research is required to determine the basis of this relationship (ie, do they have a common cause, or does auditory deprivation directly or indirectly lead to cognitive decline?), and whether auditory rehabilitation can arrest this decline in the long term. Recent evidence suggests that treating hearing loss may reduce the burden associated with cognitive decline and reduced quality of life.7 If we can increase the proportion of people with hearing impairment that receive appropriate rehabilitation—either by the use of hearing aids, assistive listening devices, or appropriate communication strategies—then this predicted burden of hearing loss may be effectively reduced.

We like to think that technology will solve our problems in the future. While advances in the field of cochlear physiology bring the
promise of metabolic protection against hearing loss from noise or ototoxic drugs, or even the restoration of inner ear function, it is still likely to be some time before these can be applied clinically. Advances in the technology surrounding hearing aids and cochlear implants have certainly improved the quality of life of people with hearing loss. While all of these advances are exciting, it is important to remember that technology does not provide the whole solution to managing the effects of hearing loss—a number of other rehabilitation interventions provided by audiologists, such as group or individual communication programmes, have been shown to be effective in improving quality of life, and reducing the activity limitation and participation restriction effects of hearing impairment. Audiologists work side by side with people with hearing impairment to navigate this process.

In addition to affecting workloads of audiologists and otolaryngologists, the growth in prevalence of hearing impairment may present challenges to the general medical community, where hearing loss is not particularly well understood. For example, we would suspect that relatively few general practitioners have a good working knowledge of the rehabilitation approaches suitable for different degrees of hearing loss.

Exeter et al,3 highlight a number of important issues in their paper, and make a case for more detailed research which we strongly support. More information is required for Māori and Pacific Island people across all age ranges, and more detailed information regarding severity of hearing loss in the population is required to get a clearer picture. Further research is also needed to examine which communication strategies and rehabilitation options are currently taken up by individuals with hearing impairment, and which of these provide the best outcomes, as this will have large implications on future service delivery. Better management of hearing loss has the potential to significantly improve the quality of life of New Zealanders, now and into the future.

Competing interests: Nil

Author information:
Philip A Bird, Associate Professor, Department of Surgery, University of Otago, Christchurch, and Otolaryngologist, Department of Otolaryngology, Head & Neck Surgery, Christchurch Hospital; Greg A O’Beirne, Associate Professor of Audiology, Department of Communication Disorders, University of Canterbury.

Corresponding author:
Greg O’Beirne, Associate Professor and Audiology Programme Director Department of Communication Disorders, University of Canterbury – Te Whare Wānanga o Waitaha Private Bag 4800, Christchurch 8140, New Zealand gregory.obeirne@canterbury.ac.nz

URL:
REFERENCES:


EDITORIAL

Recent changes in the management of aortic dissection

Adib Khanafer, Manar Khashram, Dana Mann

The first description of aortic dissection was made following the death of King George II of Great Britain in 1760, when Frank Nicolls, the King's personal physician, was ordered to open and embalm the body. It was not until the 1950s that DeBakey and colleagues in Houston, Texas, performed the first successful surgical treatment of this fatal condition.

The incidence of aortic dissection is 3–4 per 100,000 population in the UK and US. In this issue of the Journal, Gupta et al. neatly described the burden of type A aortic dissection in the Māori and non-Māori population in the Midland DHBs region. They report that the prevalence in Māori was higher than non-Māori and the average age at presentation was 5 years lower in Māori.

Classification of aortic dissection was first described by DeBakey as three distinctive types (I, II and III). A few years later, it was noted that the prognosis and treatment differed depending on if the arch was involved. Hence, a second classification emerged from the Stanford group categorising dissection into two types (A and B). DeBakey type I is when the dissection involves the ascending arch and descending aorta, and type II is when the dissection is confined to the ascending aorta. This corresponds to the Stanford type A. When the dissection starts distal to the left subclavian artery, it is classified as a Stanford B or a DeBakey type III. The Stanford classification is the more commonly used clinically for its relative simplicity. However, the DeBakey classification provides a better anatomical and descriptive classification which influences surgical management and follow-up surveillance.

Risks of dissection starting in the ascending aorta (Stanford A, DeBakey I and II) are aortic rupture into the pericardium with cardiac tamponade and acute aortic regurgitation and death. Untreated, the rate of mortality is 80%, therefore surgical treatment is the 'gold standard'. In Stanford type B or DeBakey III, the dissection can cause organ malperfusion and aortic wall weakness, which can lead to aortic dilation, aneurysm formation with risk of rupture. The management depends on the clinical presentation.

The management of aortic dissection has seen significant changes in the past two decades. This is a result of a better understanding of the dissection process and natural history, improvement in radiological imaging, stent graft technology and the advent of endovascular surgery. The natural history of dissection can be complex. The creation of true and false lumens by the dissection flap, the dynamic relationship to each other and the size of the two lumens in conjunction to the effect this has to the blood flow into the head and neck, the viscera and the spinal arteries. These factors play an important role in the management of aortic dissection and are critical to achieving acceptable outcome. It is the understanding of these concepts that shaped an alternative approach to the management of acute dissection, particularly in type A or DeBakey I & II dissections.

The treatment of type A dissections has evolved from medical therapy, with 80% mortality, to surgery, which carries 20% mortality. The goal of treatment is to prevent cardiac tamponade and/or acute aortic regurgitation, which are the primary causes of death. The traditional surgery, as recommended by DeBakey, is replacing the ascending aorta, with or without aortic valve re-suspension. However, this treatment only addresses the proximal part of the dissection and not the distal extension, whether the
dissection stops in the arch or extends distally. Although treating the ascending aorta may suffice, it is unpredictable how the distal dissection will behave. Progressive collapse of the true lumen and expansion of the false lumen, despite surgery, could cause organ malperfusion in the short term and aneurysm formation in the long term—both are challenging consequences to manage. As a result, surgeons have varied their approaches to surgical treatment of type A dissections, taking into consideration the new endovascular techniques and dynamic imaging.

In many centres, replacing the ascending aorta is still an acceptable treatment option with excellent outcomes. However, if further treatment is required at a later stage that involves re-do surgery, it becomes major undertaking. Therefore, alternative approaches that facilitate easier surgical or endovascular interventions are considered, should complications or progression of dissection occur, thereby avoiding re-do surgery. “Frozen Elephant Trunk”, De-branching and Hybrid procedures are strategies to address the distal dissection and future intervention (if required) could be performed by endovascular means. The decision on the particular approach depends on the surgeon preference and experience, the centre’s expertise, and complications of dissection. The surgeon may weigh the risk and benefits of performing acute complex surgery against potentially higher mortality and morbidity.

Frozen Elephant Trunk and Hybrid procedures have the advantage of dealing with the proximal aortic and arch dissection and the supra-aortic vessels. These methods will direct blood flow into the true lumen, causing collapse of the false lumen, with better aortic remodeling. Moreover, this simplifies the management of the distal dissection by endovascular means in the future.6,7 Even the type A dissection that was treated by the traditional surgery of replacing the ascending aorta but continued to progress leading to organ malperfusion or acute aortic aneurysm could be treated by skillful endovascular intervention. This would involve de-branching of the supra-aortic vessels, chimney graft and TEVAR (unpublished data).

Endovascular surgery is advancing and there are numerous options available to the endovascular interventionist. While de-branching of supra-aortic branches with thoracic endovascular aortic repair (TEVAR) is one approach, other approaches include custom-made fenestrated TEVAR for the supra-aortic vessels. One new technology is the Arch Branch graft (Cook Zenith) for the arch aneurysm. This has fenestrations for the brachiocephalic and left common carotid artery. This graft is in trials and the results are awaited. More challenging is the availability of endovascular stent grafts for treatment of primary type A dissections (Ascend Endovascular Graft by Cook Zenith).8 It is estimated that 10–30% of the type A dissections are not fit for traditional surgery and such patients could be offered endovascular stent-grafts. Moreover, it is estimated that up to 50% of type A dissections would be potential suitable for a stent graft based on CT aortogram.9

In Stanford type B or DeBakey III, the presentation is broadly divided into complicated (end organ malperfusion, rupture, refractory pain and uncontrolled hypertension) and uncomplicated dissection. The dissection can cause organ malperfusion and aortic wall weakness leading to aortic dilatation, aneurysm formation and risk of rupture. Its management depends on the clinical presentation.

Type B dissection was treated by surgery, but it was associated with very high mortality. Now, best medical therapy with aggressive antihypertensive treatment is the standard of care in most uncomplicated type B dissection. Should repair be required, TEVAR has become the first line treatment in the majority of cases due to the relative lower morbidity and mortality seen with open aortic repair and cross clamping.

Two recent randomised trials, the INSTEAD (INvestigation of STEnt Grafts in Aortic Dissection) and the ADSORB (Acute Dissection: Stent graft OR Best medical therapy) trials, compared endovascular treatment with medical therapy did not show any survival difference. In the long-term (3–5 years) aortic remodeling is improved in the TEVAR group.10 Type B dissection requires life-long surveillance targeted to detect the progression of aortic dilatation and aneurysm formation.

Due to the complexity of this condition, aortic dissection has attracted the attention...
of several disciplines to improve patient care and advance our understanding. Increased awareness of the disease and better imaging techniques has helped speed diagnosis and treatment. Despite that, aortic dissection still carries a significant morbidity and mortality.

We have improved our surgical and endovascular skills, but have not made strides in prevention. The two main causes of dissection are hypertension and connective tissue diseases, such as Marfan’s disease and Ehlers Danlos syndrome. A significant number of patients with acute dissection presentations were found to be hypertensive. Moreover, we have failed to identify a genetic mutation for this disease, even in families who were referred to dissection clinic with a strong family history of aortic dissection. Therefore identifying high-risk groups and prophylactic management of risk factors may prevent dissection, but we are still in preliminary stages of understanding and management, and it may take a monumental effort in convincing government agencies to invest in a disease affecting 1 in 100,000 of its population.

Competing interests: Nil

Author information:
Adib Khanafer, MBBS, FRCS, MPhil, FEBVS, Consultant Vascular, Endovascular and Renal Transplant Surgeon, Clinical Senior Lecturer, University of Otago, Vascular and Endovascular Unit, Christchurch Hospital, Christchurch; Manar Khashram, Vascular Surgery Trainee and PhD Candidate, University of Otago, Vascular and Endovascular Unit, Christchurch Hospital, Christchurch; Dana Mann, MD, Lead Vascular Interventionist, Vascular and Endovascular Unit, Christchurch Hospital, Christchurch

Corresponding author:
Adib Khanafer, MBBS, FRCS, MPhil, FEBVS, Consultant Vascular, Endovascular and Renal Transplant Surgeon, Clinical Senior Lecturer, University of Otago, Vascular and Endovascular Unit, Christchurch Hospital, Christchurch
Adib.Khanafer@cdhb.health.nz

URL:

REFERENCES:
The projected burden of hearing loss in New Zealand (2011–2061) and the implications for the hearing health workforce

Daniel J Exeter, Billy Wu, Arier C Lee, Grant D Searchfield

ABSTRACT

BACKGROUND: There is considerable evidence that New Zealand’s population is ageing. For example, the median age increased from 29 years in 1951 to 37 years in 2011–12, and will likely increase to 44 years by 2061. While the implications of an ageing population have been studied, to date there is no study investigating the impacts that population ageing will have on hearing health in New Zealand.

AIM: To explore the changing population structure and estimate the burden of hearing loss in New Zealand between 2011 and 2061.

METHODS: Using three alternative population projections from Statistics New Zealand, we quantify the likely distribution of the population between 2011 and 2061 by age and sex. Published estimates of hearing loss stratified by age and severity of hearing loss were then applied to the population projections to highlight the potential impact that population ageing will have on hearing loss in New Zealand in the next 50 years.

RESULTS: We estimated that there were 330,269 people aged ≥14 years with hearing loss and this would increase to 449,453 in 2061. Overall, males have a higher prevalence of hearing loss than females, and while the prevalence of hearing loss among those aged 14–49 years is expected to decrease, the prevalence among the population aged ≥70 years is expected to double between 2011 and 2061.

CONCLUSION: Age, sex and geographical variations in hearing loss are expected in the next 50 years. Further research into ethnic and variations in hearing loss will be instrumental in targeting the future hearing health workforce required to accommodate these increases.

New Zealand’s population is ageing. Indeed, since 1951 the median age has increased from 29 years to 37 years in 2011–12, and recent projections indicate that this will increase further to 44 years by 2061. A result of the increased proportion of the population living longer is increased pressure on centrally-funded health and social resources. A number of studies have explored the impact of an ageing society on the management of chronic illnesses in New Zealand, however these are typically focused on diseases associated with cardiovascular disease and or diabetes. To our knowledge, no research has investigated the implications of New Zealand’s ageing population on hearing health.

The World Health Organization estimates that hearing loss affects approximately 360 million people, or 5.3% of the world’s population. The most recent estimates of hearing loss in New Zealand were based on 2001 Census data, in which the prevalence of hearing loss among adults not living in institutions such as residential care facilities aged ≥15 years was 7.5%. A recent Australian study reported the prevalence of hearing loss at 17.4% among the total population. Those authors further stratified their study by severity and estimated 11.4% of the population had mild (≥25 dBHL and <45 dBHL) hearing loss, 4.0% had moderate hearing loss (≥45 dBHL and <65 dBHL) while severe hearing loss (≥65 dBHL) affected...
2.0% of the Australian population. As expected, males had a substantially higher prevalence (21.0%) of hearing loss than females (13.9%), although the prevalence increased dramatically with age among both sexes. Age-related hearing loss (presbyacusis) is the result of a number of genetic and environmental factors that primarily affect the cochlea. There is debate as to the contribution of lifetime noise exposure to presbyacusis and the effect of noise-induced hearing loss prevention programs in reducing or delaying hearing loss.

Hearing loss in New Zealand has been traditionally managed medically by otolaryngologists and through hearing aids by audiologists. To our knowledge, the most recent study that attempted to plan for hearing health services in New Zealand was published in 1984 by the New Zealand Board of Health. At that time, there were 41 otolaryngology specialists and 34.4 full-time equivalent (FTE) audiologists in practice. This equated to a practitioner: population ratio of 1:77,000 for otolaryngologists and 1:92,300 for audiologists.

While new technology and medical treatments for hearing loss will likely be developed during the next 50 years, estimating the required hearing health workforce is vital to ensure that the current level of service is, at the very least, maintained into the future.

This study aims to estimate the future trends of hearing loss in New Zealand, by age, gender and geographical region. In addition, we aim to explore the implications of the changing demography of New Zealand on the provision of hearing health services in the next 50 years. First, we briefly highlight the changing demography of New Zealand, before projecting the age-specific burden of hearing loss in New Zealand between 2011 and 2061. In addition, we demonstrate the geographical variations in hearing loss between 2011 and 2031 before highlighting the required workforce to maintain a status quo level of hearing health services.

Data and Methods

Population projections

We use Statistics New Zealand’s (SNZ) population projections as our denominator. Based on the 2011 mid-year population estimates, the stochastic population projections were created by combining 2,000 simulations of historical fertility, mortality, and migration trends. These simulations can be summarised by percentiles, which indicate the probability that the actual result is lower than the percentile. For example, the 25th percentile indicates an estimated 25% probability that the actual result will be lower, and a 75% probability that the actual result will be higher, than this percentile. In this study, we used the median (i.e., 50th percentile) population projections to estimate the burden of hearing loss in New Zealand, while the 5th and 95th percentile population projections were used to represent 95% confidence intervals. The median population projections are based on assumptions that: the total fertility rate decreases to 1.9 births per woman in 2036 and beyond; life expectancy at birth increases to 88.1 years for males and 90.5 years for females in 2061 and; there is a long-run annual net migration gain of 12,000 people from 2015.

Hearing loss prevalence estimates

The most recent prevalence study of hearing loss in New Zealand was published in 2005 (Greville, 2005) and based on results from the 2001 Census in addition to the 2001/2 Health Survey. In that study, the prevalence estimates were only provided for children (aged 0–14 years) and adults (15+ years), and did not take into account the extent to which hearing was impaired. The data used in this analysis came from the Roy Morgan Single Source database. Household surveys were conducted by Roy Morgan Research Limited in New Zealand each year between August 2007 and July 2013. Over this period, 69,976 people aged 14 years and older were interviewed via the telephone. Among those 69,976 respondents, 27,100 (38.73%) were male and 42,876 (61.27%) were female. Most respondents were aged 35 to 49 years (26.64%), while the New Zealand European and Other ethnic groups combined (NZEO) accounted for (72.56%) of participants.
There were 19,734 respondents living in the Auckland region (31.51%), representing the largest share of participants regionally. All results from the survey were weighted by age, gender and region to be representative of the New Zealand population. The weighted population for New Zealand in the Roy Morgan Survey is 3,460,730 people, marginally higher than the 3,376,419 people aged ≥15 years according to the 2013 Census.

Of relevance to this study, survey respondents were asked “Which of the following illnesses or conditions have you had in the last twelve months?” In terms of hearing loss, the response options were “Yes” and “No”. Due to the self-reported nature of the question and the absence of follow-up questions regarding frequency and severity, a response of “yes” is represented as “any hearing loss” in the past twelve months. Table 1 shows the prevalence of hearing loss for males, females and the total population, stratified by age.

We obtained the 2014 membership numbers of audiologists and otolaryngologists in New Zealand and applied those numbers to the projected populations in 2031 and 2061 to estimate the future hearing health workforce to accommodate the projected population growth.

Results
Changes in the population structure
The 2011-based 50th percentile population projections indicate that New Zealand’s total population will increase by 36% from 4,405,200 in 2011 to a projected 5,994,900 in 2061. Figure 1 demonstrates the dramatic

---

**Table 1:** Prevalence of hearing loss in New Zealand 2007–2013 (Source: Roy Morgan 2014).

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
<th>All Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 to 49 Years</td>
<td>3.72%</td>
<td>2.90%</td>
<td>3.30%</td>
</tr>
<tr>
<td>50 to 59 Years</td>
<td>12.12%</td>
<td>7.49%</td>
<td>9.76%</td>
</tr>
<tr>
<td>60 to 69 Years</td>
<td>19.09%</td>
<td>11.17%</td>
<td>14.87%</td>
</tr>
<tr>
<td>70 Years and over</td>
<td>26.90%</td>
<td>18.14%</td>
<td>22.23%</td>
</tr>
<tr>
<td>Total 14 Years and over</td>
<td>8.95%</td>
<td>6.13%</td>
<td>7.50%</td>
</tr>
</tbody>
</table>

**Figure 1:** Population pyramids for all persons in 2011 and 2061 (Source: Statistics New Zealand)
changes to the country’s population structure over the next 50 years. In 2011, children aged below 15 years accounted for one fifth of the total population, while 13% of the population were aged 65 years and above. While the projected proportion of children aged below 15 years is expected to decrease slightly to 16% of the total population in 2061, Figure 1 suggests that the population aged ≥65 years nearly doubles in the next 50 years and will account for 25% of the population. The increased proportion of the elderly population also impacts on the working age population, which is projected to reduce from 66% of the population in 2011 to 58% by 2061.

Prevalence of hearing loss in New Zealand

We multiplied the age- and gender-specific estimates of any hearing loss (see Table 1) by Statistics New Zealand’s annual median population projections for 2011 to 2061 to estimate the burden of hearing loss in the next 50 years. We repeated this approach, applying the hearing estimates to the 5th and 95th percentile population projections to indicate 95% confidence intervals. Our results suggest that in 2011 there were over 330,000 people aged 14 years and above living in New Zealand with some degree of hearing impairment, increasing to 683,000 people of all ages by 2061. Figure 2 shows that the proportion of males aged ≥14 years is expected to increase from 7.11% in 2011 to 9.81% in 2061, while among females the proportion of hearing loss will increase from 5.08% to 7.02%.

Variations in projected hearing loss by age and gender

Based on the age and gender variations in the hearing loss prevalence estimates from the Roy Morgan dataset shown in Table 1, the fact that most people with a hearing impairment will be aged above 60 years should not be surprising. However, Figures 3a and 3b highlight more clearly these variations for males and females respectively. Figure 3a shows that the prevalence of hearing loss in males aged 14 to 49 years will decrease steadily, from 1.86% in 2011 to 1.61% in 2061. Among males aged 50 to 59 years the prevalence is projected to be bimodal, peaking first at 1.55% in 2016 before reducing to 1.17% in 2034, with a subsequent peak at 1.51% in 2048, before subsiding again to 1.40% in 2061. A similar bimodal pattern is evident among the males aged 60 to 69 years, increasing from 1.74% in 2011 to 2.13% in 2026, before decreasing to 1.70% in 2043. A second wave among this age group peaks at 2.25% in 2058, falling marginally to 2.23% in 2061. The most dramatic increase is seen among males aged ≥70 years, where the prevalence of hearing loss is expected to double, from 2.04% in 2011 to 4.57% in 2061.

The age-specific trends for females are similar to those described for males, however Figure 3b shows that their hearing loss is less prevalent. For example, while
the bimodal distribution evident for males aged 50 to 59 years is apparent for females, the prevalence estimates range from 0.78% in the 2030s to 0.99% in 2018. For females aged ≥70 years, the prevalence is projected to more than double, from 1.69% in 2011 to 3.71% in 2061. Note that these distributions are a function of the underlying population structure. Therefore, the prevalence of hearing loss will generate peaks and/or troughs as the age groups in the 2011 population pyramid (Figure 1) age.

The prevalence estimates in Figure 3 appear to be particularly small, ranging between 0.78% and 4.57%. In absolute terms however, the number of individuals with hearing loss is more dramatic. Among males, the population aged 14–49 years with hearing loss will increase by 20%, from 40,201 to 48,349, while among females the same age there will be a 10% increase in the number of individuals with hearing loss between 2011 and 2061 from 32,320 to 35,684. For males aged ≥70 years the population with hearing loss will triple from 44,058 in 2011 to 137,394 in 2061. The female population aged ≥70 years will increase by 2.9 times, from 37,878 in 2011 to 111,005 in 2061.

Regional variations in projected hearing loss
We dichotomised Statistics New Zealand’s international standard urban area definition to calculate the proportion of a region’s population living in rural areas (urban area code ≥ 501). Figure 4 and Table 2 use the most recent sub-national population projections (available for 2006 to 2031) and suggest that proportionally, the older population (≥65 years) will increase more in the rural areas, such as Northland, West Coast, Tasman, than in more urban regions, such as Auckland, Wellington, Christchurch and Otago. In 2011, the population ≥65 ranged from 10.6% in the Auckland Region to 18.8% in the Marlborough Region. The projections indicate that by 2031, over 31% of the population in Marlborough Region will be aged ≥65 years. In addition, the elderly population ≥65 will comprise at least 25% of the total population in 10 of the 16 Regional Councils across New Zealand. In other words, there will be a projected 337,800 elderly people living in these regions.

Table 2 shows that the projected number of people aged ≥65 years with hearing loss in New Zealand will increase by 88.5%, from 115,248 to 217,245. The number of elderly people with hearing loss is projected increase the most in the Auckland Region, doubling from 30,839 in 2011 to 65,348 in 2031, while the Taranaki Region is projected to have the smallest increase, from 7,067 in 2011 to 11,817 in 2061. Those 10 regions with a projected elderly population growth of more than 25% also account for nearly one third of the projected hearing loss events among those aged ≥65 years.
Table 2: The prevalence of hearing loss among the population aged ≥65 years, by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>2011</th>
<th>2021</th>
<th>2031</th>
<th>Change (%) 2011–2031</th>
<th>People living in rural areas 2013 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ</td>
<td>115,248</td>
<td>161,673</td>
<td>217,245</td>
<td>88.50</td>
<td>14.03</td>
</tr>
<tr>
<td>Northland</td>
<td>5,084</td>
<td>7,185</td>
<td>9,422</td>
<td>85.33</td>
<td>50.19</td>
</tr>
<tr>
<td>Auckland</td>
<td>30,839</td>
<td>45,326</td>
<td>65,348</td>
<td>111.90</td>
<td>3.98</td>
</tr>
<tr>
<td>Waikato</td>
<td>11,130</td>
<td>15,527</td>
<td>20,435</td>
<td>83.60</td>
<td>22.88</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>8,794</td>
<td>12,033</td>
<td>15,841</td>
<td>80.13</td>
<td>18.33</td>
</tr>
<tr>
<td>Gisborne</td>
<td>1,158</td>
<td>1,610</td>
<td>2,140</td>
<td>84.80</td>
<td>25.19</td>
</tr>
<tr>
<td>Hawke’s Bay</td>
<td>4,652</td>
<td>6,340</td>
<td>8,088</td>
<td>73.86</td>
<td>12.69</td>
</tr>
<tr>
<td>Taranaki</td>
<td>3,455</td>
<td>4,554</td>
<td>5,732</td>
<td>65.90</td>
<td>22.98</td>
</tr>
<tr>
<td>Manawatu-Wanganui</td>
<td>7,067</td>
<td>9,364</td>
<td>11,817</td>
<td>67.21</td>
<td>19.29</td>
</tr>
<tr>
<td>Wellington</td>
<td>11,974</td>
<td>16,371</td>
<td>21,475</td>
<td>79.35</td>
<td>3.84</td>
</tr>
<tr>
<td>Tasman</td>
<td>1,512</td>
<td>2,297</td>
<td>3,082</td>
<td>103.84</td>
<td>41.21</td>
</tr>
<tr>
<td>Nelson</td>
<td>1,413</td>
<td>1,983</td>
<td>2,650</td>
<td>87.54</td>
<td>1.90</td>
</tr>
<tr>
<td>Marlborough</td>
<td>1,688</td>
<td>2,414</td>
<td>3,082</td>
<td>82.58</td>
<td>23.07</td>
</tr>
<tr>
<td>West Coast</td>
<td>1,021</td>
<td>1,453</td>
<td>1,884</td>
<td>84.52</td>
<td>43.42</td>
</tr>
<tr>
<td>Canterbury</td>
<td>16,627</td>
<td>23,360</td>
<td>31,231</td>
<td>87.83</td>
<td>16.61</td>
</tr>
<tr>
<td>Otago</td>
<td>5,987</td>
<td>8,068</td>
<td>10,325</td>
<td>72.46</td>
<td>20.82</td>
</tr>
<tr>
<td>Southland</td>
<td>2,827</td>
<td>3,749</td>
<td>4,711</td>
<td>66.64</td>
<td>30.57</td>
</tr>
</tbody>
</table>

Figure 4: The geographical distribution of the population aged ≥65 years
Workforce planning: meeting demands of the population with hearing loss

So far, we have outlined the projected trends in hearing loss in New Zealand between 2011 and 2061. Our final objective is to estimate the size of the hearing health workforce that will be required to serve the surge in the population with hearing loss. We obtained the 2014 membership lists of audiologists registered with the New Zealand Audiological Society (NZAS) and otolaryngologists from the New Zealand Society of Otolaryngology, Head and Neck Surgery (NZSOHNS) to calculate the distribution of population to clinicians. Of the 377 audiologists registered with the NZAS in 2014, 246 were full members, while there were 90 otolaryngologists registered with the NZSOHNS. Based on the median population estimation in 2011 of 4,405,200 there are currently 17,907 people per fully registered audiologist and 48,947 people per otolaryngologist. By 2061, the population is projected to increase to 5,994,900 and assuming that the NZAS and NZSOHNS memberships remained at the 2014 levels, we estimate that there will be 24,370 people per audiologist and 66,610 people per otolaryngologist. In order to remain at the 2011 population to clinician levels, the hearing health workforce will need a further 89 audiologists and 32 more otolaryngologists by 2061.

Discussion

To our knowledge this is the first study in New Zealand using population projections to estimate the burden of hearing loss over the next 50 years. Our findings demonstrate the dramatic increase in hearing loss among the population aged ≥60 years, compared to a relatively small and decreasing prevalence of hearing loss prevalence among adults aged 14–49 years. These patterns reflect trends in New Zealand’s rapidly changing projected population structure and assume that the current hearing loss prevalence estimates remain constant. We have shown that the projected growth of the population aged ≥65 years will be higher in the more rural regions than in the main metropolitan regions. In fact, the population aged ≥65 is likely to represent at least 25% of the population in 10 of the 16 regions across the country by 2031. These 10 regions will also be home to approximately 31% of the hearing loss burden by 2061.

Our results suggest that in 2011 there were 330,269 people living in New Zealand aged ≥14 years with hearing loss, increasing to 334,685 in 2013. This is approximately 45,000 people fewer than the 380,000 adults aged ≥15 years estimated to have hearing loss in the 2013 Disability Survey. While the 2013 Disability Survey estimated that hearing loss affected 9% of the population, with the prevalence for men (12%) higher than for women (9%), our estimates were lower at 7.50% for all persons, 8.95% for males and 6.13% for females. The differences between results in this study and the 2013 Disability Survey may result from different sampling frames, the definitions of ‘hearing loss’ and/or the denominator populations used. Nevertheless, previous New Zealand research which used 2001 Census data and reported the prevalence of hearing loss among those aged ≥15 years at 7.5% and at 22.1% for the population aged ≥65 years, is broadly similar to our estimates of 7.5% and 19.63% from the Roy Morgan data. The hearing prevalence estimates used in this study are also considerably less than those reported in a recent Australian study, which reported the population across all ages with some degree of hearing loss at 17.4% for all persons, 13.9% among females and 21% for males (Access Hearing 2005).

We have shown that proportionally, the population aged ≥65 is going to increase significantly over the next 15 years in regions that are particularly rural. Given that 10 of the 16 regions are expected to have more than 25% of their population aged ≥65 years and that these regions will account for approximately one third of the elderly population with hearing loss, there is a strong possibility that the hearing health workforce may face a situation similar to general practitioners, practice nurses and pharmacists in rural areas. A more recent report found that there were 49 vacancies for GPs in 47 rural practices and in 14 of those practices the GP is at retirement age. We estimated that there were 17,907 people per audiologist and 52,443 people per otolaryngologist in 2011 using current membership information.
These numbers were broadly consistent with those published in 2008 by Goulios and Patuzzi, who reported 22,399 people per audiologist and 59,615 people per otolaryngologist in New Zealand. This is a significant improvement in the hearing health service levels from 30 years ago. A 1984 report from the then Department of Health found there to be 34.4 full-time equivalent audiologists, giving a ratio of 92,300 people per audiologist—nearly double the suggested ratio of 50,000 people per audiologist and 2.6 times higher than the more liberal service level of 35,000 people per audiologist. Unofficial data estimated there to be 41 otolaryngologists in 1984, representing a ratio of 77,000 people per specialist. Our current estimate of 52,443 people per otolaryngologist is remarkably close to that conservative target of 50,000 people per otolaryngologist reported in 1984. A total of 126 otolaryngologists would currently be needed to meet the more liberal service provision of 1:35,000 people. Assuming that the existing population per clinician ratios are adequate, we estimated that a further 89 audiologists and 30 otolaryngologists will be required in 2061.

In 2008, New Zealand’s population per clinician ratios were about 48% higher than in Australia for audiologists and 2.21 times greater than those reported for otolaryngological services in the UK. Therefore, the extent to which the current hearing health service provision according to patients per clinician measures is appropriate is also cause for debate. Since 2008, the number of audiologists has increased by 73 from 173 to 246. During this time the number of audiology graduates in New Zealand has increased from 20 per annum to approximately 30. The projected growth in the population with hearing loss will place an increased burden and cost on society especially in terms of funding for hearing aid subsidies, however the recent increases in numbers of audiologists graduating from New Zealand universities would appear to meet this predicted demand for future hearing health services.

This research is not without its limitations. First, we have not explored variations in the burden of hearing loss by ethnicity or by deprivation. Ethnic-specific population projections based on the 2013 Census and extending to 2038 were released in May 2015, but we have not yet estimated the burden of hearing loss among these ethnic groups. Similarly, the use of deprivation indices for large geographical areas such as the regions used in this study is not recommended as pockets of deprivation are masked. Updated population projections for Census Area Units were released recently, allowing us to investigate variations in the prevalence of hearing loss through to 2043 by deprivation in the future. In addition, while there is evidence that hearing health among Māori and Pacific patients is substantially worse than for other ethnic groups, particularly among younger populations, no ethnic-specific estimates of hearing loss are currently available.

Second, the population projections used in this analysis predict future trends based on historical patterns of fertility, mortality and migration and therefore may not represent the true demographic structure of the population in 50 years. We have attempted to overcome this by using the 5th and 95th percentile population projections. We used three different projections to provide confidence limits, but acknowledge that current demographic patterns are subject to change. Third, while the estimates of hearing loss obtained from the Roy Morgan Surveys are comparable to previous estimates in New Zealand (Greville 2005), we acknowledge the bias inherent in telephone surveys. Socio-economic status, including employment status and economic activity, may influence the respondent’s perception of health, leading to a result that reflects the surveyed population’s perception of poor health, rather than the actual morbidity experienced by that population. In addition, there is a long latency period (10-years) between the first signs of hearing loss, to the time of audiometric or clinical intervention. As a result, there is a degree of likelihood that mild cases of hearing loss are under-reported in the Roy Morgan Surveys.

This paper provides a first glance at the projected burden of hearing health in the next 50 years. Further work is required...
to estimate the likely patterns of hearing loss by level of severity, and a subsequent study will investigate the ethnic variations in hearing loss following the release of new ethnic population projections in early 2015.

Competing interests: Nil

Acknowledgements: The authors wish to thank Kim Dunstan (Statistics New Zealand), for providing customised population projections and advice and Dr Jinfeng Zhao (University of Auckland) for Figure 4. Thanks also to the anonymous referees for feedback on previous versions of this manuscript.

Author information: Daniel J Exeter, Spatial epidemiologist, Senior Lecturer, Section of Epidemiology & Biostatistics, School of Population Health, The University of Auckland; Billy Wu, Research Assistant, Section of Epidemiology & Biostatistics, School of Population Health, The University of Auckland; Arier C Lee, Biostatistician, Section of Epidemiology & Biostatistics, School of Population Health, The University of Auckland; Grant D Searchfield, Audiologist, Senior Lecturer, Section of Audiology, School of Population Health, The University of Auckland, New Zealand

Corresponding author: Daniel J Exeter, Spatial epidemiologist, Senior Lecturer, Section of Epidemiology & Biostatistics, School of Population Health, The University of Auckland, PO Box 92019 Auckland 1142 New Zealand
d.exeter@auckland.ac.nz


REFERENCES:
New Zealand. 2014.


The sharp end of cardiovascular disease in New Zealand: A review of acute type A aortic dissections of the Waikato

AK Gupta, P Subramaniam, K Hulme, T Vasudevan

ABSTRACT

AIM: Acute type A aortic dissections are lethal cardiovascular surgical emergencies. This study is a retrospective comparative review of mortality in Type A aortic dissections between Māori and non-Māori populations of the Midland DHBs catchment area.

METHOD: 143 patients identified with diagnosis of type A aortic dissections at Waikato Hospital from 1990 to 2013, as identified in Waikato Hospital clinical records and cardiothoracic surgery database. The Māori and non-Māori populations were compared according to demographics, 30-day survival and 5-year survival.

RESULT: The overall 30-day mortality rate of 28% was consistent with published international data, but there were significant ethnic and gender disparities related to the high prevalence of cardiovascular risk factors, particularly in the Māori population. Māori have a significantly higher prevalence of type A aortic dissections (2.5 per 10,000) compared to non-Māori (1.4 per 10,000) and have a 5-year earlier mean age at presentation compared to non-Māori. Māori females have the highest mortality rates with almost half succumbing within 30 days of surgery (45.5%).

CONCLUSION: The future promises an increasing incidence of acute type A aortic dissections in a younger Māori population with severe disease burden and less reserve, as well as in an elderly population where age is an independent predictor of worse operative mortality, morbidity and reduced long-term survival. GP and specialist collaborative directions are identified towards evolution of surgery and systems to maintain, if not improve, early and late survival rates in the Midland DHBs catchment region.

Acute type A aortic dissections are mortal and require emergency high-risk surgical intervention and multidisciplinary critical care. They characteristically involve a primary intimal tear within the ascending aorta which may be associated with further secondary tears distally. The primary intimal disruption results in blood tearing through layers of the ascending aortic wall. This ‘dissection’ produces immediate or imminent rupture into the pericardial space to cause death, cardiac tamponade, coronary ischaemia and aortic valve incompetence.

Type A dissections involving the thoracic aorta can lead to stroke and paraplegia from cerebral and spinal malperfusion. Abdominal aortic involvement can lead to visceral ischaemia to liver, kidneys and bowel. In patients who survive the initial catastrophe, ongoing dilatation of the weakened aorta may lead to complex aneurysms.

The indication for emergency surgery is defined by the ascending aorta being affected, which influences the two nomenclature systems for aortic dissections. The Stanford system distinguishes between type A (involves the ascending aorta) and type B (does not involve the ascending aorta). The DeBakey system subdivides ascending aortic dissections into type I (involving the ascending aorta with distal extension) and type II (affecting the ascending aorta only). The DeBakey nomenclature is completed...
by type III (delineating disease of the descending aorta and beyond) which is categorized as type B in the Stanford system.

The need for definitive surgery is underscored by a mortality rate of 1–2% per hour after onset of symptoms and that 40% of acute type A aortic dissection patients die immediately, 35–70% within 24–48 hours, 94% within 1 week and 100% within 5 weeks.\(^1,4-7\)

Successful management is predicated on prompt diagnosis, transfer and treatment, and any delay after onset of symptoms affects survival. It is a surgical emergency, as correction before haemodynamic instability or deterioration is a central tenet of successful surgical outcome.\(^1,3\)

Although haste and surgery is critical, diagnosis is often delayed—ideal surgical management has yet to be defined and mortality and major morbidity rates are static at 15–30% despite better understanding and much progress in surgical technology and treatment.\(^1\)

Surgery effectively converts a 90–100% mortality risk within the 30 days to at least a 70% survival chance so that only two patients need be treated to gain a survival benefit.\(^1\) Furthermore, those that survive surgery have a 96%, 90%, 80% and 65% chance of surviving the next 1, 3, 5 and 10 years respectively.\(^8,9\)

These patients present multiple surgical and systemic challenges that affect outcome. These are also opportunities to individualise care and integrate services within a given healthcare system to achieve the best possible outcomes for patients, families and communities.

### Method

143 patients identified with a diagnosis of type A aortic dissections at Waikato Hospital from 1990 to 2013 were identified from the Waikato Hospital clinical records and crosschecked with the cardiothoracic surgery department database.

The identified patients were reviewed retrospectively using patient demographics, prior history of type A aortic dissections and risk factors such as Marfan syndrome, hypertension, diabetes mellitus, atherosclerosis and outcomes.

A comparative analysis was performed between Māori and non-Māori populations according to mean age at presentation, age above 70 years old at presentation, gender, ethnicity, 30-day survival after surgery and 5-year survival.

### Results

The total of 143 patients comprised 54 (37.8%) Māori and 89 (62.2%) non-Māori patients of whom 82 (92%) were New Zealand European.

Table 1 demonstrates that the proportion of non-Māori with acute type A aortic dissection being ≥70 years (32.2%) was 2.5-fold more compared to Māori (13%). Despite being 6 years younger on average, Māori patients had virtually the same high prevalence of hypertension with increased rates of diabetes mellitus and atherosclerotic disease.

The role of identified inherited risk factors as a causative factor for acute type A aortic dissections such as Marfan syndrome was small, with only two in the non-Māori population and none in the Māori population.

### Early survival

Table 2 shows the early outcomes of surgical treatment conventionally described as mortality rates within the first 30 days.
after surgery. The 40 30-day mortalities comprised 7 Māori males, 10 Māori females, 12 non-Māori males (9 New Zealand European) and 11 non-Māori females (11 New Zealand European).

This yields an overall 30-day mortality rate of 28% and an overall 30-day survival rate of 72%, which is consistent with published international data. However, there were ethnic and gender differences between Māori and non-Māori populations.

While Māori and non-Māori males have virtually identical mortality rates, New Zealand European males have a mortality rate approximately 20% less than Māori males. Māori females have the highest mortality rates with almost half succumbing within 30 days of surgery. This is more than twice that of their Māori male counterparts, more than two-and-a-half times that of their New Zealand European males and approximately 29% more than non-Māori females.

Table 2: Mortality of surgical patients with type A aortic dissections

<table>
<thead>
<tr>
<th></th>
<th>Māori Male</th>
<th>Māori Female</th>
<th>Non-Māori Male</th>
<th>Non-Māori Female</th>
<th>NZ European Male</th>
<th>NZ European Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Day Mortality</td>
<td>21.9%</td>
<td>45.5%</td>
<td>21.8%</td>
<td>32.4%</td>
<td>17.6%</td>
<td>35.5%</td>
</tr>
</tbody>
</table>

Late survival

Figure 1 shows that the disparities in the early survival are magnified in the long-term survival of the early survivors. Although the early survival of Māori and non-Māori males following surgery are virtually the same (78.1% and 78.2%), the 5-year survival differential increased to 76.5% for Māori males and 85.7% for non-Māori males.

The Māori female 5-year survival shows that Māori females have not only the highest early mortality rate after surgery but also the lowest 5-year survival, with only one-third of Māori females surviving. The non-Māori 5-year survival is almost a third higher (92.3%) in this relatively older population.

While this may be due to the larger proportion of non-Māori males and the relatively small number of Māori females
at presentation, the younger Māori population that present with acute type A aortic dissection also have a 40% higher prevalence of diabetes mellitus, a 41% higher prevalence of atherosclerotic disease and a prevalence of hypertension almost the same as the more elderly non-Māori population. These observations suggest that the Māori population may have a particular susceptibility to acute type A aortic dissections.

This view is supported by this study's observations in Table 3 that show Māori have a higher prevalence of aortic dissections (2.5 per 10,000) in the Waikato population compared to non-Māori (1.4 per 10,000) and have a 5-year earlier mean age at presentation compared to non-Māori.

The non-Māori survival rates of 85.7% and 92.3%, for males and females respectively, suggest that despite the relatively older age of this population, the early mortality rates (21.8% and 32.4% respectively) and late survival rates are comparable with international published data of 90% and 80% chance of surviving the next 3 and 5 years respectively.8,9

These observations also show that this population presenting with acute type A aortic dissections is already 40% larger and older than the Māori population. As the New Zealand population is increasingly aging and living longer, the incidence of acute type A aortic dissections is also likely to increase.1

### Discussion

These observations may be a harbinger that the younger Māori population who present with acute type A aortic dissection may have a particular susceptibility to this condition that has yet to be elucidated.

The older non-Māori population, part of the aging population with steadily increasing life expectancy, present a different challenge. The associated increase in incidence of acute type A aortic dissection in the increasingly aged population is likely to warrant evolution of surgical techniques and systems to maintain, if not improve, current early and late survival rates.

Waikato Hospital is the tertiary centre for the Midland region, which comprises five District Health Boards: Waikato, Bay of Plenty, Lakes, Taranaki, and Tairawhiti. It serves a total population of 853,725, of which approximately 24% (approximately 205,590) are Māori. Therefore, Waikato Hospital manages acute type A aortic dissections in the North Island of New Zealand in a population comprising approximately 20% of the total New Zealand population, which includes 34% of the total Māori population in New Zealand.10

The main causes of premature death in the Midland region are ischaemic heart disease, cerebrovascular disease, smoking-related cancers (lung cancer, breast cancer, cervical cancer, stomach cancer and colorectal cancer), chronic obstructive airways disease and diabetes mellitus.10 Māori have the highest differential in premature mortality from cardiovascular disease in the Midland catchment area.11

The significantly higher prevalence of acute type A aortic dissections in the younger Māori group may be due to being particularly susceptible to cardiovascular risk factors such as smoking, hypertension, diabetes mellitus, and obesity. Therefore, Māori with acute type A aortic dissection are at risk of a rapidly fatal condition, have poor physiological reserve associated with an increased atherosclerotic burden and suboptimally controlled cardiovascular risk factors.

Over 80% of the variance in prevalence for cardiovascular disease comes from lifestyle factors such as smoking, obesity and physical activity. The 2012 Midlands Health Network reports that 14 out of 15 Māori, and 5 out of 6 non-Māori, are at risk of developing cardiovascular disease.11

The Midlands Health Network primary health organisation (PHO) implemented the CV Risk Assessment and Management Guideline in 2004. It was enabled by standardised quality, data and reporting systems and processes, and facilitated

---

**Table 3: Comparative prevalence and age at presentation and death between Māori and non-Māori**

<table>
<thead>
<tr>
<th></th>
<th>Māori</th>
<th>Non-Māori</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence per 10,000 population</td>
<td>2.5</td>
<td>1.4</td>
<td>0.0005</td>
</tr>
<tr>
<td>Age at presentation</td>
<td>57</td>
<td>63</td>
<td>0.0114</td>
</tr>
</tbody>
</table>

---

1. nzma.org.nz/journal
2. NZMJ 7 August 2015, Vol 128 No 1419
3. ISSN 1175-8716
4. © NZMA
5. www.nzma.org.nz/journal
6. NZMJ 7 August 2015, Vol 128 No 1419
7. ISSN 1175-8716
8. © NZMA
10. NZMJ 7 August 2015, Vol 128 No 1419
11. ISSN 1175-8716
12. © NZMA
by incentive funding mechanisms. It has resulted in free risk assessments by GP and nurse delivery models, and its collaboration with The Heart Foundation has enabled the development of a suite of tools and resources to assess, communicate and manage cardiovascular risk.

The early identification of high-risk patients with high-risk presentations at peripheral hospitals in the five Midland DHBs could be made using diagnostic algorithms to differentiate between acute coronary syndrome (ACS) and acute type A aortic dissections.\textsuperscript{12,13} The early diagnoses is likely to lead to directed transfers of these patients to a tertiary hospital for prompt definitive treatment.

New Zealand’s population aged ≥65 years is projected to double by 2036 so that 21–24% of New Zealanders will be aged ≥65 years compared to 14% in 2012.\textsuperscript{14} In less than 50 years, approximately 1 in 4 New Zealanders aged ≥65 years will be ≥85 years, compared to 1 in 8 in 2012.\textsuperscript{15}

Therefore, the future will bring more of this disease in a younger Māori population with severe disease burden and less reserve. There will also be an increase in the elderly population, where age is an independent predictor of worse operative mortality, morbidity, reduced long-term survival and rising incidence of acute type A aortic dissections.\textsuperscript{1,16}

This will fuel discussion on decision-making in high-risk surgery in the frail,\textsuperscript{17,18} which will be informed by information on local surgical outcomes, the influence of ‘human factors’ on such outcomes\textsuperscript{19} and the discourse about appropriate resource utilisation.\textsuperscript{20-22}

It is likely that such decision-making will require collaborative risk-reward assessments of co-morbidities, malperfusion, surgery and postoperative management. The ‘Heart Team’ concept\textsuperscript{23} and practice in contemporary cardiovascular care to define therapeutic direction and its endpoints could be extended to the ‘aortic team’ to lead appropriate patient-centred care and resource management.

The long-term survival of these patients mandates regular postoperative surveillance as the remaining weak aortic wall is susceptible to aneurysmal dilatation or further dissection. Given the risks of co-morbidities, patient frailty and surgical complexity, conventional open corrective surgery using extra-corporeal technology, selective cerebral perfusion and moderate hypothermia may be prohibitive in some patients.

This has led to thoracic endovascular aortic repair (TEVAR) being developed as a potentially less invasive treatment (the hybrid approach of combining less morbid endovascular techniques with open bypass) and are tailored to individual patients as either staged or simultaneous procedures.

Hybrid procedures combine open extra-anatomic supra-aortic debranching with endovascular exclusion of the aneurysmal portion of aorta. In other words, open surgery is performed to re-direct the blood supply of the three great arteries of the arch of the aorta so that the blood supply to the head and upper limbs originate from the proximal ascending aorta. This creates sufficient room to introduce an endovascular graft (endograft), usually through the femoral artery, into the arch of the aorta.

The endograft isolates (or ‘excludes’) the aneurysmal arch of aorta from the pressure of the blood flow and so prevents further enlargement of the aneurysm. Further endografts are placed to the descending or abdominal aortae depending on the extent of aortic aneurysmal disease. While these hybrid procedures ostensibly help curtail surgical stress and trauma by avoiding cardiopulmonary bypass, single-lung ventilation and aortic cross-clamping, these procedures are still challenging to patients and practitioners with their own risks of mortality and morbidity.\textsuperscript{24}

Conclusion

Acute type A aortic dissections are a significant and increasingly important public health issue in New Zealand. Their lethality adds weight to cardiovascular preventative health programmes and reinforces the need to have a high index of suspicion in patients with high-risk cardiovascular disease profiles and/or ACS-type presentations.

The importance of the roles of general practice care in the Midlands Health Network cannot be understated, with PHO-based surveillance, assessment and referral together...
with early diagnosis and directed transfer from peripheral hospitals. The role of general practice care is central to managing cardiovascular risk factors to reduce the devastating impact, as is its role in successful definitive management of this disease.

The population distribution and the patient mix at Waikato Hospital has led to significant cross-disciplinary collaborations and continues to evolve, offering optimised treatment in this difficult group. It is a population of patients whose co-morbidities, such as obesity, ischaemic heart disease, chronic obstructive pulmonary disease, hypertension, diabetes mellitus and their associated complications, compete with their aortic disease to threaten their lives.

Waikato Hospital has implemented contemporary surgical techniques—such as hybrid aortic surgery, particularly in younger patients—to mitigate the risks of surgery and is auditing the outcomes of developing techniques. Its participation in the vascular surgical and new national cardiac surgical database system will contribute to the evolution towards ideal surgical management strategies and techniques.

Waikato Hospital has also implemented lifelong surveillance to monitor and manage the aortic sequelae of this disease. It is on its way to improving the human factors and the access issues in the region to improve outcomes and to create a template for optimal treatment and follow up of patients with complicated type A aortic dissections.

This review has identified a number of collaborative opportunities for the Midlands Health Network and Waikato Hospital to bring their substantial experience and resources to bear on managing the force of mortality of this lethal disease into the future.

Competing interests: Nil

Author information:
Anshuman Gupta, Medical Student, University of Otago, Wellington; Peter Subramaniam, Cardiothoracic Surgeon, PO Box 3535, Manuka ACT 2603, Australia; Katherine Hulme, Registrar in Cardiothoracic Surgery, Waikato Hospital, Hamilton; T Vasudevan, Director of Vascular Surgery, Waikato Hospital, Hamilton.

Corresponding author:
Peter Subramaniam, PO Box 3535, Manuka ACT 2603, Australia
subramaniam.peter@gmail.com

URL:

REFERENCES:


Treatment of octogenarians with lung cancer: A single centre audit of treatments and outcomes

Irina Baimatova, Catherine Smith, Lutz Beckert, Harsh Singh

ABSTRACT

AIMS: Document the incidence, stage at presentation and therapy offered to octogenarians with non-small cell lung cancer (NSCLC) over 3 years and compare to those under 80 years old.

METHODS: A retrospective analysis of patients with NSCLC managed via a lung cancer multidisciplinary team at Canterbury District Health Board. Follow-up data at one year following presentation was analysed.

RESULTS: The study population comprised 124 octogenarians (mean 83.7 years), of whom 54 (42%) were female. Participants presented with adenocarcinoma 48 (38.7%), squamous cell 35 (28.2%) and without tissue diagnoses 41 (33.1%). Stage I and II lung cancer was found in 43 (34%) patients. Surgical resection ensued in six (4.8%), radiotherapy with curative intent in 20 (16.1%), non-curative treatment options in 98 (79%), compared to 106 (15.4%), 112 (15.6%) and 431 (67.2%) respectively of the 635 patients in the under 80 group with NSCLC. All of the surgical group and 15 (75%) in the radiotherapy group of octogenarians were alive at one year; which is comparable to the rest of the cohort, where all patients of the surgical group and 63 (64.2%) of the radiotherapy group were alive at one year.

CONCLUSION: Octogenarians who undergo radiotherapy or surgery with curative intent have an excellent one year survival. Because all patients were alive at one year following surgical resection, we conclude that surgery seems to be a viable treatment option in octogenarians, which may be underutilised.

The population of 80–89 year olds living in New Zealand is currently 130,053 (3.1% of the population)¹ and is increasing since the 2001 census, which recorded 94,794 octogenarians (2.5% of the population).² Currently, the life expectancy is 80.9 years,³ however people born today are expected to live into their late 80s or early 90s.⁴

Lung cancer is the leading cause of death from cancer in New Zealand, contributing to 18.9% of deaths in 2011 from cancer.⁵ There is variation in outcomes across New Zealand, leading to a wide range of five-year survival rates from 4–14%.⁶ The mean age at diagnosis has been increasing in recent years. It remains the third leading cause of death from cancer in the developed world.⁷

Treatment depends on histology, genetics, staging and overall physical health of the patient. Stage I–II non-small cell cancer (NSCLC) is routinely considered for treatment with curative intent. Radiotherapy with curative intent is generally offered to patients with resectable tumours who are not fit for surgery or decline surgery.

Some researchers have argued that more aggressive management in octogenarians with lung cancer may be appropriate.⁸ This audit reports on the incidence, stage at presentation, and therapy offered to octogenarians with NSCLC and compares them to those of the under 80 years old at the time of diagnosis.

Methods

Canterbury District Health Board offers specialist thoracic surgical services for most of the South Island, serving a population of about 500,000. Since 2009, all patients with lung cancer are presented at Multidisciplinary Meeting (MDT) as per international guidelines.⁹ Records of these meetings were reviewed for this audit. The patient cohort
comprised those presented with a diagnosis of NSCLC in the time period from June 2009 until December 2012, allowing for at least a year of follow up. The inclusion criteria were patients 80–89 years with a NSCLC diagnosis. Exclusion criteria were: metastatic cancer to the lung; mesothelioma; small-cell lung cancer; patients presenting with recurrence; a primary diagnosis confirmed prior to their eightieth year; and patients who chose to receive treatment outside the Canterbury region.

The frailty score was calculated as published by CSHA clinical frailty index. Comorbidities were measured using the Charleston Comorbidities index. A scoring system was not in place, but the comorbidities were counted using their classification of comorbidity.

This study was a retrospective audit and did not need ethics approval according to the New Zealand Ministry of Health, as no individual patients were identified. The statistical methods used for all calculations was Fisher’s exact two-tailed P test, using GraphPad Prism (GraphPad Software Inc 2009).

### Results

124 octogenarians were identified. They consisted of 57% (70/124) men and 43% (54/124) women (ratio 1.3:1) with a mean age of 83.7 years (range 80–89 years). The demographics, histological type, and treatment received are summarised in Table 1. The distribution of the cancer type was similar to the rest of the cohort, with a larger proportion of octogenarians not receiving a confirmed tissue diagnosis.

Figure 1 summarises the cytological or histologically confirmed lung cancers of

<table>
<thead>
<tr>
<th>Study population</th>
<th>80–89 years old</th>
<th>Under 80 years old</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, n (%)</td>
<td>54 (43.5%)</td>
<td>286 (45.0%)</td>
<td>0.77</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>48 (38.7%)</td>
<td>321 (50.6%)</td>
<td>0.018</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>35 (28.2%)</td>
<td>192 (30.2%)</td>
<td>0.77</td>
</tr>
<tr>
<td>No tissue diagnoses</td>
<td>41 (33.1%)</td>
<td>122 (19.2%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Surgical resection n (%)</td>
<td>6 (5%)</td>
<td>106 (16.7%)</td>
<td>0.0003</td>
</tr>
<tr>
<td>Curative Radiotherapy</td>
<td>20 (16%)</td>
<td>98 (15.4%)</td>
<td>0.89</td>
</tr>
<tr>
<td>Non-curative treatment</td>
<td>98 (79%)</td>
<td>431 (67.2%)</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Figure 1:** Pathology and staging of lung cancer in octogenarians at presentation

80–89 years old Under 80 years old p-value

<table>
<thead>
<tr>
<th>Study population</th>
<th>124 (100%)</th>
<th>635 (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, n (%)</td>
<td>54 (43.5%)</td>
<td>286 (45.0%)</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>48 (38.7%)</td>
<td>321 (50.6%)</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>35 (28.2%)</td>
<td>192 (30.2%)</td>
</tr>
<tr>
<td>No tissue diagnoses</td>
<td>41 (33.1%)</td>
<td>122 (19.2%)</td>
</tr>
<tr>
<td>Surgical resection n (%)</td>
<td>6 (5%)</td>
<td>106 (16.7%)</td>
</tr>
<tr>
<td>Curative Radiotherapy</td>
<td>20 (16%)</td>
<td>98 (15.4%)</td>
</tr>
<tr>
<td>Non-curative treatment</td>
<td>98 (79%)</td>
<td>431 (67.2%)</td>
</tr>
</tbody>
</table>
the octogenarians. 41 patients did not have a tissue diagnosis. Two patients were left out of the staging (and the Figures above) as further investigation was not felt to be appropriate: one patient refused all further treatment and follow up, the other patient was on end-of-life treatment and passed away shortly after diagnosis. No patients were excluded from the under-80 group. More than half of the octogenarians presented at an advanced stage (stage III–IV). Two histologies were identified: adenocarcinoma and squamous cell carcinoma; no patient was diagnosed with large cell carcinoma.

Treatment choices
Surgical treatment with curative intent was offered to six (4.8%) of 124 octogenarians, compared to 106 (17.7%) of the 635 of patients under 80 (p 0.0003). Radiotherapy with curative intent was offered to 20 (16.1%) octogenarians, compared to 98 (15.4%) in the rest of the cohort (p 0.89).

Non-curative treatment options include best supportive care, radiotherapy with palliative intent and palliative chemotherapy. Non-curative treatment was offered to 98 (79.0%) of octogenarians, compared to 431 (67.9%) under 80 (p 0.01), showing a statistically significant difference in treatment options.

Frailty and comorbidities
Of the 46 octogenarians who presented with early stage (I and II) lung cancer, six were offered surgery, 20 radiotherapy with curative intent and the remaining 20 were offered best supportive care. The total frailty score of all the 124 octogenarians was 3.6; the frailty score of the advanced disease group 3.9 and the frailty score of the group with limited disease group 3.2. The frailty score of octogenarians who presented with stage I or II lung cancer and who received radiotherapy was 2.6 and frailty score of the group operated on was 2.4 (Table 2).

Table 2: Frailty scores of the octogenarians

<table>
<thead>
<tr>
<th>Staging and Treatment</th>
<th>n</th>
<th>Frailty score</th>
</tr>
</thead>
<tbody>
<tr>
<td>All octogenarians</td>
<td>124</td>
<td>3.6</td>
</tr>
<tr>
<td>Advanced disease</td>
<td>78</td>
<td>3.9</td>
</tr>
<tr>
<td>Stage I &amp; II</td>
<td>46</td>
<td>3.2</td>
</tr>
<tr>
<td>Curative radiotherapy</td>
<td>20</td>
<td>2.6</td>
</tr>
<tr>
<td>Surgical resection</td>
<td>6</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Figure 2a &b: Treatment of a) Non-small cell lung cancer in Octogenarians compared to b) the those <80 seen in that timeframe

The pie chart summarises the treatment offered to octogenarians with NSCLC compared to the rest of the cohort over the period of 3.5 years. The two treatment options with curative intent are highlighted, all other treatment options are summarized among the non-curative treatment options.
Of the 26 patients who were offered radiotherapy or surgery with curative intent, four (15%) were judged to have no significant co-morbidities, five (19%) to have one, three (12%) had two and five (19%) had three co-morbidities. The six patients who underwent surgical resection had the lowest frailty score (2.4) and they had between 0 and 6 comorbidities. All octogenarians had an excellent post-op recovery and all survived at least 1 year following surgical resection of their tumour.

Mode of presentation

Of the patients that presented with disease at a curative stage, the majority had their lung cancer diagnosed from an incidental finding.

Treatment outcome

Of the six octogenarians who were offered surgery, all were alive at one year (100%) which is the same as the cohort’s survival post-surgery of 106/106 (100%). The surgeries offered one wedge resection, which later required a completion lobectomy, one pneumonectomy and four lobectomies. None received adjuvant chemotherapy, although one patient was offered adjuvant therapy and declined. Of the 20 octogenarians who underwent radiotherapy with curative intent, 15 (75%) were alive at one year, compared to 63 (64.2%) (p 0.52) of 98 patients in the under 80s group who were alive at one year post radiotherapy with curative intent. Two of the octogenarians died of cardiac events and one of pneumonia both deemed not related to disease or treatment.

Discussion

124 (16%) of our patients with NSCLC were octogenarians, of which 46 (37%) presented with stage I and II lung cancer. However only six (5%) were offered surgery and 20 (16%) radiotherapy with curative intent. Of the octogenarians offered radiotherapy, 75% were alive at one year, and of those offered surgery, 100% were alive at one year. While the percentage offered radiotherapy is similar, the percentage offered surgery is less compared to the rest of the cohort, six (5%) versus 106 (15%) (p <0.0003). This difference is not fully explained by the frailty score of the octogenarian which was 3.6 for the cohort and 3.2 for the group with early disease.

Octogenarians should not be excluded on age alone. They have comparable outcomes following surgery and radiotherapy at one year (75% vs 64.2%) (p 0.52). The survival post-surgery in octogenarians is equal to those under 80, with no deaths in either group. Our data suggests that we may have been conservative in offering surgery to octogenarians. If one were to consider a frailty score of 4 or less acceptable for surgery, more than a third of our population could have been considered for surgery. Although the frailty score is not a reliable predictor of outcome, it is more robust than just adding co-morbidities.

While not taking in account patient preferences, it does suggest that potentially 11 (9%) octogenarians were not offered therapy with curative intent, despite presenting at an early stage with a frailty score of four or less. Of the advanced stage, 53 patients had a frailty score of less than 4 and could have been potentially fit for surgery should they have been detected at an earlier stage.

Of note is that two-thirds (67%) of the octogenarians with early stage lung cancer...
cancer were identified incidentally. Most patients presenting with symptoms were in an advanced stage. Late presentation and diagnosis is not exclusive to the elderly populations. Cancer Research UK,\textsuperscript{15} shows 67.7% of patients with lung cancer presented at stage III to IV. Chest X-rays have poor sensitivity at demonstrating early lung cancer,\textsuperscript{16} offering false reassurance to patients.\textsuperscript{14,17,18} Internationally, guidelines are being developed to offer screening for a targeted group of patients with an at least 20 pack/year history of smoking and age 50–75 years.\textsuperscript{19} Our data suggests the average octogenarian is not frail and could potentially be fit for surgery should their diagnosis of NSCLC be made at a curative stage. As most of our patients were asymptomatic on presentation, we suggest that screening in a population above the age of 80 may be of value.

This was a retrospective single centre study. All scoring was applied retrospectively. We were unable to adjust for confounding factors due to study population size. There is also a potential for referral bias as some patients were referred directly to palliative care services, therefore forgoing our MDT meeting. We are still not able to look at five-year data as our database has only been active since 2009.

**Conclusion**

Octogenarians carry a large burden of lung cancer. Only a small number of patients are being offered curative intent treatment, surgery or radiotherapy. Octogenarians cope well with curative treatment and should be referred and considered for curative treatment including surgery. All patients were alive at one year following surgical resection, which suggests that surgery may be underutilised in this age group.

<table>
<thead>
<tr>
<th>Table 4: Performance status of Octogenarians independent of their NSCLC stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frailty score ≤ 4</td>
</tr>
<tr>
<td>Frailty score &gt; 4</td>
</tr>
</tbody>
</table>

Summarises a retrospective analysis of stage and frailty score.


4. How long will I live?

**Competing interests:** Nil

**Author information:**

Irina Baimatova, Department of Cardiothoracic Surgery, Canterbury District Health Board, Christchurch Hospital, Christchurch; Catherine Smith, Respiratory Medicine, Canterbury District Health Board, Christchurch Hospital, Christchurch; Lutz Beckert, Respiratory Medicine, Canterbury District Health Board, Christchurch Hospital, Christchurch; Harsh Singh, Department of Cardiothoracic Surgery, Canterbury District Health Board, Christchurch Hospital, Christchurch

**Corresponding author:**

Irina Baimatova, Department of Cardiothoracic Surgery, Canterbury District Health Board, Christchurch Hospital, Christchurch 8140, New Zealand

irina.baimatova@cdhb.health.nz

**URL:**


**REFERENCES:**


4. How long will I live?
New Zealand’s neurologist workforce: a pragmatic analysis of demand, supply and future projections

Annemarei Ranta, Priyesh Tiwari, John Mottershead, David Abernethy, Mark Simpson, Kiri Brickell, Christopher Lynch, Elizabeth Walker, Richard Frith

ABSTRACT

AIMS: To estimate current and future specialist neurologist demand and supply to assist with health sector planning.

METHODS: Current demand for the neurology workforce in New Zealand was assessed using neuro-epidemiological data. To assess current supply, all New Zealand neurology departments were surveyed to determine current workforce and estimate average neurologist productivity. Projections were made based on current neurologists anticipated retirement rates and addition of new neurologists based on current training positions. We explored several models to address the supply-demand gap.

RESULTS: The current supply of neurologists in New Zealand is 36 full-time equivalents (FTE), insufficient to meet current demand of 74 FTE. Demand will grow over time and if status quo is maintained the gap will widen.

CONCLUSIONS: Pressures on healthcare dollars are ever increasing and we cannot expect to address the identified service gap by immediately doubling the number of neurologists. Instead we propose a 12-year strategic approach with investments to enhance service productivity, strengthen collaborative efforts between specialists and general service providers, moderately increase the number of neurologists and neurology training positions, and develop highly skilled non-specialists including trained neurology nurses, physician assistants, and/or general practitioners with a special interest in neurology.

The worldwide burden of neurological disease is significant and rising.1,2 A 2006 World Health Organization report indicated that neurological conditions rank highest when it comes to loss of disability-adjusted life years (DALYs) compared with other important conditions affecting health status worldwide.2 Analysis of the most common neurological conditions and predicted trends over the next 15 years suggests the greatest impact will be on high-income countries, including New Zealand.

Worldwide there has been a longstanding under-provision of neurological services for a variety of reasons.3 This gap of service provision is forecast to widen and the pressures on the health system are going to increase over the next decades.3 It will be challenging to address this increasing neurological service need solely through increases in the number of specialists. Other potential options to help address service requirements may include better primary and secondary prevention,4 improved neurological management in primary care,5,6 enhanced collaboration between health providers and other societal stakeholders,3 developing new workforce roles in innovative models of care7 and utilisation of technological resources to improve efficiencies.8-10

This paper explores the current workforce, estimates current and future service demands and how we might provide sustainable neurological services into the future. We hope that our proposed models can serve as
a reference for service planning and initiate discussion as to how New Zealand and other countries around the world can work toward addressing the challenges in global neurological service provision.

**Methods**

This paper focuses on specialist adult neurological workforce. The contribution of non-medical service providers such as neurophysiology technicians, neurology nurses, and neurology clinical nurse specialists is to some extent captured in the neurologist productivity figure.

**Building a model**

The New Zealand demand for specialist neurological services depends on the incidence and prevalence of neurological disease in New Zealand. Other contributing factors include public awareness of neurological disease, public health interventions, availability of diagnostic and therapeutic options, quality of primary care services, referral and service protocols and the ability of non-neurology specialists (eg, geriatricians and internal medicine specialists) to manage common conditions (Figure 1).

The incidence and prevalence of neurological disease is subject to demographic change as well as changes in the epidemiology of neurological disease.

**Estimating demand**

New Zealand epidemiological data for neurological disease is limited and we primarily estimated incidence and prevalence rates using international evidence. Comparing international to New Zealand figures, where such were available, suggests that neuro-epidemiologic data may be similar between the populations. (Table 1)

MacDonald et al estimated an incidence of 0.6% of new neurological conditions and a lifetime prevalence of 6% in the UK. A US study by Kurtzke et al arrived at different figures, with an incidence of 1.0% and point prevalence of 3.6% (people deemed to require care by a neurologist). However, relying completely on these estimates may be erroneous given that not all patients with neurological conditions seek health provider input, not all health providers diagnose neurological conditions accurately, prevalence and incidence can vary significantly among populations and access to care and methods used to collect data across studies are not always consistent. Taking into account these difficulties we took a pragmatic and conservative approach.

We made estimates following Kurtzke's assumption that much neurological care is provided by non-neurologists, and that only a proportion of patients with neurological conditions require neurologist review. He assumes that even if all headache, all trauma, all spinal disorders, all alcohol-related illness, and all retardation, blindness, deafness, and psychosis were managed by other specialists, one percent of the population per year will require the attention of a physician skilled in clinical neurology. If we exclude a proportion

---

**Table 1:** Comparing known New Zealand epidemiologic neurological data with international figures

<table>
<thead>
<tr>
<th>Condition</th>
<th>Overseas estimate</th>
<th>New Zealand Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke incidence per 100,000 population per year</td>
<td>200(^{1,12})</td>
<td>204(^{11,12})</td>
</tr>
<tr>
<td>Multiple Sclerosis- Point prevalence per 100,000 population</td>
<td>60(^{1})</td>
<td>71.9(^{13})</td>
</tr>
</tbody>
</table>

---

**Figure 1:** Proposed model of neurologic service demand and supply

![Figure 1: Proposed model of neurologic service demand and supply](image_url)
of stroke, Parkinson’s disease and dementia, diseases which in New Zealand are often managed by other physicians—it is estimated that a minimum of 0.6 percent of the population will require first specialist assessment (FSA) by a neurologist per year. This is consistent with the incidence rates estimated by MacDonald, et al.\textsuperscript{2}

After excluding all the aforementioned disease categories, prevalence rate estimates suggest that 3.6 percent of the population at any one time should be under the follow-up (FU) care of a neurologist.\textsuperscript{1,2}

We multiplied these estimated incidence and prevalence rates by projected total New Zealand population over the next 12 years\textsuperscript{14} to arrive at projected volume of patients requiring neurology services in New Zealand. The figures were not adjusted for population changes relating to age and ethnic distribution. Such adjustments would likely further increase estimated demand and thus our projections are conservative.

Estimating supply and productivity

To assess current supply of specialist neurological services, we conducted a survey seeking information on head count and full-time equivalent (FTE) figures for neurologists working in public hospitals from each neurology department in New Zealand. In addition, case volumes and time allocation for each scheduled activity were also collected. This allowed estimation of workload and productivity of neurologists in New Zealand. To validate these data, we also contacted the Ministry of Health to provide publicly funded neurologist FTEs and annual case volumes. The relatively small contribution of the private sector was not considered in this analysis.

Specialists perform a range of clinical activities of varying duration and complexity. To account for these variations we converted case volumes to new neurology assessment equivalents that we call Patient Contact Equivalents (PCEs). For example, on average 45 minutes are allocated for a new clinic patient or FSA (base figure for PCEs), but if 15 minutes are allocated to assess and manage a new patient for botulinum toxin injection then one botulinum injection appointment equals 0.33 PCE. PCE does not reflect the total workload of a specialist but is a notional figure which allocates weights to all countable patient encounters such as FSA, FU, inpatient consultations, inpatient case weights, patients undergoing botulinum toxin injections, electromyography procedures, and virtual clinic patients. Clinical activity provided by non-neurologists eg, tests such as electroencephalography (EEG) performed by neurophysiology technicians and only interpreted by specialists were excluded. Average times spent for each activity were calculated based on average appointment duration at each unit. Such formulae were developed for all clinical cases assessed in order to arrive at an annual PCE figure that one full time neurologist can provide.

Dividing the total number of PCEs per year by currently available neurologist FTE provides a figure of cases/FTE to estimate current productivity level.

\[
\text{Total number of PCEs/Total number of FTEs} = \text{Productivity}
\]

Productivity is expressed in PCEs per year per neurologist FTE. This figure represents an average across neurology departments in the country. Neurologists spend significant amounts of time with activities such as reviewing and reporting diagnostic tests, writing reports and other administrative tasks, training and teaching, service development and audits, continuing medical education, to name but a few. These activities were considered when arriving at the productivity estimates, but are not numerically reflected in the PCE figure. The productivity will be higher in some departments and lower in others depending on other service requirements and resources. This figure also averages varying degrees of sub-specialisation, models of service, and referral pathways/protocols across New Zealand as well as contributions made by existing residents, nurse specialists and clinical physiologists to the productivity of specialists.

We considered inflows and outflows to the current workforce pool to estimate neurology specialist workforce supply over the next 12 years. We estimated inflows using the number of advanced training positions and actual historical retention rate in the New Zealand workforce. The analysis does not consider recruitments from overseas, as it is seen as desirable to be self-sufficient over the long run. We estimated outflows on the basis of age/estimated retirement time of specialists.
Currently employed within the public sector. We assumed that the currently employed pool is relatively stable and the emigration rate would be zero over the next 12 years.

Mapping demand-supply projections and developing scenarios

Quantifying supply of neurology services against the estimated demand is difficult given a large number of confounding factors and variable practice patterns. Kurtzke estimated a ratio of 800 new and 1,200 follow-up neurological specialist consultations per year per 100,000 population, or approximately 1 neurologist per 50,000 people.1 The latest neurology workforce data available from the US indicates a geographic range between one neurologist per 56,000 people in rural areas to one per 9,000 people in metropolitan areas.15 However, in New Zealand many neurological patients are seen once or twice and are then referred back to their general practitioner or a different service, such as geriatrics for ongoing care. This reduces the need for FU appointments, but also means that during the course of the illness, which can last many years, some patients are re-referred for a ‘new’ assessment a second time. Some of the focus on FSAs is politically driven in an effort to reduce waiting and a general push to devolve specialist care to generalist services. Whether it is appropriate to devolve neurological care to generalists in many instances is debatable, but this paper makes the assumption that such a model is acceptable to New Zealanders. These practice patterns shift the ratio of FSA to FU in New Zealand in favour of more FSAs compared to Kurtzke’s US estimates.

In light of the above, the analysis presented in this paper assumes each new case would generate demand for an average of 1.2 PCEs per year and existing cases on an average would demand one PCE every 5 years (ie, 0.2 PCEs/case/yr). The total estimated demand for PCEs per year was calculated by adding total demand for FSAs (estimated incidence multiplied by 1.2 PCEs) and demand for FU consults (estimated prevalence multiplied by 0.2 PCEs). The assumptions are made qualitatively based on in-depth analysis of overseas evidence, currently funded Ministry of Health volumes, expert opinion and the experience of specialists practicing in New Zealand.

We mapped the estimated demand for neurology specialist services over the next 12 years (ie, from 2014 to 2026) against the projected number of specialists considering retirement. We then developed models that considered the effects of increasing training sites, increasing contributions by new workforce roles, and greater application of new technologies/service models in hopes to improve efficiency.

Results

Estimated demand

We estimated that the current average productivity rate of neurologists practising in New Zealand is 875 PCEs/specialist/year. Dividing the total yearly demand for PCEs by current productivity rate allowed a prediction of demand for FTE neurology specialists over the next 12 years (Table 2, column A).

This analysis was compared with four additional scenarios. Column B in Table 2 shows demand for neurology FTEs assuming the productivity increases by almost 15% (from current 875 PCEs/specialist/year to 1000 PCEs/specialist/year). Such increased efficiency could potentially be achieved through the application of new technologies or the adoption of alternative models of care. While such an increase in productivity is conceivable, there is currently no evidence that it is, in fact, achievable.

The other three scenarios (columns C, D and E) show predicted demand on the basis of specialist to population ratios suggested in international publications (columns C & D).1,16 Kurtzke suggested that the health system required one neurologist for every 50,000 people.1 The UK Royal College of Physicians indicated a more conservative figure of 1/70,000.16 A 1989 New Zealand workforce report recommended a more conservative estimate of 1/100,000 (column E).17 To our knowledge, there is currently no other country in the OECD that recommends a 1/100,000 staffing level and most current ratios range between 1/10,000 and 1/70,000.3,16,17
Table 2: Neurology specialist service demand in New Zealand over the next 12 years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected total NZ population</th>
<th>Estimated volume of new cases (0.6%)</th>
<th>Estimated volume of existing cases (3.6%)</th>
<th>Estimated total/number/year*</th>
<th>Estimated demand for neurology specialists in NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A (current productivity)</td>
<td>Based on incidence and prevalence</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B (higher productivity)</td>
<td>Based on specialist population ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
<td>1/50,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>1/70,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td>1/100,000</td>
</tr>
<tr>
<td>2014</td>
<td>4,511,400</td>
<td>27,068</td>
<td>162,410</td>
<td>64,964</td>
<td>74</td>
</tr>
<tr>
<td>2015</td>
<td>4,553,280</td>
<td>27,320</td>
<td>163,918</td>
<td>65,567</td>
<td>75</td>
</tr>
<tr>
<td>2016</td>
<td>4,595,450</td>
<td>27,573</td>
<td>165,436</td>
<td>66,174</td>
<td>76</td>
</tr>
<tr>
<td>2017</td>
<td>4,637,390</td>
<td>27,824</td>
<td>166,946</td>
<td>66,778</td>
<td>76</td>
</tr>
<tr>
<td>2018</td>
<td>4,679,585</td>
<td>28,078</td>
<td>168,465</td>
<td>67,386</td>
<td>77</td>
</tr>
<tr>
<td>2019</td>
<td>4,721,465</td>
<td>28,329</td>
<td>169,973</td>
<td>67,989</td>
<td>78</td>
</tr>
<tr>
<td>2020</td>
<td>4,762,765</td>
<td>28,577</td>
<td>171,460</td>
<td>68,584</td>
<td>78</td>
</tr>
<tr>
<td>2021</td>
<td>4,804,050</td>
<td>28,824</td>
<td>172,946</td>
<td>69,178</td>
<td>79</td>
</tr>
<tr>
<td>2022</td>
<td>4,845,520</td>
<td>29,073</td>
<td>174,439</td>
<td>69,775</td>
<td>80</td>
</tr>
<tr>
<td>2023</td>
<td>4,887,325</td>
<td>29,324</td>
<td>175,944</td>
<td>70,377</td>
<td>80</td>
</tr>
<tr>
<td>2024</td>
<td>4,928,175</td>
<td>29,569</td>
<td>177,414</td>
<td>70,966</td>
<td>81</td>
</tr>
<tr>
<td>2025</td>
<td>4,968,660</td>
<td>29,812</td>
<td>178,872</td>
<td>71,549</td>
<td>82</td>
</tr>
<tr>
<td>2026</td>
<td>5,008,605</td>
<td>30,052</td>
<td>180,310</td>
<td>72,124</td>
<td>82</td>
</tr>
</tbody>
</table>

* Estimated total number of PCEs/year = (Estimated Incidence x 1.2 PCEs/case/year) + (Estimated Prevalence x 0.2 PCEs/case/year)
A - Estimated number of specialists required in NZ = Total PCEs required in a year/PCEs provided per specialist (i.e. current productivity of 875 PCEs/specialist/year)
B - Estimated number of specialists required in NZ at higher productivity = Total PCEs required in a year/PCEs provided per specialist (i.e. productivity of 1000 PCEs/specialist/year)
C - Estimated number of specialists required in NZ at the specialist population ratio of 1/50,000 as suggested by Kurtzke in the US.
D - Estimated number of specialists required in NZ at the specialist population ratio of 1/70,000 as suggested by British
E - Estimated number of specialists required in NZ at the specialist population ratio of 1/100,000

Estimated need for neurologists per population is displayed for illustrative purposes to allow comparison to estimates from the international literature:
1/100K = 1989 NZ Health Department estimated need for neurologists per population
1/70K = Recent UK estimate for neurologist need per population
1/50K = US Kurtzke estimate for neurologist need per population
Estimated supply

As of 2014, there were 36 FTE specialist neurologists in New Zealand with an average age of 52.7 (± 9.2) years. This figure translates into an average of 1 neurologist per 126,000 people.

Nearly half the current workforce is expected to retire within the next 12 years, assuming the age of retirement to be 65 years. New Zealand has nine one-year neurology advanced training posts, six to seven of which are usually filled at any given time. The advanced training duration is three years and on average two to three new neurologists could join the consult pool each year. However, due to additional sub-specialty training and emigration, the annual retention rate of New Zealand-trained neurologists has been one per year over the past five years. Neurologist workforce supply projections, shown in Figure 5, consider both upcoming retirements and recruitments at the rate of one per year over the next 12 years. The data from column D, which closely match column B in Table 2, are used to draw the demand curve. These projections assume that current service configurations will not change over time. Demand estimates based on proposed ratios of neurologists per population are added to provide further context.

Regional variation is not the focus of this paper. However, it is noteworthy that neurologist access in rural areas is currently especially limited with the equivalent of one neurologist per 700,000 in some rural/provincial districts.

Modeling of potential future scenarios

An undersupply of specialists is evident, both currently and into the future, creating an increasing risk for unmet need and pressure on health resources. This paper does not present a particular solution but explores several options that could be considered or may develop.

One solution is to increase supply by increasing the number of consultant neurologists. The earliest this could be achieved would be 2016, at which point the gap will have widened, requiring the recruitment of 42 additional neurologists. This solution requires large upfront resource investments, depends on the ability to recruit sufficient specialists (presumably from overseas), and does not address the issue of long-term sustainability (Figure 3, Model 1).

The gap could also be narrowed by reducing demand through neurologist productivity gains using modern technologies such as telemedicine, which can help to save on travel time and costs to remote locations. This may also help to mitigate the regional disparities. Other technological advances that could improve efficiency include the use of better referral pathways and electronic decision support that could improve sector integration and can help to reduce duplication and administrative work. Administrative work could also be alleviated through recruitment of additional administrative staff support. We estimate that a maximum of a 15% increase in productivity is achievable. If every neurologist can increase productivity by 15% to an annual caseload of 1,000 PCEs, lesser FTEs will need to be recruited (shown as a black dotted line in Figure 3 and used as demand target for Models 2–4 below).

Another option to reduce the demand and supply gap is to increase efforts to retain more neurology trainees in New Zealand. If all New Zealand trained neurologists stayed in New Zealand, or trained neurologist attrition was replaced with overseas trained neurologists, the annual recruitment rate could rise from one to two neurologists each year. This would see an increase in neurologists over time. Assuming the above presumed productivity gains are achieved this would require additional funding of eight specialist neurology posts across New Zealand over the next 12 years and reduce the need for immediate increase of neurologists from 42 to 30 (Figure 3, Model 2).

A further option is to expand the number of currently available neurology advanced trainee posts. Adding neurology training posts has the benefit of increasing the immediate workforce by adding extra neurology trainees while also producing more senior specialists over time providing improved long-term sustainability. There is capacity to train more neurologists in New Zealand and we estimate a maximum rate of one advanced trainee (AT) per two neurologists can be feasibly achieved by gradually increasing the number of training posts—initially 4 extra posts in 2016, then...
1–2/year, until a total of 14 new training posts is reached in about seven years. We estimate that advanced trainees, averaged over their training duration, add about 50% of the productivity of a fully-trained neurologist to the service. Coupled with increased productivity and maximal trainee retention (Model 2) would reduce the number of neurologists immediately required from 30 to 20 (Figure 3, Model 3).

Yet another option, Model 4, is the addition of supporting clinicians such as clinical nurse specialists (CNS), nurse practitioners (NPs), or possibly physician associates (PAs) or general practitioners upskilled in a particular condition, such as headache management, to the neurology teams.\(^\text{7,21,22}\) We believe that these professionals primarily help to enhance the team’s ability to provide patient-focused, well-coordinated, and more comprehensive neurological services to patients, which are becoming increasingly important as neurological therapies are growing ever more complex. Thus, while we believe that the contribution of these clinicians is invaluable, we believe that their contribution to overall specialist level productivity will be more modest at around 30% of a specialist neurologist. We estimate that a reasonable ratio of neurologist to specialist nurse (or similar) is 2:1 allowing the addition of 18 new nurse specialists as soon as feasible. Combining this initiative with the aforementioned options would further reduce upfront investment into an immediate increase in consultant level neurologist from 20 to 10 across New Zealand.

**Discussion**

The analysis shows a significant shortfall in specialist workforce that will worsen over time if status quo prevails. As of 2014, the New Zealand neurologist workforce does not match international recommendations from other OECD countries, the recommendations from a New Zealand neurology workforce report in 1989, or

**Figure 3:** Projected neurology workforce demand and supply under different modeling conditions.
estimated current demand based on epidemiological data. The gap will increase as the population grows over time.

Increasing the current specialist neurology workforce to achieve the US recommended 1 in 50,000 would require the creation and recruitment of an additional 64 full-time consultant neurologist positions—nearly tripling the current number of neurologist FTE in New Zealand. Such an increase in the specialist workforce, while perhaps desirable, is unlikely to be affordable or practically achievable given current and ever increasing health resource constraints. Our own demand estimates are somewhat more conservative and more closely align with recent recommendations from the UK, a health system similar to the New Zealand health system, but would still require an immediate addition of 42 neurologists—more than doubling the current workforce.

As an alternative, we propose a combination of strategies that may achieve adequate neurological service provision into the future without relying exclusively on an immediate dramatic increase in neurologists. Firstly, we suggest that investment is made into services to enhance efficiency. This includes technology to assist with remote support of more rural populations to reduce travel time. In addition, we propose that investments are made into an enhanced primary/secondary/tertiary interface through the use of electronic pathways and electronic decision support tools with more active support from specialists to generalists both intra- and inter-DHB. These service provisions require proper funding and a culture shift from the current model, where funding across DHB lines is based on inter-district flow case volumes rather than on provision of comprehensive sub-regional or regional services. The ongoing assumption by some that non-neurologists can manage neurological patients as well as neurologists is not backed by evidence. In fact, local audits have confirmed that insufficient access to neurologists results in poorer outcomes. Lack of specialist access has been the main driver behind generalists managing neurological patients, especially in more rural areas, and if new technologies, funding streams, and models of care can achieve better equity of access than these should be explored.

Adjusting current models of care and supplementing with new technologies will help, but are insufficient to close the service gap. In addition, we need to increase the number of neurologists immediately. We propose several options requiring varying degrees of upfront immediate investment. A modest number of new neurologist posts may be sufficient and provide long-term sustainability if this is combined with a gradual but substantial increase in advanced training posts, a commitment to retain and employ all newly trained New Zealand neurologists, and investment in training and recruitment of clinical nurse specialists or other non-neurologist equivalents.

Our data have several limitations. Firstly, the neuro-epidemiological and neurologic case mix data in New Zealand are insufficient, and relying on overseas data could be misleading. For example, the contribution of non-neurologists to neurological service provision could be greater than estimated despite best efforts. This may mean that more patients receive specialist input than estimated, but of course they would still not be cared for by a neurologist a situation that, by international standards, would be deemed sub-optimal.

Second, neurologists also perform diagnostic test interpretation. The degree to which neurologists participate in this varies between hospitals. To ensure maximum consistency we excluded test interpretation from the analysis. We hope that the contribution to diagnostic test interpretation will have been captured in the overall neurologist productivity figure, but this is not certain. The consistency between New Zealand neurologist productivity and expected neurologist per capita demand based on other sources gives some reassurance in this regard.

Furthermore, our data do not include the relatively modest contribution from private sector neurology in New Zealand, which may have led to an underestimate of supply in our data. However, conversely, while population growth has been incorporated into our analysis we have not adjusted for aging and ethnic changes within popula-
tions, which will likely increase prevalence of some neurological conditions. Along with these demographic changes, new neurological therapies become available every year, increasing the complexity of care provided by neurologists, and this will further affect future demand, making our these estimates on balance highly conservative and likely significant under-estimates of the growing crisis that lies ahead. To improve precision of projections future work could include estimates of the private sector contribution and the impact of demographic and medical advance related changes on demand and supply.

In addition to the implications for neurological workforce, we have suggested a novel method of estimating service contribution of specialists (ie, the concept of PCEs as a unit of supply), present the concept of quantifying increase in productivity using PCEs as a unit of measurement, and present a team-based service model approach that considers the needs of multiple stakeholders. Future research could include validation, refinement, and testing of the PCE unit method.

In summary, we have identified a significant gap between neurological service demand and current supply in New Zealand. We have further demonstrated that unless changes to current service provisions are implemented, this gap will worsen over the next 12 years and we have proposed some potential solutions. Our approach could be adopted to assist with other medical workforce planning.

Competing interests: Nil

Funding Source:
The workforce committee was formed as a working group of the Neurological Association of New Zealand, the professional body of New Zealand’s Neurologists, who covered the costs for one all-day face-to-face meeting. There were no other funding sources.

Acknowledgements:
We would like to acknowledge the contribution of all Neurology Departmental Heads in New Zealand and many other neurologists who have assisted with providing valuable data without which this project would not have been possible.

Author Information:
Annemarei (Anna) Ranta, Consultant Neurologist, Department of Neurology, Executive Clinical Director, Medicine, Cancer, and Community Directorate, Capital & Coast DHB and Senior Lecturer, Department of Medicine, University of Otago, Wellington; Priyesh Tiwari, Senior Project Manager, Workforce Innovations Programme, Ministry of Health, Wellington; John Mottershead, Consultant Neurologist, Department of Neurology, Southern DHB, Dunedin; David Abernethy, Consultant Neurologist and Clinical Leader, Department of Neurology, Capital & Coast DHB, Wellington; Mark Simpson, Kiri Briknell, Elizabeth Walker, and Richard Frith, Consultant Neurologists, Department of Neurology, Auckland DHB, Auckland; Christopher Lynch, Consultant Neurologist and Clinical Director, Waikato DHB, Hamilton.

Correspondence:
Anna Ranta, MD, PhD, FRACP, Medicine, Cancer, and Community Directorate, Wellington Regional Hospital, Level 6, Grace Neil Block, Private Bag 7902, Wellington South. anna.ranta@otago.ac.nz

URL:

REFERENCES:


A lack of anaesthetic clinical attachments for emergency medicine advanced trainees in New Zealand: perceptions of directors of emergency medicine training

Alexander Browne

ABSTRACT

AIMS: Anaesthetic skills are a core competency for emergency physicians. Anecdotally, there are limited anaesthetic attachments specifically available for Emergency Medicine Advanced Trainees (ATs). This study had several aims: Firstly, to quantify anaesthetic terms set aside for ATs; secondly, to gauge the opinions of Directors of Emergency Medicine Training (DEMTs) regarding the importance and difficulty in securing and maintaining anaesthetic training terms for ATs in their institutions; thirdly, to outline strategies that DEMTs used to get or maintain these posts and their opinions about what institutions should do to provide anaesthetic training for ATs.

METHODS: An online qualitative survey was emailed to all DEMTs of hospitals accredited for vocational ED training within New Zealand. Registered Medical Officer (RMO) units at accredited hospitals were asked to provide numbers of anaesthetic places available specifically for ATs.

RESULTS: Annually there are 15 anaesthetic training posts set aside for 145 ATs. Most DEMTs thought that an anaesthetic term was important for progression of vocational training, and a majority thought that term availability was a significant barrier to progression of training. A number of DEMTs felt that procuring and maintaining anaesthetic posts was difficult, some citing a lack of collegiality from anaesthetic departments. Some DEMTs and ATs used novel approaches to procure anaesthetic attachments.

CONCLUSIONS: Anaesthetic skills are an essential component of emergency medicine vocational training. It is in the best interests of hospitals to provide anaesthetic training positions for ATs. There are few training positions currently available.

Emergency medicine practice in Australasia has evolved over time to encompass anaesthesia as part of the essential emergency physician skill set. Emergency physicians in Australasia perform the majority of rapid sequence intubations in the emergency department (ED) and regard it as the cornerstone of airway management in the ED, with no evidence of increased adverse outcomes for patients. Emergency practitioners need to be skilled in acute airway management, the use of anaesthetic drugs for procedural sedation and pain control, to make these procedures and interventions as safe as possible.

The Australasian College for Emergency Medicine (ACEM) oversees vocational training in emergency medicine, which is supervised at hospital level by DEMTs. ACEM regulations state that advanced training:

“must include a minimum of six months training in either anaesthetics or intensive care medicine or a combination of both, which training must be undertaken at a hospital accredited for specialist advanced training by...the Australia and New Zealand College of Anaesthesia (ANZCA) or the College of...”
It goes on to state that:

“\textit{It is highly recommended that, in addition to this minimum requirement, further experience in anaesthesics should be obtained during the course of advanced training.}”

There is no doubting the importance placed by ACEM on completing an anaesthetics term. Anecdote suggests that these training positions are popular and can be difficult to obtain for both non-anaesthetic and anaesthetic trainees alike. The numbers of ACEM advanced trainees have increased over the years, placing further pressure to secure these positions as part of the training journey.

The purpose of this study was to better quantify the availability of anaesthetic positions for ATs in New Zealand, and to gauge the opinion of DEMTs about this issue.

**Methods**

This study used an online survey tool (www.surveymonkey.com). DEMTs were identified from an email group and a survey was sent to the DEMTs of 15 hospitals identified as accredited adult ACEM sites in New Zealand. Some hospitals had shared DEMT roles so the opinion of the first respondent was taken from that site. Three reminders were sent to increase the number of respondents.

Survey questions:

- Is the Anaesthetic Department in your hospital accredited for training by ANZCA?
- Are ACEM accredited junior anaesthetic terms available to ATs in your hospital?
- How many 6 month anaesthetic training positions are available for ATs in your hospital every year?
- How many ATs do you have in your hospital currently?
- Is there a waiting time for ATs to get anaesthetic training positions in your hospital?
- Are there barriers to getting anaesthetic training positions for your trainees (eg, limited availability, anaesthetic department issues, funding, RMO unit issues)? If so, please list them below.
- How much do you agree with this statement? Getting anaesthetic terms for ATs at my hospital is easy. (1=extremely easy; 2=easy; 3=somewhat difficult; 4=difficult; 5=impossible).
- How much do you agree with this statement? Getting anaesthetic terms for ATs at my hospital is a significant barrier for the progression of their advanced training. (1=negligible; 2=minor 3=somewhat; 4=significant; 5=extremely significant).
- What do you think your hospital should do about providing anaesthetic training positions for ATs?
- Have you employed strategies to get/maintain or increase anaesthetic training positions for your ATs (eg, reciprocal relationships, lobbying etc)? Please elaborate.

Accredited hospital RMO units were contacted by telephone to ascertain the number of anaesthetic terms specifically available for ED trainees. ACEM was contacted regarding trainee numbers in New Zealand as of September 2014.

**Results**

There were 13 DEMT respondents out of a possible 15 hospitals surveyed (86%). There was a spread in terms of the numbers of ATs per department, ranging from one to up to 20. Three tertiary referral hospitals responded and the remainder were regional or urban district hospitals. Eleven DEMTs thought that their hospital was ANZCA accredited for anaesthetic training, one thought not, and one respondent was unsure.

The ACEM trainee census as of September 2014: 145 ATs training in New Zealand.

A telephone survey of RMO units below shows the number of anaesthetic terms specifically available for ATs in 2014:

- Southland: 6-month Senior House Officer (SHO) term; two available
- Dunedin: 6-month term, performed over 1 year for 3rd year ATs or above; one available
• Christchurch: 6-month SHO terms; two available
• Nelson: None
• Wellington: None
• Hutt: None
• Palmerston North: 3-month SHO term; two available
• Whanganui: None
• Hawkes Bay: None
• Gisborne: None
• Rotorua: None
• Tauranga: None formally, but up to four year-long positions
• Waikato: 6-month SHO positions; two available
• Northern Regional Training Hub (Middlemore, Auckland, Waitakere, North Shore): 3-month SHO term available for ICU or ATs; four available
• Whangarei: 3-month SHO terms combined with ICU and retrieval; two available.

Of the hospitals that had anaesthetic terms available and responded to the survey, one department had no waiting time, two departments recorded a 1-year waiting time and two departments had a waiting time of 2-years or greater.

The DEMTs were asked about the perceived barriers to getting anaesthetic terms for ATs. Four out of 13 respondents cited limited places available, and three cited heavy competition for limited places. Other perceived barriers included anaesthetic departments being resistant to getting trainees outside of their training program; a lack of collegiality was mentioned twice. Three respondents cited lack of hospital funding for training positions as a major barrier.

Nine respondents (60%) thought that obtaining anaesthetic training for their trainees was either impossible or extremely difficult; three respondents had no/few issues with obtaining training posts. Eight DEMTs saw a lack of anaesthetic positions as a significant barrier for progression through vocational training, whereas two felt that this was not a barrier. Two respondents stated that anaesthetic jobs were generally reserved for juniors with an interest in a career in anaesthetics, excluding those from different specialties.

When asked what their institution should do about providing anaesthetic terms for ATs, three DEMTs stated that DHBs should fund or mandate training posts for ED. One DEMT stated “We need to explore the mutual benefits and common ground between the specialties”. Two DEMTs suggested simulation training as an alternative.

Finally, DEMTs were asked about strategies that they used to try to get anaesthetic training posts. Others reported lobbying, pleading, and tenaciously holding onto the training posts that they have in the face of threatened disestablishment. Two DEMTs had presented business cases to create funding for these positions. In Auckland, vocational training is managed regionally by the Northern Regional Training Hub to maintain anaesthetic training posts.

DEMTs reported novel approaches to procure anaesthetic training. Trainees have apparently entered dual training with ICU, where getting an anaesthetic run is easier and having no intention of completing ICU training. Trainees also went to theatre in their own time to attempt to improve their anaesthetic skills.

Discussion

This survey demonstrates in the hospitals surveyed, there are limited training positions in anaesthesia for ATs in New Zealand. This situation may have occurred for a number of reasons. ANZCA regulations stipulate that:

“In order to be able to perform an anaesthetic without direct supervision, a minimum of a six month term of fully supervised anaesthesia needs to have been completed”.¹

ACEM trainees mostly complete six months of anaesthesia as part of the training program and do not contribute in a meaningful way to anaesthetic department service provision. Hospital Boards provide limited funding for training positions. In this current climate of austerity, hospital management is unlikely to provide funding for extra training jobs that do not contribute significantly to service provision in the near future. One hospital circumvented this by
having a combined ED/anaesthetic term, so that some service provision could be maintained. They:

"...created a post that comes from ED funding. It is a senior registrar post where trainees do alternate weeks of anaesthesia and senior registrar ED work... We encourage our trainees to be ambassadors for the ED and to show their transferable skills ... in exchange for increasing airway management skills. Being a mature [AT] facilitates this".

There is competition for anaesthetic posts, therefore established trainees are more likely to get these positions, and they may not be available until late in training. It could be argued that anaesthesia training is advantageous early on in ED training in order to have suitable anaesthetic skills as part of effective ED practice. A lack of anaesthetic training positions may impact on the safety of a hospital at night if the most senior doctor in the ED is not airway trained. Provision of procedural sedation in the ED is not always possible if there are no properly skilled doctors available to perform this task. Procedural sedation is considered a core EM proficiency, which has been shown to be safe when performed by trained staff, prevent hospital admissions, theatre time, and saves money.5,6

There are reciprocal training arrangements with intensive care departments, where anaesthetic trainees have to complete a minimum of three months ICU training.7 For ED, these arrangements may not exist, as there is no ED term requirement for anaesthetic training. Some ED trainees have taken advantage of ICU reciprocal arrangements by signing up for ICU training, thereby adding College fee costs to training budgets. Some trainees have no desire to complete ICU training, doing this to procure anaesthetic clinical attachments, increasing RMO training costs.

The numbers of both anaesthetic and emergency trainees has increased markedly over the decade, putting pressure on anaesthetic training positions and anaesthetic attachments are in great demand from RMOs.8,9 Anaesthetic departments were thought by a minority of DEMTs to reserve positions for potential anaesthetic trainees for training purposes, with resistance to supply training to doctors outside their specialty.

Paucity of term availability has repercussions for trainees, departments and hospitals. Trainees may move hospitals several times to get desired training posts. This can be advantageous to gain exposure to different clinical styles and systems, but it is disruptive for families and examination preparation. Smaller hospitals may have trainees for a limited period, as ACEM accredited non-ED terms may not be available. This means EDs and hospitals lose the institutional knowledge of trainees, incur increased human resource costs when ATs leave to continue their training pathway.

Two DEMTs suggested simulation training as an alternative to anaesthetic terms. The fidelity of simulation is increasing constantly, but requires expensive equipment, skilled technicians, tutors and physical space.10 Short airway courses are available, but are only adjuncts to current anaesthetic training, with more relevance in maintaining rather than building anaesthetic skills. As equipment becomes cheaper and simulation education becomes mainstream, it may well replace the anaesthetic term for ATs in the future.

Limitations and disclaimer

This study looked at the availability of anaesthetic terms in New Zealand hospitals; there are training opportunities in Australia and abroad. This study used DEMT opinion to make conclusions which may overstate the issues discussed. This study did not gather a census of all junior anaesthetic training positions in New Zealand, so the lack of availability may be overstated. This paper explored the opinions of DEMTs and does not necessarily represent the views of ACEM.

Conclusion

ACEM and DEMTs in New Zealand recognise and advocate for anaesthetic terms for their ATs. DEMTs recognise the importance of anaesthetic terms for training and department safety, and report significant barriers in getting these placements for their ATs. Some departments
have used novel approaches for service provision in order to fund anaesthetic posts. Some DEMTs report a lack of collegiality as a significant barrier to getting training positions. Disestablishment of these positions remains a concern for some departments, and the lack of availability in some hospitals means that trainees are lost to these institutions, as they have to relocate to maintain training momentum. Based on DMT opinion, ACEM, ANZCA, anaesthetic departments, Health Workforce New Zealand and DHBs need to collaboratively address the paucity of anaesthetic training positions available for emergency trainees.

**Competition interests:** Nil

**Acknowledgements:**
I would like to thank all DEMTs for their participation, and ACEM (including the New Zealand Office) for providing DEMT contact details, and trainee census information, and ANZCA President Dr Genevieve Goulding for the College's formal response to this paper.

**Author information:**
Alexander Browne, Emergency Medicine Consultant, Intensive Care Specialist, Nelson Hospital Emergency Department
alex.browne@nmdhb.govt.nz

**Corresponding author:**
Alexander Browne, Emergency Medicine Consultant, Intensive Care Specialist, Nelson Hospital Emergency Department
alex.browne@nmdhb.govt.nz

**URL:**

**REFERENCES:**


The role of medical generalism in the New Zealand health system into the future

Carol Atmore

ABSTRACT

New Zealand hospitals are facing medical workforce shortages and an ageing population with increasing multimorbidity. To be sustainable in the future, the future medical workforce will need expertise in dealing with the complexity of people living with multiple physical and mental health issues. This will require a greater focus on generalism within the speciality colleges, and generalist doctors within the hospital settings, as well as their traditional home of community settings. Doctors’ career choices will need to be matched to changing community need.

The Transalpine Health Services generalist, specialist and sub-specialist workforce model developed by the West Coast and Canterbury health systems points the way to future sustainable provision of a quality patient hospital experience as close to home as possible, for people who live in provincial New Zealand, through a regional network approach.

System-wide changes are suggested to support a more balanced future medical workforce. These include greater valuing of careers in generalism, aligning of incentives to promote medical careers based in generalism, developing regional networks that cross existing District Health Board boundaries to provide patient care, and application of system outcome metrics that measure quality of care and patient outcomes in an integrated health system.

The current challenges

New Zealand hospitals are facing medical workforce shortages and a changing patient demographic. The Association of Medical Specialists continues to project workforce shortages for hospital consultants.¹ The Ministry of Health is predicting an ageing population with an increase in people with multiple long-term health conditions in the future.² It is timely to consider whether the current mix of doctors' skills and expertise in New Zealand is fit for purpose, as we look towards the future.

In New Zealand, as in many other developed countries, the last 60 years has seen increasing sub-specialism within medicine. The Royal Australasian College of Physicians now has 24 recognised sub-specialty ‘-ologies’, and the Royal College of Surgeons lists nine surgical subspecialties.³ Anaesthesia has separated into Anaesthetics and Intensive Care Medicine colleges. Emergency Medicine has developed as its own college. Younger hospital consultants are less comfortable working across a broad scope than the consultants of a generation ago. The proportion of doctors working as general practitioners has also reduced and it is uncommon for them to work within the hospital setting when compared to the past.⁴ More doctors train as subspecialists over generalists, and live in main urban centres, in preference to provincial and rural centres.⁵

This drive towards subspecialisation over recent decades has come from both within and without the profession. Within the profession, defining areas of specialised expertise has allowed the development of deeper expertise in a narrower area of knowledge with new technology, which has an appeal in its own right. It also has
allowed doctors to create areas of service which they can stake a legitimate claim on as their territory, both in the public and private hospital settings. Increasing prestige is associated with subspecialisation, and often increased remuneration. Consumer pressure and regulatory body changes, in response to the concerns about competency, has led to narrowing of scopes of practice in an effort to increase standards of care provided to patients.

In provincial New Zealand, the unintended consequence of increased subspecialisation has been the loss of flexibility in the range of services able to be provided at the local hospital. There has been a trade-off between the additional quality gained by subspecialisation and the quality foregone due to this lack of flexibility in smaller hospitals. There are also increased costs involved with the increasing fragmentation that specialisation brings.

Grey Base Hospital, on the South Island’s West Coast, is the smallest provincial base hospital in New Zealand. It has been the ‘canary in the coal mine’ of these negative effects of increased medical subspecialisation. It has had long-standing difficulties recruiting and retaining doctors to provide the health services required to meet the local communities’ needs. This has led to a high dependence on locum services to provide 24/7 rosters for each specialty area within the hospital setting. With this high locum use comes the risk of compromise on quality of care provided, as teams and teamwork are weakened.

It is worth noting that not every country has followed this subspecialisation path to the degree that New Zealand has. Whilst the general physician and general surgeon have become rarer and generalist doctors inhabit primary care almost exclusively in England, areas of rural Scotland are endeavouring to maintain or develop the generalist doctor in their hospitals. In rural Australia and rural Canada, comprehensive primary care encompasses hospital, emergency and population health care, with expanded scopes of services in anaesthetics, obstetrics and surgery. Indeed, Australian rural general practitioner colleagues can work in expanded scopes in anaesthetics, obstetrics and surgery with appropriate training, under the Australasian specialty colleges that govern standards and quality on both sides of the Tasman. In the US, generalism in the hospital setting has emerged in what is termed ‘hospitalists’. These doctors, either general physicians or specifically-trained hospitalists, provide generalist care in the hospital setting, and work with subspecialists as the patients’ needs dictate.

The number of people with multiple long-term health conditions in New Zealand is increasing, as it is around the world. As the population ages, obesity rates rise, and social inequalities continue, the number of people living with multimorbidity, including dementia, is projected to rise further. There is an increasing call internationally for a change in how health care is delivered to meet the challenge of ageing populations and multimorbidity. To continue with a preponderance of doctors with subspecialised skills for disease or organ-specific care will see patients with multiple complex health issues getting increasingly segmented and fragmented care. This will likely be expensive, exceed the workforce's capacity and reduce the overall quality of the care people receive. Subspecialisation for the few could be seen to come at the expense of holistic care for the many.

Medical generalism now and for the future

For health systems to be sustainable in the future, more whole person care will be required. The future medical workforce will need expertise in dealing with the complexity of people living with multiple physical and mental health issues. They will need to be skilled at working in teams with nurses, allied health professionals and patients and their whānau, and coordinating patient care across different settings. This will require a greater focus on generalism within the speciality colleges, as signalled recently by the Royal College of Physicians, and generalist doctors within the hospital settings, as well as their traditional home of community settings. These generalists and general specialists will work collaboratively with sub-specialists as part of the person’s health care team.
So what is medical generalism? A Commission on Generalism in the UK noted that where specialism was about depth, generalism was about breadth. It identified medical generalism as an approach to the delivery of health care that deals with undifferentiated illness and works across inter-professional boundaries, recognising the interdependency of professionals’ skills. Generalism has been described as patient- and family-centred care, and as expertise in whole-person medicine. Generalism is not settings bound, and exists in both the hospital and community. A doctor can practice generalism within their specialty, such as a general physician or general surgeon, or as a generalist with a broad set of skills and expertise who provides care across specialty boundaries.

The generalist doctor in New Zealand is usually found in general practice. They provide whole-person care, using investigation and treatment judiciously, grounded on the evidence base, working in collaborative partnerships with patients, nurses, allied health professionals and their specialist colleagues. A generalist can recognise the limitations of their skills and experience and knows when and where to enlist the most appropriate help, support and advice from colleagues. They are able to tolerate uncertainty and manage tension and ambiguity, understanding how the person fits within their community. They have a broad skill and knowledge base that allows them to synthesise the treatment plan for the whole person, from the various organ and system dysfunctions and social concerns and context of the patient. Traditionally in New Zealand, our generalist doctors work as general practitioners practising in the community, and in local small rural hospitals run by generalists.

What is the right path for New Zealand’s medical workforce to follow that will meet the challenge of changing health needs? Given the changing demographic of our patients and their need for holistic care to deal with their multimorbidity, more generalism in the specialties is needed. As well, a role is emerging for generalist doctors to work with specialists in our provincial hospitals to provide high-quality and sustainable patient care. Julian Tudor Hart’s Inverse Care Law of 40 years ago still applies today, that: “The availability of good medical care tends to vary inversely with the need for it in the population served. This inverse care law operates more completely where medical care is most exposed to market forces, and less so where such exposure is reduced.”

For future health services to be sustainable, doctors’ career choices need to match changing community need. There is no ‘market mechanism’ working within the public health system to ensure this changing need will lead to changes in relative supply of generalists over specialists. Deliberate design is required.

In response to these challenges, embodied in the need to provide sustainable care at Grey Hospital, the West Coast and Canterbury health systems have been planning and implementing a regional generalist, specialist and sub-specialist workforce model to support the provision of Transalpine Health Services. The creation of the rural hospital medicine vocational scope has provided an opportunity for developing generalist doctors within the small provincial hospital setting.

The West Coast paediatric and orthopaedic services are provided by a generalist-specialist workforce, of rural hospital medicine doctors, locally-based specialists, and visiting specialists and subspecialists based in Canterbury. The specialists and rural hospital medicine generalist doctors work together to provide inpatient care, with the rural hospital medicine doctors being the senior West Coast-based doctor for these services out-of-hours and on some days of the working week. In these times, they are supported by specialist services in Canterbury through telephone and telemedicine contact, with a shared laboratory, radiology and hospital summary IT platform. Patients whose care can’t be safely provided on the West Coast are transferred to Canterbury by air or road. Handover and patient review between the specialists and the rural hospital medicine doctors provide ongoing team building and education. It is planned to test a version of this model for general medicine inpatient services. It has potential applicability in other areas, such as mental health.
The success of this new model of service provision depends on high trust relationships with skilled clinicians (doctors, nurses, allied health professionals) on the ground on both sides of the Alps, who see themselves as part of the transalpine team. Easy and timely communication with the right clinical people when required is important. Jointly developing patient pathways which all clinicians follow allows care to be provided consistently and transfers of care to happen without delay. Appropriate use of technology, and joint appointments, with shared responsibility, also have enabled this model to work. Focusing on developing trust, and listening to feedback from people on the ground, have been key to improving services when difficulties have arisen.

The vocational scope of rural hospital medicine is new, and it sits within the Royal New Zealand College of General Practitioners. The number of Fellows is currently small in New Zealand, and emphasis is being placed on training rural hospital medicine registrars, as well as general practice registrars within the West Coast and Canterbury health systems, to match the demand for this new breed of generalist doctors. Fellows can be jointly trained in both rural hospital medicine and general practice and registrars are encouraged to pursue dual training. This provides the opportunity for generalist doctors to increasingly span across the community and hospital settings.

The Transalpine Health Services model points the way to a future sustainable way of providing a quality patient experience as close to home as possible, for people who live in provincial New Zealand. It is worth noting that within major urban tertiary hospitals, the need for generalist doctors to manage the complexity of multimorbidity in patients exists alongside the highly specialised services provided.

**Actions needed for a sustainable future medical workforce**

So what is required to develop a more balanced medical workforce that is fit for future purpose? There must be the political will for change, both at the national ‘high politics’ end, but also within the health community. A change in the medical culture is required from one that values subspecialisation above generalism, to one that spreads prestige across the spectrum. We all have a part to play to bring about this change.

Our medical schools and teaching faculties have a significant role to play in promoting generalists as doctors who are highly valued for their broad knowledge and skills over a large spectrum of health issues. Positive exposure to generalist doctors, both in hospital and community settings, in undergraduate and early postgraduate years increase the uptake of generalist careers. Our medical schools have a real opportunity to influence the future career decisions of the next generation of doctors and need to continue increasing the undergraduate exposure they provide to generalism.

Incentives need to be aligned to promote medical careers based in generalism for junior doctors. Academic opportunities, and opportunities for procedural work, have been shown to be equally important as expected future earnings in driving career choice for junior doctors. Increasing the academic base where research in generalism happens would increase its attractiveness as a career. Increasing the opportunities for general practitioners and rural hospital medicine doctors to be involved in procedural work should be considered. Health Workforce New Zealand should direct more funding towards generalist registrar training, both within specialty colleges and within the generalist college. The increase in uptake of general practice registrar training this year shows the value of Health Workforce New Zealand providing junior doctors with information about where future senior medical jobs will lie. It should also consider how to support senior doctors who wish to expand or refresh their skill set to work in a more generalist way.

The specialist medical colleges could more actively promote generalist training within their specialty, as the Royal College of Physicians are doing in the UK. They also could explore endorsing extended scopes of practice for generalist doctors in New Zealand with appropriate training, as the Australian branches of their colleges do.
When the Medical Council of New Zealand considers scopes of practice, they should consider patient access to timely services as an element of quality of care.

District Health Boards need to continue developing regional networks that cross existing DHB boundaries, through their regional service planning and implementation work. The recently created Alliance structures between District Health Boards and Primary Health Organisations offer great potential for developing clinically-led, system-wide governance for integrated care.223

Effective local and regional health systems need to be designed by the doctors, nurses and allied health professionals working in them, with input from patients who use them, and with local management support and enablement. Generalists and specialists working collaboratively will provide shared clinical governance of the health system they create. The Commission on Generalism report noted

“For the patient, it should not have to be generalist or specialist care: we can combine the strengths of each.... That is not to say that generalism should supplant specialism; rather there needs to be a much more effective spectrum of medical care embracing a generalist perspective and specialist practice.”22

Lastly, system wide outcome measures need to align to measure quality of care and patient outcomes appropriate to the community being served. There should be an increasing focus on metrics that monitor the health system's ability to keep people with complex multimorbidity and social disadvantage living well in the community, out of hospital and out of aged residential care. The new Integrated Performance and Incentive Framework that the Ministry of Health is leading the design of, with significant sector input, is seeking to do this.23 Its development should be supported and progress watched keenly.

We need a new workforce model to provide sustainable health services in the future. This challenge is not unique to New Zealand. System-wide changes are needed to support a more balanced future medical workforce. The developing Transalpine Health Services model for the smallest provincial hospital in the country points the way to how future sustainable services could be provided in other areas, with generalists, specialists and subspecialists working together. We have the opportunity to become a world leader in promoting generalism, training generalists and redesigning our health system for the changing needs of our population. We must rise to the challenge.

Competing interests: Nil
Author information:
Carol Atmore, General Practitioner
Corresponding author:
Carol Atmore, General Practitioner
drcarolatmore@gmail.com

REFERENCES:


18. Hart JT. The Inverse Care Law. The Lancet 1971;297:405-412


23. Gauld R. What should governance for integrated care look like? New Zealand’s alliances provide some pointers. MJA 2014;201:567-8

Meeting the challenges of interpreting variants of unknown clinical significance in BRCA testing

Vanessa Lattimore, Margaret Currie, Caroline Lintott, Jan Sullivan, Bridget A Robinson, Logan C Walker

SUMMARY IMPORTANCE OF BRCA1 AND BRCA2 GENE SCREENING

- Many BRCA1 and BRCA2 genetic mutations are known to result in an elevated breast cancer risk.
- Routine BRCA1/2 gene screening is offered to patients thought to have an increased risk of carrying a deleterious mutation.
- 5–10% of genetic tests identify a variant of unknown clinical significance (VUCS), creating significant challenges to health care providers.
- Recent advances in sequencing technologies allow more genes to be screened in an increasing number of individuals and at an ever decreasing cost.
- Significantly more VUCS will be identified, adding to the uncertainty of how to manage these patients.
- The addition of splicing assays to current variant classification tools may be instrumental towards understanding the disease risk of these variants and improve the reliability of these assays.

Genetic mutations in the breast cancer susceptibility genes BRCA1 and BRCA2 are known to confer a highly elevated risk of breast cancer in at least 20% of multi-case families, ranging from 44% to 75% risk of cancer for BRCA1 mutation carriers and 41% to 70% risk for BRCA2 mutation carriers. Moreover, BRCA1 and BRCA2 mutations are estimated to account for up to 84% of families with four or more cases of breast cancer diagnosed younger than age 60 years.

Routine diagnostic BRCA1 and BRCA2 gene screening for deleterious mutations is offered to affected individuals from high-risk breast-ovarian cancer families to identify the genetic cause for their disease. Currently, the pre-test probability of a genetic test identifying a pathogenic mutation in these high risk individuals is very low, while we are also yet to gain a thorough understanding of how to interpret many of the variants that are identified. This uncertainty may lead to possible adverse psychosocial consequences for patients and their families.

While elevated stress levels are observed in women confirmed to carry pathogenic mutations, the intensive precautionary and preventative measures implemented as a result of this knowledge can significantly improve both disease-free survival and outcome if disease does develop. A negative genetic test result usually decreases anxiety in these patients, whereas it also reduces health costs as treatment, and preventative measures can be focused on those who are thought to have a significantly elevated risk of disease.

Currently, affected patients are offered BRCA1 and BRCA2 screening by Genetic Health Services New Zealand (GHSNZ) if they have one or more criteria outlined by eviQ Cancer Genetics—Breast and Ovarian Referral Guidelines (https://www.eviq.org.au/) (Box 1).

In New Zealand, approximately 300–500 of the 1,600 women referred to GHSNZ for genetic risk assessment are offered BRCA1 and BRCA2 gene screening each year. A further 350–400 individuals are
Discussion

Variants of unknown clinical significance

An important practical issue associated with genetic testing is the identification of rare sequence variants that are not predicted to lead to obvious or easily detectable molecular aberrations, such as protein truncation or RNA splicing defects. These variants are identified in approximately 5–10% of BRCA1/BRCA2 clinical test results and are difficult to classify clinically as pathogenic (associated with disease risk) or neutral. Variants of unknown clinical significance (VUCS or unclassified variants) create a significant challenge for counselling and clinical decision making when identified in patients with a strong family history of breast and/or ovarian cancer. Over the last 10 years, up to 100 New Zealand individuals from a large number of families will have received a report from their BRCA genetic test indicating that they carry a VUCS. The associated uncertainty is known to leave many variant carriers with higher levels of anxiety, depression, and distress compared with those individuals receiving a negative result.7 Thus, interpreting unclassified sequence variants is not only necessary for the patient undergoing genetic testing but also for their relatives and future generations who may inherit these unclassified variants.

Seventy percent (1757/2474) of the entries in the commonly utilised genetic database, Breast Cancer Information Core database (http://research.nhgri.nih.gov/bic/accessed 11th June 2015) remain unclassified. We predict that this number will rise substantially with the increased uptake of next-generation sequencing technologies in testing laboratories. Such technologies offer cheaper (per base), user-friendly, high-throughput sequencing, and this will enable more diagnostic laboratories to offer genetic testing across the entire gene of interest (exonic and intronic regions) on a greater number of individuals. Furthermore, advances in NGS technology have enabled the development of multiplex gene panels so that numerous genes can be assessed simultaneously for breast/ovarian cancer-risk sequence variants. Expanding the number of genes included in each test will inevitably lead to a rise in the number of unclassified variants being detected. Indeed, a recent study evaluating the coding regions and exon-intron boundaries (±10 base pairs) of a 42-cancer gene sequencing panel (including BRCA1 and BRCA2) identified unclassified

<table>
<thead>
<tr>
<th>Box 1. Example of criteria used to prioritise individuals for germline BRCA1/BRCA2 testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Triple negative (oestrogen, progesterone and HER2 receptor negative) breast cancer and &lt;40 yrs at diagnosis</td>
</tr>
<tr>
<td>• Invasive non-mucinous ovarian, fallopian tube or primary peritoneal cancer at any age and a family history of breast or ovarian cancer</td>
</tr>
<tr>
<td>• Personal and/or family history of both breast cancer and epithelial ovarian cancer</td>
</tr>
<tr>
<td>• Ashkenazi Jewish ethnicity (for Jewish founder mutations)</td>
</tr>
<tr>
<td>• Member of family with confirmed BRCA1 or BRCA2 mutation</td>
</tr>
<tr>
<td>• Individual with a calculated BRCA1/2 mutation probability of 10–20% or more using a BRCA1/2 mutation probability risk calculator e.g. BRCApro or BOADICEA</td>
</tr>
<tr>
<td>• Woman with bilateral breast cancer and a family history of breast and/or epithelial ovarian cancer</td>
</tr>
<tr>
<td>• Male breast cancer</td>
</tr>
<tr>
<td>• Breast cancer diagnosed before age 30 years</td>
</tr>
<tr>
<td>• Bilateral breast cancer with first diagnosis under age 50 years</td>
</tr>
</tbody>
</table>
variants in approximately 90% patients who had previously undergone BRCA1/2 testing. The trend towards sequencing deeper into the intronic regions will also undoubtedly increase the numbers of unclassified variants identified in BRCA1 and BRCA2 genetic tests. Managing high rates of unclassified variants will become increasingly difficult for oncologists and genetic counsellors as they try to explain the significance of these results to patients. Although surveillance of such patients will likely continue, based on personal and family history, health providers and/or diagnostic laboratories also need routine protocols for 1) re-examining the genetic results on a regular basis as international databases update; and 2) anonymising genetic data so that they too can contribute to international databases. In addition, existing variant classification tools need to be adopted and further developed by New Zealand laboratories, to keep abreast of the technological advances.

Classifying BRCA1 and BRCA2 variants of unknown clinical significance

An important tool to evaluate the clinical significance of unclassified variants is the multifactorial likelihood model. This statistical tool integrates data from several sources, such as clinical, tumour pathology and molecular data, targeting characteristics associated with known BRCA1/BRCA2 pathogenic mutations (Figure 1). This multifactorial approach can help gain an understanding of the role each variant is having on disease development.

The posterior probability calculated from the multifactorial model is assigned to one of five classes using a scheme developed by a panel of experts at the 2008 IARC Unclassified Genetics Variants Working Group. This scheme defines class 1 low clinical significance variants as having a <0.01% probability of being pathogenic; class 2 variants—low clinical significance, probability 0.1%–4.9%; class 3 variants—uncertain probability 5%–94.9%; class 4 variants—likely pathogenic, probability 95%–99%; and class 5—pathogenic, probability >99%.

From these categories, predictive testing of at-risk relatives is recommended for class 5 variants, however research testing of relatives for class 2, 3 and 4 variants may also be important to refine their classification. Multifactorial analysis has been successfully used to reclassify 109 BRCA1 and 93 BRCA2 variants into classes 1 (benign), 2 (low risk), 4 (likely pathogenic) and 5 (pathogenic). Research is currently underway to assess the potential of mRNA splicing assays for determining the molecular impact of unclas-

Figure 1: Multifactorial model for classifying rare variants in BRCA1 and BRCA2.
sified variants in patient samples. Aberrant mRNA isoforms may occur as a result of rare sequence variants and have the potential to disrupt the normal function of BRCA1 and BRCA2 proteins. The implementation of RNA splicing assays has previously been described as an indispensable tool in a clinical diagnostic setting, and the inclusion of these assays into the above multifactorial analysis is only a matter of time. However, a number of guidelines need to be adopted to improve the reliability of these assays and ease of use for everyday clinical practice, including the standardisation of assay designs and reporting. As future assays will likely require both qualitative and quantitative assessment of mRNA splicing aberrations, it is easy to envisage another role for NGS, such as targeted RNA-seq.

Of note, New Zealand researchers are currently involved in several molecular and sequencing-based projects in collaboration with members of the international ENIGMA (Evidence-Based Network for the Interpretation of Germline Mutant Alleles) consortium (enigmaconsortium.org). ENIGMA was established to focus on developing and improving methods to classify variants in breast cancer genes, including BRCA1 and BRCA2, by pooling resources from international collaborative diagnostic and research laboratories. Their work includes an assessment of the IARC system, which highlighted several of the recommendations and challenges mentioned above. Furthermore, the New Zealand Familial Breast Cancer Study was established to recruit a cohort of women who have a personal or family history of breast cancer, and meet the Genetic Health Services New Zealand criteria for genetic testing. This study will allow local researchers to maintain collaborative links with ENIGMA and other international consortia to help understand the effects of BRCA1 and BRCA2 variants on cancer risk.

Future impact of genetic testing for breast cancer families in New Zealand

The recent evolution in sequencing technologies will enable more affordable genetic testing for New Zealand breast cancer families. However, it will also likely mean that an increased number of tests will return ambiguous results, thus providing a significant challenge to health care providers. Current efforts to improve variant classification systems, such as those by ENIGMA, will be crucial to understand the impact these variants are having on the risk of disease for an individual. It is imperative that oncologists, genetic counsellors and general practitioners are resourced sufficiently to take advantage of current and future classification tools. This may include routine collection of necessary clinical and pathological data along with bio-specimens to enable laboratory based analyses.

In the age of advancing genetic sequencing technologies patients are required to be fully informed of the implications and increasing likelihood of obtaining an unclassified variant result in their genetic test. Emphasising that many of these variants may not have an impact on disease risk is important, but also, such variants should not be included in patient management decisions until strong evidence is obtained that determines whether or not the variant is deleterious. Improvements to the current classification guidelines to help establish risk will be ongoing, as new information becomes available and interpretation processes advance. It is therefore recommended that all variants recorded in public databases are date-stamped to mark the time of classification. Furthermore, variant information should be submitted with donor consent to locus specific databases, such as the Breast Cancer Information Core, and the Leiden Open Variation Database 2.0, to facilitate accurate interpretation of genetic tests and contribute to the national and international health and research community. Use of quantitative tools to assess variants, such as the multifactorial likelihood model, is time consuming and therefore may not be feasible for routine application by genetic associates and clinical geneticists. An alternative approach is to develop a multidisciplinary collaboration of stakeholders (health care providers, patients and researchers) to curate DNA variants identified in New Zealand breast (or ovarian) cancer patients and assign clinical relevance. Analysis of genetic data would be carried...
out nationally by dedicated research and/or diagnostic laboratories and expertly curated in collaboration with the international community through consortia, such as ENIGMA.

Establishing better variant classification tools (e.g., laboratory-based assays) and national practices is critical to meet the challenges associated with the increased sensitivity and specificity of genetic tests. If successful for BRCA1 and BRCA2 variants, then these methods will provide exemplars when striving to understand the risk behind variants in other cancer-associated genes.

Competing interests: Nil
Acknowledgements: VL is funded by the Otago University PhD scholarship, LW by the HRC Sir Charles Hercus Health Research Fellowship, and the research was supported by the Mackenzie Charitable Foundation. The authors are members of the Canterbury Comprehensive Cancer Centre (C4).

Author Information: Vanessa Lattimore, PhD student, Pathology department, Otago University Christchurch, Christchurch; Margaret Currie, Senior Research Fellow, Pathology department, Otago University Christchurch, Christchurch; Caroline Lintott, Senior Genetic Associate/Team leader, Genetic Health Service NZ – South Island Hub, Christchurch Hospital, Christchurch; Jan Sullivan, Genetic Health Service NZ – South Island Hub, Christchurch; Bridget A Robinson, Medical Oncologist, Department of Medicine, Otago University Christchurch, Christchurch

Correspondence: Logan C Walker, Senior Research Fellow, Pathology department, Otago University Christchurch, 2 Riccarton Ave, Christchurch, 8011
logan.walker@otago.ac.nz

REFERENCES:


Huge palatal mass
Toshihiro Inagaki, Makoto Adachi, Munehiro Azuma, Yasunori Muramatsu

An otherwise healthy 67-year-old man was referred to an oral and maxillofacial surgery clinic for the diagnosis and treatment of a mass in the vault of the palate (Figure A). Three months previously, the lesion was pointed out by his physician whilst undertaking upper gastrointestinal endoscopy for a medical health examination. This lesion was of long time duration and was asymptomatic.

On intra-oral examination, the mass was 38×25mm diameter, pedunculated, elastic, firm, the surface non-ulcerated and covered with normal mucosa without ulcer. Biopsy was performed and the lesion was diagnosed as a fibroma.

Then, the tumour was resected surgically under general anaesthesia and histology confirmed a benign fibroma. (Figure B) Healing was satisfactory and there has been no recurrence. The differential diagnosis of a palatal mass should be considered including, torus palatinus, pleomorphic adenoma of minor salivary gland, malignant minor salivary gland tumour, odontogenic or neurogenic tumours.¹

Competing interests: Nil
Author information:
Toshihiro Inagaki, DDS, Makoto Adachi, DDS, PhD; Munehiro Azuma, DDS, Yasunori Muramatsu, DDS, PhD, Department of Oral and Maxillofacial Surgery, Asahi University Murakami Memorial Hospital, Gifu, 500-8523, Japan
Corresponding author:
Makoto Adachi, DDS, PhD, Department of Oral and Maxillofacial Surgery, Asahi University Murakami Memorial Hospital, 3-23 Hashiotocho, Gifu, Gifu 500-8523, Japan.
madachi.dds.phd@yahoo.co.jp
URL:

REFERENCES:
LETTER

May we at least have a civilised discussion about primary aldosteronism in New Zealand?

Walter van der Merwe, Veronica van der Merwe

Primary aldosteronism (PA) is the commonest and most important remediable secondary cause of hypertension reportedly affecting at least 2% of the general hypertensive population and up to 22% of patients referred to specialist clinics for hypertension.\(^1,2\) The diagnostic rate of PA in New Zealand (or greater Auckland anyway) however, appears to be extremely low, and it is a matter of intense frustration to me that I have, to date, been unable to generate any meaningful discussion or debate about this.

I attribute this, in part, to The New Zealand Medical Journal (based on reviewer reports) declining to publish two PA series from the Waitemata DHB Hypertension Clinic. In the first paper, in 2012, we reported 8 cases of PA among 635 patients referred to the clinic—an incidence of 1.25%. (We eventually published these results in an open-access hypertension journal which is available for perusal free on-line\(^3\)). This seemed a very low number given the international experience, so we revised our screening and workup criteria and following implementation of these, then did a further prospective audit of PA diagnosis. In the calendar year 2013, we reported 33 cases among 631 consecutive hypertension clinic patients—an incidence of 5.2%, which represents a quadrupling of the earlier diagnostic rate. The majority of these patients were Waitemata DHB (population 550,000). For comparison, I did a straw poll of endocrinologists in greater Auckland, including (population 1,500,000) and could only find an additional 5 or 6 confirmed PA diagnoses for that year.

We wrote up this second study, and again submitted it to The New Zealand Medical Journal, who again declined it, on the basis of the report of one of two reviewers. The reviewer who did not like the paper took issue with our interpretation of data and suggested that widespread screening for PA was too expensive, and that missing the diagnosis of PA may not matter too much because patients with resistant hypertension are likely to eventually end up on spironolactone anyway. The reviewer also questioned why our PA diagnostic rate was less than some reported series. All of these points may have some validity, but this subject is too important just to be swept under the carpet. This (by New Zealand standards) is a big series, and (reviewer's comments notwithstanding) we are diagnosing the vast majority of PA in greater Auckland (containing 1/3 of the national population). This in turn implies that either the problem is widely undiagnosed (at least in greater Auckland, outside the Waitemata DHB area), or we are egregiously diagnosing PA where it does not exist (which we would vigorously contest).

PA is an important and common secondary cause of hypertension, which is difficult to diagnose. I don't pretend to have all the answers, but I passionately believe that its profile needs to be raised among New Zealand medical professionals—particularly GPs who are the sole medical contact for most patients with hypertension. I urge you to read the full text of my (unpublished) paper ‘Amplified Screening and Workup Protocol for Primary Aldosteronism: A Strategy to Improve New Zealand's Woefully Low Diagnostic Rates?’ A PDF version of this is available on my educational website www.hypertensionclinic.co.nz. At the bottom of the first page click on the link to
LETTER

‘Primary Aldosteronism Paper’. There is also a link to a second (unpublished) paper on fludrocortisone suppression testing, which we believe is an essential component of PA work-up.

We would welcome contact from anyone who has an interest in this area.

2. Calhoun DA. Aldosteronism and hypertension. CJASN 2006;1:1039-1045
3. Chan PL, Van Der Merwe V, Van Der Merwe W.

Competing interests: Nil

Author Information:
Walter van der Merwe, Hypertension Specialist Ltd, Auckland; Veronica van der Merwe
Hypertension Specialist Ltd, Auckland

Correspondence:
Walter van der Merwe, Hypertension Specialist Ltd, Level 2/ 187 Queen Street, Auckland. waltervandermerwe7@gmail.com

URL:

REFERENCES:

2. Calhoun DA. Aldosteronism and hypertension. CJASN 2006;1:1039-1045
3. Chan PL, Van Der Merwe V, Van Der Merwe W.

Should all hypertensive patients be screened for primary aldosteronism? J.Hypertens (open-access).2014;3:1-5
Efficacy and safety of blood pressure-lowering agents in adults with diabetes and kidney disease

The authors of this study note that the comparative efficacy and safety of pharmacological agents to lower blood pressure in adults with diabetes and kidney disease remains controversial. Their meta-analysis of relevant randomised trials investigates the benefits and harms of various blood pressure lowering drugs in these patients. The primary outcomes were all-cause mortality and end-stage kidney disease.

157 studies comprising 43,256 participants, mostly with type 2 diabetes and chronic kidney disease, were included in the network meta-analysis. No drug regimen was more effective than placebo for reducing all-cause mortality. However, compared with placebo, end-stage renal disease was significantly less likely after dual treatment with an angiotensin-receptor blocker (ARB) and an angiotensin-converting-enzyme (ACE) inhibitor and after ARB monotherapy.

The researchers noted the benefits of the ARB and ACE treatments need to be balanced against potential harms of hyperkalaemia and acute kidney injury. The analysis showed no support for the use of beta blockers, calcium channel blockers, renin inhibitors, or diuretic monotherapy in the clinical trials.

Lancet 2015; 385:2047-56

Efficacy and safety of paracetamol for spinal pain and osteoarthritis

Paracetamol is the most commonly used over-the-counter medicine to treat spinal pain and osteoarthritis. This meta-analysis reviews the efficacy and safety of its usage in these conditions.

The review included 13 randomised trials comparing placebo with paracetamol. Approximately 4,000 patients were involved. Most of the included trials used the maximum dose of 4,000 mg/day, as recommended by the US Food and Drug Administration, with only two trials using 3,000 mg/day as the maximum dose.

The conclusions reached were that paracetamol is ineffective in reducing pain or disability in patients with low back pain and provides small and not clinically important effects for those with hip or knee osteoarthritis. Adverse events were found to be similar between the paracetamol and placebo groups. There was a four-fold increase in liver function test abnormality in the paracetamol group.

BMJ 2015; 50:h1225

Allopurinol in the treatment of gout

Allopurinol is the most common option selected for urate-lowering therapy in the management of gout. Lowering the concentration of the serum uric acid (SUA) reduces the risk of gout and facilitates the dissolution of tophi.

New international recommendations suggest lower starting doses in patients with impaired renal function, followed by titration of dose every 2-4 weeks to achieve target SUA of ≤ 0.36 mmol/L. This review looks at the management of gout in a large teaching hospital in Sydney.

They found that the dose prescribed was most commonly a continuation of the pre-admission dosage. SUA concentrations were measured in only 21% of the patients. They concluded that without SUA measurements and allopurinol dose titration, patients with SUA >0.36 mmol/L are at increased risk for acute attacks of gout in hospital.

Internal Medicine Journal 2015, 45; 383-390

URL:
A Legal Opinion

12 Childers Road, Gisborne, April 20th, 1915.
Dr. Reid, Hon. Secretary P.B., N.Z., B.M.A., Gisborne.

Dear Sir,

Re “Medical Practitioners’ Act, 1914.”

We are asked to advise you on the position of a medical practitioner under the following state of facts:—

1. A chemist allows a medical practitioner the use of a room at his shop for consultations during one or two hours a day.
2. No rent or charge is made for the use of the room.
3. There is no bargain or understanding with the chemist that the latter is to have the doctor’s patients sent to him with their prescriptions. On the contrary, the patient is free to go to any chemist he pleases.
4. This has been a common practice here for a number of years.

The question as to the doctor’s position arises by reason of section 25 of “The Medical Practitioners’ Act, 1914.” It is as follows:—

“Every medical practitioner liable to a fine not exceeding twenty pounds who solicits, accepts, or agrees to accept from any registered chemist, or from any person being the proprietor or manager of any open shop or place of business for the compounding and dispensing of prescriptions, any monetary gift or other consideration or concession, either directly or indirectly, as commission on prescriptions prescribed by such medical practitioner, or who uses in the course of his business any prescription forms or envelopes, or other wrappers having written or printed thereon any reference to the name, shop or place of business of such registered chemist, proprietor or manager.”

The mischief which this section of the Act is designed to prevent is the payment of any commission by a chemist to a doctor in respect of prescriptions. Two elements must be present in order to constitute an offence:
(1) The acceptance of “any monetary gift or other consideration or concession either directly or indirectly,” (2) “as commission on prescriptions prescribed by such medical practitioner.”

Whether these elements are present in the case stated depends on the facts or the inference that may legitimately be drawn from the facts.

There is a “consideration or concession” made by the chemist to the doctor in allowing him the use of the room free of rent. The matter is therefore narrowed down to the question whether such consideration or concession is given “as commission on prescriptions.” In the first place notwithstanding that there is no bargain or tacit agreement with the chemist, does the receipt of the concession of itself justify an inference that the concession is a commission? There can be no doubt that it does not, for the section does not forbid in general the making of any concessions. It only forbids those made “as commission on prescriptions.” So long, therefore, as the consideration or concession is not “as commission on prescriptions” it is not unlawful, and from the mere fact of a concession being made no adverse inference should be drawn.

The question therefore seems to depend on this: What is the consideration or benefit moving from the doctor to the chemist in respect of the license to use the room free of charge? The true answer to this seems to be that in exchange for the RIGHT to use the room the doctor does in fact use it. It is a probable result of that use that patients who are indifferent as to where their prescriptions are made up (and perhaps others as well) will employ the chemist through whose shop they will pass. It is probable that waiting patients will make purchases. The chemist does not obtain the business of these persons from any recommendation that would suggest a commission, but merely because of the favourable position of his shop in relation to the doctor’s rooms.

It may be argued however that on the above facts an inference should be drawn that the use of the room rent free is a consideration as commission on prescriptions. And the matter would be put thus:—

1. Most of the doctor’s patients present their prescriptions to the chemist at whose shop he has rooms.
2. In return the doctor received a consideration or concession.
3. The consideration or concession is given because of the prescriptions.
4. It is therefore given as commission on prescriptions. We think this fallacious at it reverses the order of events.

The rooms are in the first place let to the doctor and it is after he begins to use them that prescriptions are handed to the chemist. They are therefore not let in return for any preceding benefits. And as there is no bargain between the doctor and the chemist with regard to prescriptions it is not a commission paid in advance for it is conceivable, if unlikely, that no patients may employ the chemist. Assuming that on the first day on which a doctor uses his rent-free room no patients came to him, could it be said that the benefit of having the rooms rent free was a concession received by him as commission on prescriptions prescribed by him? The true position seems to be that the room is let free of charge not on account of what has passed but in expectation of future benefits derived from the doctor but from his patients.

We have not dwelt on the words “on prescriptions prescribed by him.” Without elaborating the matter we may add that they have some bearing on the view that to support a conviction under the section there must be some bargain or understanding on the matter of prescriptions and commission.

For the reasons given we therefore think that on the facts as stated there would be no breach of clause 25 of the Act.

Yours faithfully,

(Signed) BLAIR AND SAINSbury,
Legal Advisers to the P.B., N.Z., B.M.A.

[This opinion is legal, but not altogether logical.—Ed. NEW ZEALAND MEDICAL JOURNAL. August 1915]