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Avoidable hospitalisations: potential for primary and public health initiatives in Canterbury, New Zealand
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All hospitalisations in Christchurch Hospital from 2000 to 2004 were analysed to identify admissions that were potentially avoidable and their associated costs; 31% of all admissions were found to be potentially avoidable by earlier detection and intervention (using primary health and public health initiatives such as smoking cessation). The total estimated costs of avoidable admissions to Christchurch Hospital in 2003 were NZ$96.6 million, accounting for an estimated 94,462 bed days. The leading causes of potentially avoidable hospitalisations were cardiovascular disease, stroke, respiratory, gastrointestinal, and urinary disorders. There is considerable potential to invest in early detection and intervention in these areas.

Otago Rural Hospitals Study: What do utilisation rates tell us about the performance of New Zealand rural hospitals?
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The aim of the project is to increase our understanding of the role of rural hospitals within the healthcare system. The study used information routinely collected about every patient admission (at point of discharge), which is held centrally by New Zealand (NZ) Health Information Service. The findings of most significance were that the hospitalisation rates for the rural Otago population were in keeping with NZ averages, whilst the average length of stay for patients was significantly less than the NZ average. The study findings cautiously suggest that rural Otago is served appropriately by its rural hospitals which handle about 40% of all hospital admissions for rural Otago residents. Furthermore, these figures suggest a potential for rural hospital services elsewhere in NZ. The Otago rural hospitals are run by active community groups and are independent contractors with the ODHB, so they can perhaps more actively negotiate appropriate levels of funding than rural hospitals elsewhere in NZ. Similar analyses should be carried out elsewhere in New Zealand to ascertain if DHBs are making the best use of their rural hospitals.

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The provision of specialist services to the rural communities is a difficult problem faced not only in New Zealand. This has been addressed by the introduction of an innovative service delivery method—using a mobile surgical service (bus). This study reviews the first 2 years of this service in regard to the initial goals that were set out before the service was started. The study finds most of the gaols were achieved and finds that over 1900 procedures were undertake , 1 in 3 treated were Māori and 40% were aged under 15 years.

Patients' complaints about doctors in surgical training
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Complaints are a part of medical life. Speciality trainees are arguably most at-risk in regard to the detrimental psychological effects of these complaints. This study explores surgical trainees' responses to major complaints. Trainees receiving complaints find them difficult to deal with. It is important that trainee doctors receive support and guidance throughout this difficult and stressful event.

International medical graduates' training needs: perceptions of New Zealand hospital staff
S Narasimhan, A Ranchord, M Weatherall

The study's aims were to identify key areas that International Medical Graduates (IMGS) working under supervision in New Zealand hospitals need to focus upon when working in New Zealand and to make recommendations based upon those identified areas, which will allow hospital service leaders to establish a programme to help these IMGS to have a more equitable entry into the New Zealand health system. We identified that specific training may improve performance of overseas-trained doctors working in the New Zealand health system. Additionally, we believe a follow-up study specifically for IMGS would be useful, as it may get a better understanding of the experiences of IMGS in New Zealand and it may identify their perceived needs.

The Community-Referred Radiology scheme: an evaluation
P Crampton, A Bhargava

Radiological investigation is a necessary basic component of primary health care—yet primary health care access to radiology services in New Zealand is inconsistent and is frequently hampered by long waiting times (in the case of outpatient referrals) or considerable financial barriers to access (in the case of private referrals). The Community-Referred Radiology (CRR) scheme was introduced in the Wellington region in December 2000, whereby private radiology clinics were funded by Capital and Coast District Health Board to carry out GP-referred radiology procedures. The aim of the study reported here was to evaluate the CRR scheme. From both clinical and administrative points of view, the CRR scheme is perceived as being a popular, well-run, and streamlined service. The comparatively low rate of radiology referral for Māori people and people living in the most deprived areas, as well as the lower average cost of their tests, warrant further investigation. Several recommendations are made aimed at further enhancing the scheme.

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Is it ethical for doctors to strike?

Frank Frizelle

A strike by doctors meets with a great deal of resistance not only by the public but from within the medical profession. The recent resident medical officers' (RMOs—also known as junior doctors) strike in New Zealand has again created a discussion about the ethics of doctors striking. Previous national strikes in 1992 caused a raft of letters to the *NZMJ* complaining that the strike was unethical, with an equal number saying that junior doctors needed an improvement in conditions and that the strike was justified.[1–6]

The present junior doctors' strike has lead to local newspapers publishing letters from senior doctors and members of the public saying that this action (of striking) is unethical and "has broken the 2000-year-old Hippocratic oath."

The press has reported the present RMO strike as unprecedented. But anyone who has been an RMO or senior medical officer (SMO—also known as specialist or consultant) since 1985 will know that this is rubbish. RMOs have been on strike before—locally, nationally, and internationally. Not only RMOs have been on strike, but SMOs as well.

The usual claims are pay, conditions, or contractual relationships—as with any occupational group. (The specific details of the claims that form the basis of the latest New Zealand junior doctors' strike are not the basis for discussion here.)

Apart from New Zealand, in the past 20 years there has been strikes by medical doctors in Australia, Belgium, Canada, Chile, Finland, France, Germany, Ghana, India, Ireland, Israel, Italy, Korea, Malta, Peru, Serbia, Spain, Sri Lanka, Romania, USA, UK, Zambia, and Zimbabwe to name but a few.

Many of these strikes have caused lasting damage from which health systems have struggled to get over; have been very costly (both in the short and long term); and have not achieved what the management appear to have wanted.

Many strikes around the World have been about similar issues. One of the most famous strikes was in the Mediterranean island state of Malta, which lasted for 10 years.[7] The origin of this strike lay with low pay for RMOs, leading to problems with recruitment (as new medical graduates left the country as soon as possible after graduation).

A new role was subsequently established called temporary medical offices (TMOs). These TMOs were required to work long hours for low pay. To correct this chronic shortage of junior doctors, the Maltese Government made it compulsory for all graduating doctors to serve as housemen in public hospitals for 2 years. The senior doctors protested and, as a result, the Government brought in overseas doctors from Libya, Algeria, Cyprus, Czechoslovakia, and Egypt at three times the rate the local doctors were being paid. Many of the Maltese doctors left for the UK and other countries, no doubt to large pay increases themselves.

Amongst those who left were the teaching staff from the medical school, leading to the Malta Medical School losing the General Medical Council (GMC) and international recognition of the Maltese medical degree. The Maltese Labour Party in power at the time lost the next election. The National Government which replaced the Labour Government attempted to reappoint doctors at higher pay rates than those who had lost their jobs, however by them many were well-established elsewhere in other countries—in fact, some of the most famous British surgeons over the past 20 years have come from Malta.

Strikes in New Zealand have also caused considerable and at times lasting dysfunction in certain hospitals. The SMO Timaru strike of 2003 was over the usual issues of pay and working conditions. Eventually, after a 5-week strike by SMOs, it was settled, however several consultant staff left Timaru Hospital for other centres or full-time private practices. The strike is reported as creating an "overwhelming feeling of a complete lack of confidence and trust in the hospital management team."[8]

A similar situation occurred with the prolonged strike in Invercargill where RMO staff were on strike for about 2 months in 1992. The strike was over individual contracts versus collective contracts. The strike was near the end of the year, and when the RMOs finished their year, the new RMOs took up the individual contacts, however within 2 years almost all were back in the collective contract. The results of the strike meant that the general manager left, a large number of SMOs felt disillusioned by the pathway the management had taken with dealing with the RMOs, and the hospital struggled to obtain and retain New Zealand RMOs for years afterwards, instead relying heavily on overseas RMOs. This required special packages and extensive (and expensive) advertising to facilitate recruitment.

Reasons given by those against strikes were published in 1986 and are the same as those reiterated by many today.

These include:[9]

- It could result in avoidable suffering and death;
- It would be a breach of the implicit contract doctors have entered into with their patients;
- It would be against the code of ethics doctors may have sworn to;
- It would amount to "holding to ransom" a weak and vulnerable segment of the population for material gain;
- It would shatter the image of doctors as selfless healers; and
- Doctors are already overpaid—strike action is greed.

(While there are shades of truth in each of these points they are all debatable.)

A detailed ethical justification for doctors striking was put forward and published 20 years ago in the NZMJ.[9] It is worth re-reading for those interested. The main point is that despite doctors having a special contract with society, a utilitarian case can be made for a strike. What this means in simple terms is "what is right should result in the greatest good for the greatest number of people." The short-term inconvenience such as a strike must be balanced against an improvement in care—as a result of

allowing doctors to have better living conditions and being better rested, and so then being able to do their job better.

If doctors (and others) truly believe it is important for patient care, then they must sometimes have the courage to do things that are unpopular and difficult. If the conditions that doctors work under put patients at risk, then (on balance) they are morally obliged to strike.

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The Cochrane Library is now freely available to all New Zealanders

Vanessa Jordan, Mark Jeffery, Cindy Farquhar

The Cochrane Collaboration was established just under 13 years ago and has now grown into a large international network of 13,000 individuals from 91 countries. The aim of the organisation is to "help people make well-informed decisions about health care by preparing, maintaining, and promoting the accessibility of systematic reviews of the effects of healthcare interventions". The production of Cochrane reviews has continued at an impressive rate over the last few years with, on average, 350 new reviews being added each year; almost 1 new review per day! At the time of writing the total number of Cochrane Reviews is 2608 with 1592 further reviews in progress with their published protocols available.

The second part of the Collaboration's mission statement is about the accessibility of Cochrane reviews. The reviews are published in The Cochrane Library which has been available in two formats: CD ROM updated four times per year and via Internet access. Whilst the abstracts and synopses of Cochrane reviews are available free on the Internet, access to the full reviews and other databases in The Cochrane Library has been restricted to subscribers; either individual or institutional. This has proved to be a significant financial barrier for many health professionals and most consumers, with a yearly subscription costing in the region of $NZ380.

Over the last few years some governments have chosen to negotiate a national license for their citizens making the full content available free in the public domain. The first of these countries was Ireland in February 2002. Australia has had a national license since October 2002 and it has been renewed in late 2005 for a further 2 years. Several other (mainly European) countries have also provided public domain access for their citizens and the Cochrane Library is also available to developing countries through the Health InterNetwork Access to Research Initiative (HINARI).

In the latter part of 2005, a national license to The Cochrane Library was negotiated for all New Zealanders. The license has been confirmed for 3 years and was jointly funded by the Ministry of Health and DHBNZ.

Any individual with Internet access from a New Zealand computer IP address can obtain full-text access at www.thecochranelibrary.com or via the website for the New Zealand Branch of The Australasian Cochrane Centre at www.cochrane.org.nz

The decision to place the access to The Cochrane Library in New Zealand in the public domain is a significant one and quite rightly makes the same health information available to consumers and health professionals alike.

In addition to the Cochrane Database of Cochrane Systematic Reviews, The Cochrane Library also contains several other databases of health information. These include the DARE database of other non-Cochrane systematic reviews, Health Technology reviews, reviews of economic analyses (NHS EED), and CENTRAL, the largest repository of randomised controlled trials with 470,139 entries in the latest issue of

the Library. Searches for health information will yield "hits" in each of these databases at the same time. There is also a database of systematic review methodology and information about the Cochrane Collaboration itself and its individual entities.

This is an extraordinary, rapidly-enlarging health information resource which contains so much information that the CD version is now delivered on four CDs.

There are real issues about the useability of The Cochrane Library. The Collaboration has insisted on a similar format for all protocols and reviews and the format is rather "dry" reading particularly for health and disability consumers. The reviews do contain a synopsis for ease of reading, and the Cochrane Consumer Network provides tailored consumer summaries. The Collaboration is debating ways of making the health information contained with Cochrane Reviews more accessible and useable to the multiple users and readers of the reviews. This may include producing derivative products of the reviews to make them more accessible to health professionals and consumers.

Making the content of The Cochrane Library freely available is an important contribution to the lofty goal of achieving “universal access to essential healthcare information by 2015”.[1] The challenge now is for all New Zealanders to begin accessing and using the vast store of health information available in The Cochrane Library so that long-term access to this resource becomes part our health information culture and not discarded after 3 years.

Our country is well placed to demonstrate how widely this resource can be used, with the proportion of New Zealanders (76.3%) who have access to the Internet being the second highest in the World.[2] The Cochrane Library needs to be widely promoted so that it becomes one of the first “ports of call” for health information before resorting to other general search engines.

Colleagues are also invited to contribute to the work done by the Cochrane Collaboration by contacting the New Zealand Cochrane Fellow, Dr Vanessa Jordan, at v.jordan@auckland.ac.nz

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Avoidable hospitalisations: potential for primary and public health initiatives in Canterbury, New Zealand

Ian Sheerin, Gary Allen, Mark Henare, Kirsty Craig

Abstract

Aim To investigate the extent of potentially "avoidable hospitalisations" in the Canterbury District Health Board area; specifically, to identify the leading causes, recent trends, and estimated costs of avoidable hospitalisations.

Methods All hospitalisations in Christchurch Hospital from 2000 to 2004 were analysed and potentially "avoidable admissions" were categorised using ICD10 clinical codes. Costs of these admissions were estimated for the financial year ending 30 June 2003 using diagnostic-related groups (DRGs).

Results The leading causes of potentially "avoidable hospitalisations" in Christchurch Hospital were cardiovascular disease, stroke, respiratory, gastrointestinal, and urinary disorders. The total estimated costs of avoidable hospitalisations in 2003 were NZ$96.6 million, accounting for an estimated 94,462 bed days. The estimated costs of cardiovascular admissions (excluding stroke) were $50.6 million, with stroke accounting for an additional $6.2 million.

Conclusion Potentially "avoidable admissions" to Christchurch Hospital comprised 31% of all hospital admissions. There is considerable opportunity to invest in public and primary health initiatives aimed at early detection and intervention, with the major opportunities being identified as cardiovascular disease, stroke, respiratory, gastrointestinal, and urinary disorders.

The New Zealand health system must make decisions about how best to spend limited budgets to attempt to cater for ever-increasing demands. The concept of "avoidable hospitalisations" offers a way of helping to identify options for spending these health resources on initiatives where heath gains may be achieved or even maximised.

The concepts "avoidable hospitalisations" and "avoidable mortality" have been proposed as a way of identifying hospital admissions and premature mortality that could potentially be prevented by timely and effective health interventions[1]. These are theoretical concepts based on a list of selected diseases and causes of death that are amenable to early detection and/or preventive measures.

The majority of potentially "avoidable hospitalisations" involve conditions that could have been identified and treated earlier by either public health or primary healthcare interventions, thereby preventing deterioration that may involve a hospital admission or even death. Examples include lung disease; cervical and breast cancer; traffic accidents; infectious, cardiovascular, and vaccine preventable diseases; early detection and excision of melanoma; and effective glycaemic control in people with diabetes.

The majority of these conditions are amenable to early diagnosis, prevention, and/or earlier interventions that could potentially prevent more severe morbidity and save life and health system costs.

The Ministry of Health[2,3] found that avoidable hospitalisations in New Zealand increased slightly during the 1990s, then stabilised from 2000. However, when this trend was disaggregated, ambulatory sensitive hospitalisations increased by 25% from 1989 to 1998.[2] These were categorised as diseases that are sensitive to prophylactic or therapeutic interventions that are able to be delivered in a primary healthcare setting.[2]

Other researchers have found that this increase in potentially avoidable hospitalisations has occurred since at least 1980, and that there are some regional differentials that are related to ethnic and demographic factors.[4] Indeed, some studies have suggested that there is a link between avoidable hospitalisations and under-utilisation of primary care, particularly by lower socioeconomic groups.[4,5] Lower income people may put off going to the doctor until it is too late to avoid hospitalisation.[5]

The idea of placing more emphasis on early detection and intervention is related to the concept of *allocative efficiency*, which aims to achieve a more efficient use of resources by providing services in different ways. This literature indicates the intriguing idea that it may be possible to achieve a reduction in potentially "avoidable hospitalisations" and "avoidable mortality" by placing more emphasis on primary-health and public-health interventions. Although this potential has been noted using national data, little attention has previously been given to investigating the extent of avoidable hospitalisations at the regional level, and the total resources that such admissions may be consuming.

Therefore, Canterbury District Health Board (CDHB) data were used to estimate the extent of potentially avoidable hospitalisations in Canterbury, the estimated costs of such admissions, the leading causes, and recent trends. Such data should be an important consideration for making decisions about both new investments and how existing services are configured.

Methods

All hospitalisations in Christchurch Hospital for financial years 1 July 2000 to 30 June 2004 were analysed, using data provided by the Decision Support Unit of the Canterbury District Health Board.

Hospitalisations were categorised using the International Classification of Diseases (ICD 10) and were identified as "avoidable" following the definition used by the Ministry of Health,[2] which states that potentially avoidable hospitalisations fall into two subcategories:

- Preventable hospitalisations which result from diseases preventable through population-based health promotion strategies (e.g. tobacco taxes, smokefree laws); and
- Ambulatory sensitive hospitalisations which result from diseases sensitive to prophylactic or therapeutic interventions deliverable in a primary care setting.

As stroke is an important health issue in its own right, stroke was recorded as a category distinct from other cardiovascular disease for the purposes of this study.

Identification of an admission as potentially "avoidable" was based on the primary diagnosis. Comorbidities and secondary discharge codes were not taken into account. Consistent with the Ministry of Health[2] definition, hospitalisations of people aged 75 years and over were excluded from the analysis.

The costs of hospitalisations were estimated using diagnostic-related groups (version New Zealand DRG WEIS 8B). ICD codes were mapped across to the corresponding DRG codes to obtain average

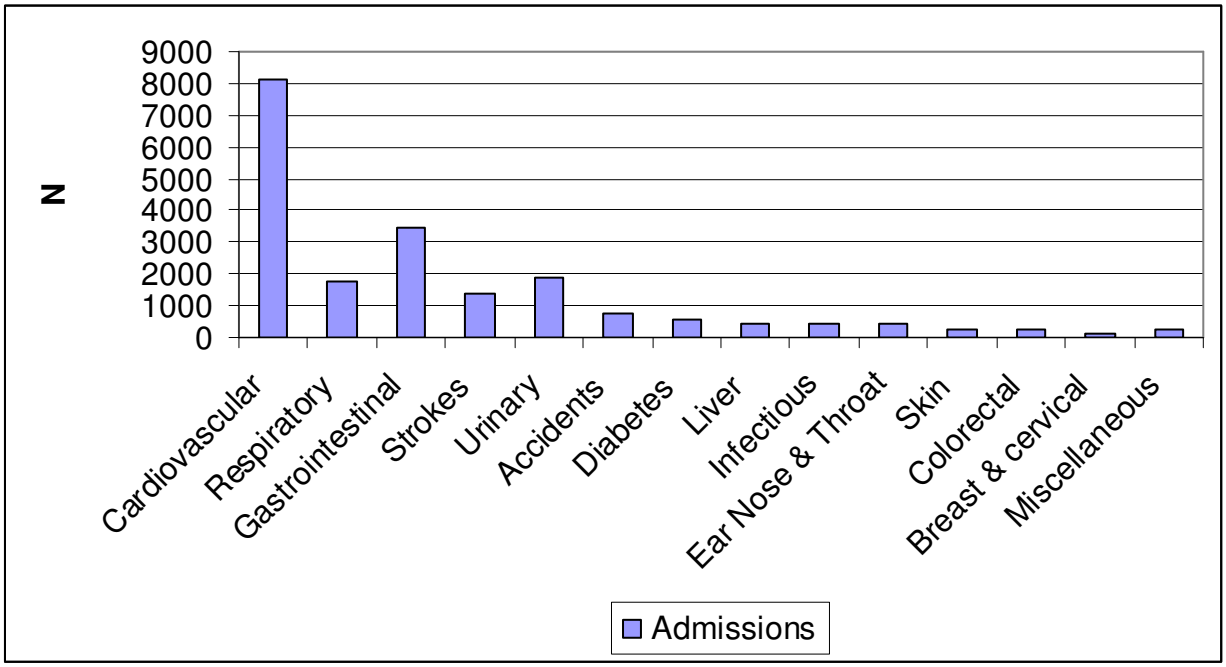
lengths of stay by admission, and the appropriate DRG payments were multiplied by the number of admissions to obtain an estimate of their total costs. Costs of hospitalisations were estimated for the financial year ending 30 June 2003.

Data was analysed using Microsoft Excel spreadsheets.

Results

Findings and trends—In 2003, 31% of admissions to Christchurch Hospital were categorised as potentially "avoidable hospitalisations." By far the largest category was cardiovascular disease, which comprised over 8000 of the total 66,399 admissions in Canterbury in 2003, and 40% of all avoidable hospitalisations. The next most frequent causes of avoidable admissions were gastrointestinal (17%), respiratory (9%), stroke (7%), and urinary disorders (9%) [Figure 1]. Comparatively small numbers of admissions were due to cervical, breast, and colorectal cancers.

Figure 1. Major categories of avoidable admissions to Christchurch Hospital in 2003



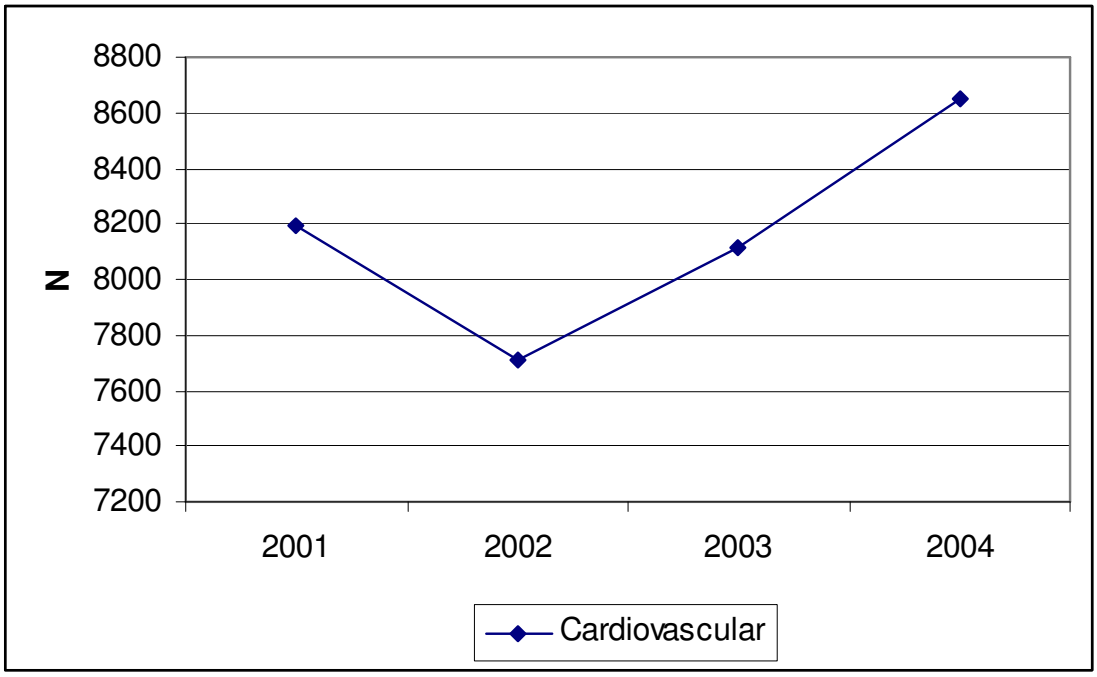
Note: Hospitalisations were for the financial year ending 30 June 2003.

The trend has been for increasing numbers of cardiovascular admissions from 2002 to 2004 (Figure 2), which reflects total numbers of admissions for people aged under 75 years, and does not control for possible age-specific trends. Numbers of admissions for respiratory and urinary disorders have demonstrated a similar increasing trend (Figure 3).

In contrast, admissions for gastrointestinal disorders have declined since 2003. While other diseases were comparatively less frequent, some of them have shown a trend of marked increases from 2001 to 2004, notably for liver disease and diabetes (Figure 4).

Given the increasing prevalence of both liver disease and diabetes, continued increases in hospital admissions can be expected in future, unless effective policies are implemented that are aimed at earlier intervention and prevention.

Figure 2. Trends in total cardiovascular admissions: 2001 to 2004



Note: Admissions were for the financial years ending 30 June, for each of the years 2001 to 2004.

Estimated costs of potentially avoidable admissions—Total estimated costs of potentially avoidable admissions to Christchurch Hospital in 2003 were NZ$96.6 million (Table 1). Cardiovascular disease (excluding stroke) accounted for 52% or $50.6 million and an estimated 34,390 bed days (Table 1).

Stroke accounted for a further $6.1 million and 12,160 bed days. Following (in descending order of cost) were ear, nose, and throat (ENT); respiratory; urinary; gastrointestinal disorders; accidents, poisonings, burns; and colorectal (Table 1).

Ranking in order of estimated total costs provides some changes in ranking compared with that obtained from total numbers of hospitalisations. The most notable are costs of ear, nose, and throat conditions, which rank third in order of total costs (Table 1), although they are comparatively low in actual numbers of admissions (Figure 1). Similarly, costs of colorectal admissions are high relative to their lower volumes shown in Figure 1.

Figure 3. Trends in total admissions for respiratory, gastrointestinal and urinary disorders: 2001 to 2004

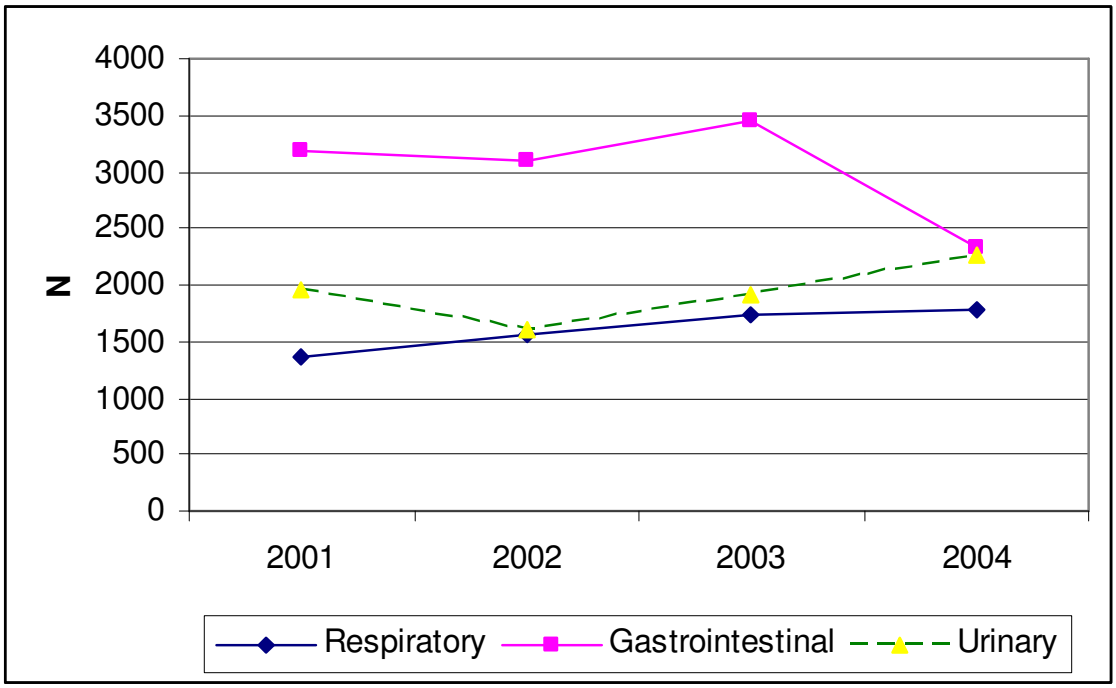


Figure 4. Trends in total admissions for diabetes, liver, and infectious diseases: 2001 to 2004

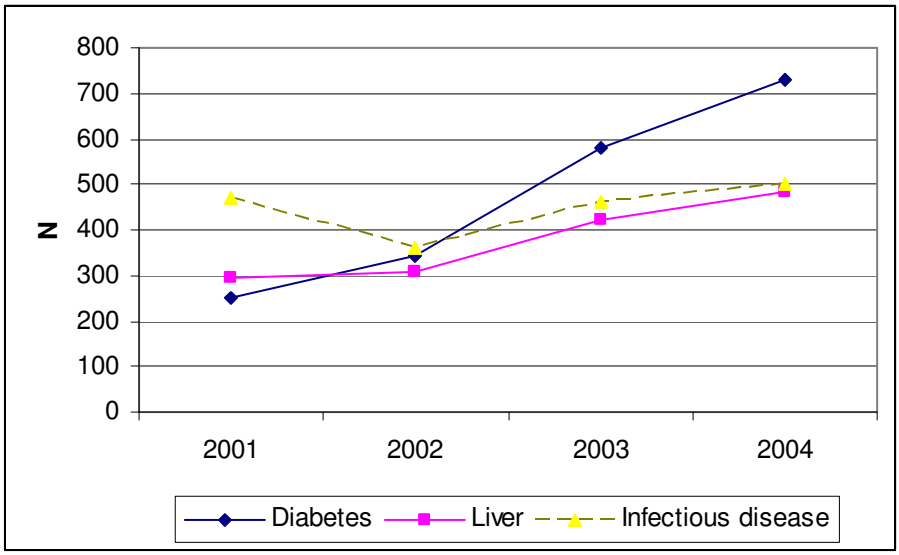


Table 1. Estimated costs of avoidable admissions to Christchurch Hospital in 2003

Disease or condition	Estimated cost (NZ$)	Estimated bed days
Cardiovascular disease	50,578,119	34,390
Stroke	6,168,203	12,160
Ear, nose, and throat (ENT)	7,903,666	5,579
Respiratory disorders	5,852,304	9,034
Urinary	4,812,688	6,348
Gastrointestinal	4,527,573	5,986
Accidents, poisonings, and burns	4,373,880	4,549
Colorectal	4,086,276	4,495
Diabetes	2,665,868	4,215
Liver and biliary	2,027,793	2,451
Infectious disease	1,991,593	2,882
Skin disease	518,395	1,052
Breast and cervical cancers	687,696	735
Miscellaneous	417,532	586
Total estimated costs	**96,611,586**	**94,462**

Note: Hospitalisations were for the financial year ending 30 June 2003.

Discussion

The concept of potentially "avoidable hospitalisations" helps to highlight opportunities for health interventions that may make a difference. It indicates the categories of morbidity that could potentially be targeted in public health and/or primary care settings. The proposal is that through earlier identification and intervention there are opportunities to prevent more advanced disease that may involve hospitalisations or deaths.

This data shows that, in Canterbury, by far the largest number of avoidable hospitalisations are for cardiovascular disease, involving estimated costs of over $50 million in 2003 and over 34,000 bed days.

Recently, the New Zealand Guidelines Group (NZGG)[6, 7] recommended more systematic screening and management of cardiovascular risk factors. Indeed, given the prevalence of cardiovascular disease, and the available options for preventive interventions, primary health care practitioners are well placed to play a key role in such a strategy.

The main components recommended in the NZGG guidelines were:

- Risk assessments at specified age thresholds, with earlier assessment for Māori, who bear the greatest burden of cardiovascular disease;
- Lifestyle changes such as physical activity and diet;
- Medication aimed at modifying blood pressure and lipid levels.[6]

The data presented in this paper reinforces the importance of cardiovascular disease that has been highlighted by other studies, and indicates the high costs of cardiovascular admissions in one of New Zealand's largest district health boards.

Cardiovascular disease has been well documented as being the leading cause of premature mortality and disability.[2] A recent New Zealand study has noted suboptimal management of risk factors in a sample of patients with known cardiovascular disease.[8] Only 30% of patients met all prevention targets, thus indicating the potential for a partnership between secondary and primary care providers with the aim of improving management of risk factors and preventive strategies.

Previous research has ranked respiratory disease as the fifth leading cause of premature mortality and disability for the total New Zealand population.[2] This study also found that, in Canterbury, respiratory disorders are one of the most important causes of avoidable hospitalisations (Figure 1).

The Ministry of Health[9] ranked chronic obstructive respiratory disease (CORD) and asthma as highly modifiable (using evidence-based medicine). Guidelines have been developed for improved management of respiratory disease in the community, with general practitioners playing a key role. Respiratory disease is currently not identified as one of New Zealand's health goals. However, because it is amenable to intervention and is a major cause of hospitalisation, consideration should be given to making it a higher priority.

Much of the literature on "avoidable morbidity," indicates that there is considerable opportunity for improving allocative efficiencies in healthcare by investing in initiatives which have the potential to make a difference in improving outcomes.

The idea of *allocative efficiency* involves providing services in different ways with more emphasis on earlier detection and intervention in order to prevent or slow the development of more severe disease. Examination of the main types of avoidable hospitalisations indicates that such initiatives should focus on cardiovascular disease, stroke, gastrointestinal, respiratory, and urinary disease (Figure 1).

As shown in Table 1, more than $75 million was spent on hospital care for these categories of admissions in Christchurch Hospital in 2003. Although these were the top five causes of such admissions, there is evidence of trends of continuing increases in admissions for other diseases, particularly for diabetes and liver disease (Figure 4).

There is an ongoing debate about whether new investments should emphasise secondary care such as angioplasty, or primary care such as improved lifestyle and management of high blood pressure and cholesterol. However, there is increasing evidence that improved health care in community settings can lead to better health outcomes and this should involve a partnership between secondary care, primary, and public health providers.

For example, a 2002 UK National Heart Forum study estimated that coronary heart disease incidence could be reduced by 30% by relatively modest changes in peoples' cholesterol levels, blood pressure, physical activity as well as by smoking cessation.[10] Also, two New Zealand studies have demonstrated that "avoidable admissions" can be successfully managed in primary healthcare settings.[11,12]

From 2002 to 2005, the New Zealand Government has committed over $400 million to the *Primary Healthcare Strategy*, with the major aim of reducing patients' out-of-pocket costs of attending consultations with general practitioners. While reduction in financial barriers to access is an important goal, consideration should also be given to

targeting some of this investment to detecting and managing common health problems that are amenable to intervention, such as cardiovascular disease. There is good evidence that this can be achieved cost-effectively.[13]

There will be challenges to placing more emphasis on prevention and earlier detection, with one of the major ones being how to fund these services. A possible option would be to target new investment in primary care specifically to preventive programmes, rather than the present strategy in which the new funding seems relatively untagged in the hope that it will flow on to lower patient co-payments.

A further option would be to improve the funding of public health programmes that could complement primary care strategies aimed at lifestyle changes such as quitting smoking as well as improvements in diet and physical activity. Historically, public health has received less than 4% of the *Vote Health* package (money allocated by the Government to health in its budget), despite contributing to major reductions in morbidity during the twentieth century. Such strategies would not involve major re-allocation of resources from curative services, rather they imply changes in emphasis and thinking.

The New Zealand health system has devoted much energy over the past 20 years to technical efficiencies—by reducing costs of overheads and service delivery. The data in this study, and in other research on "avoidable admissions," suggest that there may also be major opportunities to improve *allocative efficiency* by investing in initiatives that emphasise earlier detection as well as public health and primary health interventions.

CDHB is undertaking initiatives in some of these areas, in conjunction with primary health providers. A pilot project is being planned to screen for cardiovascular risk factors in some general practices. A revised manual is being trialled for rehabilitation of patients with cardiovascular disease.

Improved detection and management of diabetes is a major priority. Respiratory disease has also been recognised as a priority and a project is being planned to provide community spirometry services. These projects are important steps towards public and primary health initiatives that will promote earlier detection and management in community settings.

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Otago Rural Hospitals Study: What do utilisation rates tell us about the performance of New Zealand rural hospitals?

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Abstract

Aim To provide a description of the role and function of Otago Province's three main rural hospitals, utilising analysis of hospital discharge data for the period July 2001 to June 2002.

Methods Calculation of hospitalisation rates based on analysis of information contained in the National Minimum Dataset (Hospital Events); Census data from Statistics New Zealand; and local knowledge of hospital utilisation by geographical district.

Results A comparison between the rural Otago population and New Zealand (as a whole) show age-standardised hospitalisation rates of 19,847 vs 19,930 per 100,000, and a mean length of hospital stay of 4.5 days vs 6.8 days respectively. Patients aged over 75 years account for 49% of the work of rural Otago hospitals calculated by total bed days; 9% of patients account for 28% of the total discharges.

Conclusions Results show that Otago's rural hospitals (when compared to the New Zealand average) provide an efficient and appropriate service for their communities when judged by hospitalisation rates, mean length of stay, and patient groups cared for. There are serious difficulties encountered in using the National Minimum Dataset to analyse the workload of a rural hospital. An agreed methodology to overcome these difficulties is needed as they have significant implications for service planning and resource allocation for rural hospitals in New Zealand.

Rural hospitals are a significantly understudied yet important part of the rural healthcare system in New Zealand. A PubMed database search using *Rural Hospitals* AND *New Zealand* as search terms revealed 25 papers which referred to New Zealand rural hospitals in some way; only 11of the papers appeared in peer-reviewed journals and the earliest dated back 25 years. The first paper to attempt a description of rural hospitals in New Zealand was published in 1999.[1]

Furthermore, there is lack of clarity over the definition and role of rural hospitals in New Zealand.[1] Indeed, the number of hospitals that could be classified as rural varies according to how they are defined.

In times of fiscal restraint, rural services have often been a target for cuts, and communities have had to face closure of their hospitals. Some have successfully resisted closure whilst others have succumbed.[2] Otago has three major rural hospitals, all of which underwent a transition to community ownership during the health reforms of the National Party Government in the 1990s. These communities formed companies or incorporated societies to contract with the Health Funding Authority (and subsequently the Otago District Health Board [ODHB]) to provide services for

their district. It could be argued that the commitment shown by these and other groups is one demonstration of the importance of rural hospitals to their communities.

Six of the studies identified by our search refer to patient care and emphasise the safety or quality of work that can be provided by rural hospitals.[3–8]

There is a need to further research the nature of the services provided to their communities by rural hospitals and to define their role in the health service as a whole. It is hoped that research of this nature will contribute towards greater understanding of the roles or potential roles for New Zealand's rural hospitals.

This article discusses findings from a research project at Te Waipounamu Rural Health Unit, Department of General Practice, Dunedin School of Medicine. The project is an attempt to provide a description of the role and function of Otago's three main rural hospitals by analysis of hospital discharge data for the period July 2001 to June 2002.

Background

Otago has three major rural hospitals, situated in the Waitaki district (Oamaru township), Clutha district (Balclutha township), and Central Otago district (Dunstan Hospital, Clyde township). Community groups have run all three of these hospitals since 1999.

Balclutha and Oamaru suffered the loss of surgical services to their hospitals prior to the handover to community organisations, and both of these hospitals are now operating from new purpose-built facilities. Dunstan Hospital in Clyde, was transferred to community ownership at a similar time, but had long gone without surgical services, and, at the time of this study, operated from its original building.

In summary, the Otago rural hospitals have been the subject of significant community input, resulting in increased autonomy and (in two out of three hospitals) modern up-to-date premises. (Respectively, these hospitals are 110 km [75 minutes], 80 km [60 minutes], and 200 km [180 minutes] away from their base hospital, Dunedin Public Hospital (DPH) in Dunedin City. See Table 1.)

- Oamaru Hospital has a resident specialist physician, and so does not qualify as rural under the definition from Janes,[1] but is considered rural by the Otago District Health Board (ODHB). It is staffed by Medical Officers of Special Scale (MOSSs) with on-call General Practitioners (GPs), and has 30 acute medical beds.
- Balclutha Hospital is staffed by 2 MOSSs backed up by on-call GPs, and has 13 acute medical beds.
- Dunstan Hospital is staffed by MOSSs, with oversight from visiting specialists. It has 24 acute medical beds.

Table 1. Otago rural hospital characteristics (2001/2002)*

Variable	Oamaru Hospital	Balclutha Hospital	Dunstan Hospital
Beds (acute medical)	30	13	24
Distance to Dunedin Public Hospital	110 km	80 km	200 km
Travel time to Dunedin Public Hospital (by road)	75 minutes	60 minutes	180 minutes
Specialists (FTE)	1.4 resident	visiting	visiting
MOSS (FTE)	3.7	2	3.2
GP	1 on-call	4 on-call	0.3
Estimated population served by hospital	22,000	18,000	22,000

*Data from unpublished study: *New Zealand Rural Hospital Survey*; FTE=Full Time Equivalent (e.g. 1 FTE could equate to 1 person full-time, or 2 people at half-time each, or any other combination); MOSS= Medical Officers of Special Scale.

Methods

We analysed Hospital Events information in the National Minimum Dataset (NMDS), for the financial year 2001/02 for the three main rural Otago hospitals. (The NMDS is a national collection of hospital discharge information that includes clinical information for patients.)

Data for each patient discharge is entered by a clinical coder at each hospital (Dunedin Hospital provides the coding service for Balclutha) based on the admission, procedure, and discharge information from the patient's record. The data are then submitted in an agreed electronic format to the New Zealand Health Information Service (NZHIS) within 21 days after the month of discharge. This data are held centrally by NZHIS on a computer database.

For ethical and security reasons, NZHIS supplied the dataset after identifiable data such as patient name and address had been removed. In addition, each patient's National Health Index (NHI) number was replaced with an encrypted NHI. The data were supplied in a non-summarised spreadsheet-type format where each new line is a separate "event". The fields supplied are shown in Table 2.

Letters of permission from the hospitals involved allowing access to and use of the data were obtained and sent to NZHIS. Data were then sent to us by the NZHIS in a SAS software file format via email. Encryption of the NHI number was carried out by NZHIS prior to them sending the data set.

For some analyses, the data were grouped into age-classes that covered periods of between 5–20 years.

Age-specific hospitalisation rates were calculated by dividing the number of discharges for an age-class by the population of that age-class. The result is multiplied by 100,000 to obtain a rate per 100,000 for each age-class. Age-specific hospitalisation rates allow comparisons between different age groups, by removing the confounder of unequal population sizes.

The *age-standardised* hospitalisation rate is an expression of the overall hospitalisation rate of a population. It enables direct comparison between populations of differing sizes and age structures, by using a standardised population. We have used *Segi's World Population*, as this is the reference population used by the Ministry of Health, which therefore allows us to compare rural Otago data with New Zealand national data.[9] Segi's World Population is based on a predefined age structure for a total population of 100,000.

To calculate the *age-standardised* hospitalisation rate for rural Otago hospitals, we divided the number of discharges for each of the age-classes by the population of that age class (the same first step of the age-specific hospitalisation rate). We then multiplied this figure by the number of "people" in the corresponding age class of Segi's World Population. The age-classes were totalled to give a single overall figure that is the *age-standardised* rate per 100,000 for the total population under study.

When calculating the mean length of stay, discharges relating to patients discharged on the same day as admission were omitted. In addition, the mean length of stay for New Zealand hospitals was recalculated excluding discharges relating to *Mental and behavioural disorders*. This adjustment was performed, as the mean length of stay nationally was approximately 57 days for this diagnosis group, which greatly skews the overall mean length of stay. As this service is not offered by the rural

hospitals, removal of the figures allows a more meaningful comparison of rural Otago hospital length of stay against New Zealand hospital length of stay.

The rural Otago population data was obtained from census data held by Statistics New Zealand that is available online at http://www.stats.govt.nz/census. This data gives age, sex, and ethnicity-structured population data for each "domicile" code. Data for all of the domiciles in the rural Otago area were combined to produce the demographic dataset. To produce hospitalisation rates for various age group categories, the number of residents in each group within the hospitals' catchment area must be determined. This area is defined by local knowledge of hospital utilisation patterns.

Hospitalisation rates for the population of rural Otago consisted of two components. The first component includes patients who are admitted to Rural Otago hospitals. The second component includes the proportion of Rural Otago residents that are admitted to Dunedin Public Hospital (DPH). DPH provides secondary and tertiary level care for the Otago population. The two components were combined when calculating the hospitalisation rates for the population of rural Otago.

As far as possible, the data are presented following the format used in the Ministry of Health publication to allow comparison of rural Otago figures with New Zealand as a whole.[9]

Table 2. List of fields supplied by the New Zealand Health Information Service (NZHIS)

Master Encrypted NHI
Event Encrypted NHI
Admission source
Admission type
NZ resident status
Date of birth
Age at admission
Sex
Ethnicity (*prioritised, all three recorded*)
Domicile
Event type
Event end type
Event start date
Event end date
Event leave days
Length of stay
Diagnosis codes (first 20 recorded)*
Accident codes (first 15 recorded)
Accident date (first 15 recorded)
Operation codes (first 20 recorded)
Operation date (first 20 recorded)
Health agency facility
AR-DRG 4.2
PCCL

*The New Zealand standard for morbidity coding in health services was the ICD-10-AM 2nd Edition (International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification, 2nd Edition).

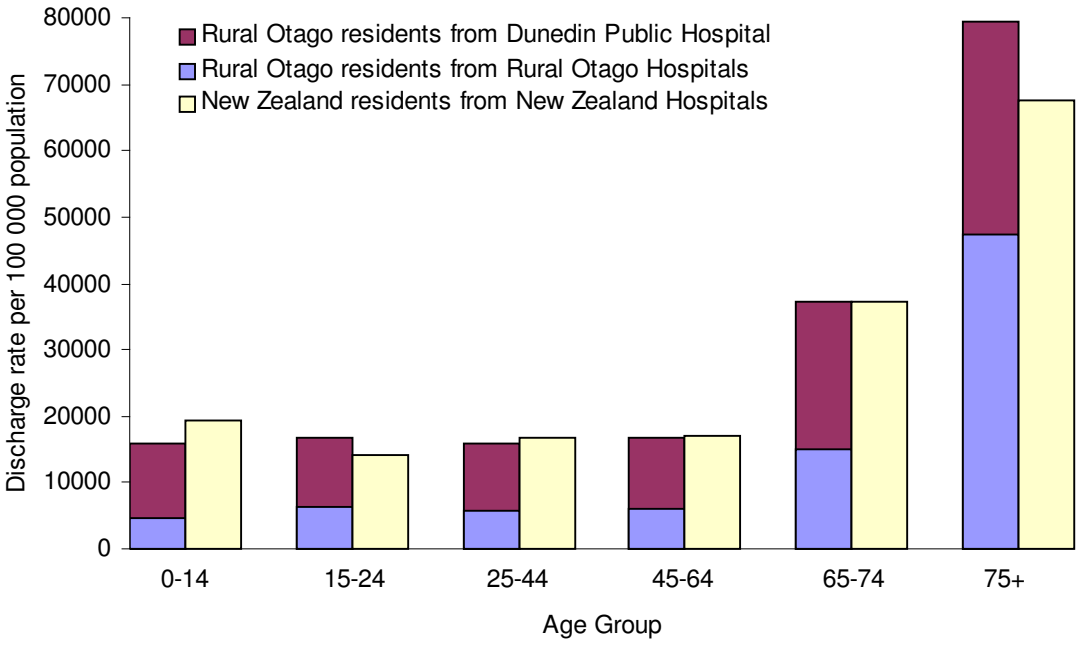
Results

Results from the most recently published New Zealand (NZ) morbidity study, *Selected Morbidity Data for Publicly Funded Hospitals 2000/2001*,[9] have been used as a benchmark for the Rural Otago hospital figures. The New Zealand results have been included where possible and have been put in square brackets—e.g. [NZ=53.1%].

A total of 3407 individual patients were discharged from the three major Otago rural hospitals, producing a total of 4984 discharges.

To compare rural Otago and New Zealand figures, age-specific and age-standardised rates are used. Figure 1 compares the *age-specific* hospitalisation rates for rural Otago residents to the national rate from 2000/2001. (Rural Otago hospital rates includes discharges of rural Otago residents from both DPH and the rural Otago hospitals.)

Figure 1. *Age-specific* hospitalisation rates (per 100,000 people) for rural Otago residents from Dunedin Public Hospital and rural Otago hospitals—compared to all New Zealand residents from all New Zealand public hospitals



Approximately 5% of discharges from rural Otago hospitals relate to people domiciled outside Otago, possibly resulting in a slight overestimate of hospitalisation rates for the rural Otago population. As not all the rural hospitals offer a birthing service, and there are private providers in some areas, the figures were re-analysed excluding birth-related diagnosis codes, however this did not appear to have a significant effect on the results.

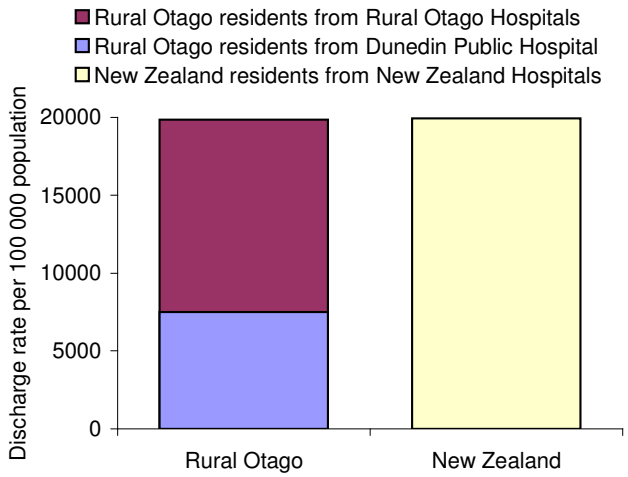
The proportion of rural Otago residents admitted to rural Otago hospitals rather than DPH was 42%, and was relatively constant across all age classes, apart from the 75+ age-group, where it was 60%. The combined rural Otago discharge rates are very similar to the national rates with noteworthy differences only in the 0–14 (NZ>rural Otago) and 75+ age groups (rural Otago>NZ).

Figure 2 shows the *age-standardised* hospitalisation rates for Rural Otago residents and New Zealand residents. The *age-standardised* hospitalisation rate for Rural Otago residents is 19,847 per 100,000 (7495 from rural Otago hospitals and 12,352 from DPH).

Using these age-standardised figures, Otago rural hospitals account for 38% of the total discharges for the rural Otago population. The *age-standardised* hospitalisation

rate for New Zealand is 19,930 per 100,000.[9] When excluding mental health and birth related codes, the difference between the hospitalisation rates for rural Otago and New Zealand was still very small, at less than 200 per 100,000.

Figure 2. *Age-standardised* hospitalisation rate (per 100,000 people) for rural Otago and New Zealand



This result can be looked at in the context of the length of stay for patients (Table 3). The mean length of stay was 4.4 days for Otago rural hospitals [NZ=8.3 days]. The New Zealand figure included a significant number of discharges coded as *Mental and behavioural disorders* that had an average length of stay of 57.2 days. Removing this potential confounder from the national data reduced the New Zealand average length of stay to 6.8 days.

The mean length of stay for rural Otago patients at DPH was 5.0 days. The mean length of stay for rural Otago patients overall was 4.7 days. Thus, rural Otago patients are admitted no more often than the New Zealand average, and the rural hospitals also have a much shorter mean length of stay.

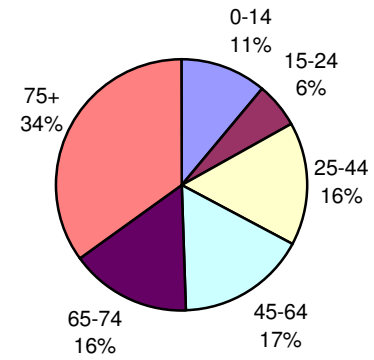
Table 3 shows, for rural Otago Hospitals only, an analysis by age group of the mean length of stay in days and the total number of discharges. Bed days were calculated by multiplying the mean length of stay by the number of discharges. The mean length of stay for each of the age groups is below the overall NZ mean, including that for the 75+ age group (6.3 vs. 6.8).

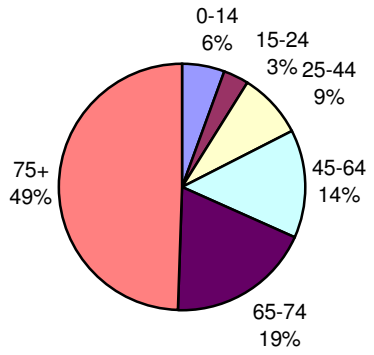
Table 3: Mean length of stay, total discharges, and bed days for rural Otago hospitals (by age groups)

	0-14	15-24	25-44	45-64	65-74	75+	All
Mean Length of Stay (Days)	2.3	2.5	2.4	3.8	5.3	6.3	4.4
Total Discharges	443	236	639	682	633	1408	4041
Bed Days	1004	586	1534	2584	3378	8889	17975

Figure 3 shows the percentage of total discharges and the percentage of total bed-days for rural Otago hospitals by age group. Expressed by percentage of bed days, the 75+ age group accounts for 49% of the work done in rural Otago hospitals, which is a significant increase on the percentage by discharges for that age group.

Figure 3. Pie charts showing percentage of discharges [upper chart] and percentage of bed days [lower chart] (by age group)





The relative proportions for the 45–64 and 65–74 age groups remain similar when looked at by discharges or bed days, whereas the younger age groups have relatively short length of stays resulting in the percentage work calculated by bed days being about half of that by calculated by discharge.

Age specific rates do not give an indication of the number of different individuals discharged per age group, because some patients account for multiple discharges. Table 4a provides this analysis for the population as a whole (all age groups combined). For example, 2631 patients had only one discharge, and 475 patients had 2 discharges, 157 patients 3 discharges and so on. The number of discharges

represents the multiple of discharges per individual and number of patients, and shows how the total discharges are accounted.

Table 4b provides further analysis of the workload derived from patients with more than one discharge. It does this in a cumulative sense whereby the smaller figures are incorporated in the figure above so that the top line refers to the percentage of individual patients who account for two or more discharges. The third column shows the percentage of total discharges from that group. Thus, 22.8% of patients create 47.2% of the work by discharge, 8.8% account for 28.2%, and so on. (The value for "1 or more discharges per individual" would naturally account for 100%.) Table 4b shows how relatively low percentages of patient individuals account for a relatively high percentage of workload.

Table 4a. Analysis of discharges per individual patient

Discharges per individual	Number of patients (n=3407)	Number of discharges (n=4984)
1	2631	2631
2	475	950
3	157	471
4	57	228
5	25	125
6	19	114
7	11	77
8	11	88
9	2	18
10+	19	282
Total	**3407**	**4984**

Table 4b. Multiple discharge analysis by percentage of individual patients and percentage of total discharge numbers

Discharges per individual	Percentage of individuals (n=3407)	Percentage of discharges (n=4984)
≥ 2	22.8%	47.2%
≥ 3	8.8%	28.2%
≥ 4	4.2%	18.7%
≥ 5	2.6%	14.1%
≥ 6	1.8%	11.6%
≥ 7	1.3%	9.3%
≥ 8	0.9%	7.8%
≥ 9	0.6%	6.0%
≥ 10	0.6%	5.7%

Discussion

These results show the significant role played by Otago's rural hospitals in providing health care for their rural communities, i.e. 44% of hospital discharges. This role applies especially to care of the over 75 year olds, an age group one would expect to

have more dependence because of restrictions such as transport difficulties, ill health or frailty of spouse, in addition to their own multiple health problems.

Elderly people may make choices about where they retire based upon the presence or absence of local facilities such as hospitals and primary medical care. Approximately 50% of the work done by rural Otago's hospitals involves caring for the over 75 year age group. Admissions in this group may be precipitated by the complex interactions of social factors and multiple pathologies.

One value of rural hospitals to their communities is that their presence allows a lot of this care to take place in surroundings familiar to patients resulting in an increased likelihood of visits from friends and family, and a greater understanding of local conditions impacting on or influencing healthcare.

One possible drawback from a health funding and equity viewpoint could be that rural hospitals provide an easier avenue of care for these problems and thus their use may be "abused" compared to standards in urban areas. However, these data suggest (that for rural Otago hospitals) this is not the case as both the age-standardised hospitalisation rates and mean length of stay are lower for rural Otago hospitals than the national average.

Rural Otago has a higher proportion of residents aged 75+ when compared to the national figures. And this older age group has higher hospitalisation rates. These combined factors result in the high proportion of total discharges (49%) for that age group of the total rural Otago hospital workload.

The data do show that the age-specific rate for care of the over 75s is higher for the rural Otago population than the New Zealand average for that age group. It is unlikely that the clinicians providing care would operate different standards for the over-75 group than for any others however, so it may be reasonable to assume a fairly consistent level of clinical decision-making.

Therefore, this higher rate may be due to demographic, geographic, or social factors in the patients (i.e. a patient admitted overnight for observation because of distance from hospital) or may be related to the difficulties of providing community services in rural areas compared to more compact urban environments. The shorter mean length of stay would itself suggest an efficiency of care compared to the New Zealand average.

There were significant methodological difficulties in using the NMDS and census data for an analysis of this type. These difficulties need to be recognised and addressed before attempting to investigate the work of a rural hospital, particularly if comparisons between hospitals are being made.

Accurate local knowledge of patient-referral patterns is essential for defining the population denominator. Difficulties arise when a hospital's catchment population (denominator population) does not match that suggested by territorial authority boundaries and census data—e.g. Dunstan hospital serves Central Otago and also receives patients from Wanaka and Hawea (Queenstown Lakes District). Also some of the rural population in the official catchment area may naturally utilise the base hospital rather than the rural hospital because of local geography—e.g. Palmerston tends to feed directly to Dunedin rather than Oamaru, but would be included in Waitaki district census figures.

These figures can reach significant percentages of the total for an individual rural area and may potentially skew the data analysis when looking at an individual hospital's workload. Local knowledge is essential to identify these anomalies. Denominator populations should be constructed from mesh block levels based on this local knowledge. Any analysis of rural hospitals using the datasets described without this contribution should be regarded as potentially inaccurate. This has significant implications for central planners and funders.

The hospital utilisation pattern of the denominator population also needs to be understood. For these purposes, we assumed that rural patients were either admitted to their rural hospital or to Dunedin Hospital. However there will be a proportion that are admitted either directly or by interhospital transfer to hospitals elsewhere in New Zealand.

Similarly there are patients from outside the denominator population who are admitted to the rural hospitals. The numbers and characteristics of the "visiting" population can affect the significance of the impact of these patients on hospital utilisation figures. For example, Central Otago has high visitor numbers, including many from overseas. Thus examining the overall workload of a rural hospital/s is somewhat different from examining the hospitalisation utilisation of a defined rural population. (In this study, the approximately 5% of patients domiciled from outside the area admitted to rural Otago hospitals did not have a significant impact on the results.)

There are limitations to the data themselves. They are dependent upon consistency and accuracy of clinical coding. A high degree of effort goes into assuring this accuracy, but despite this effort we found inconsistencies in the dataset with event type *ID-day patient,* and length of stay of zero days. Some patients with a primary ICD diagnosis of mental illness were coded as event type *psychiatric inpatient*. The significantly longer mean length of stay some psychiatric patients have can potentially skew any analysis.

The workload of Otago rural hospitals will be different from New Zealand public hospitals as a whole, which could confound length of stay data. However the inclusion of data for rural Otago residents at DPH into the calculation removes most of that effect. The reduced length of stay is despite the high proportion of work at rural hospitals from the over-75 age group compared to the New Zealand average. This suggests that the data indicating shorter length of stay in rural Otago hospitals and for rural Otago residents is likely to be valid and not due to confounding factors.

Patients are coded as discharged when they are transferred between hospitals and when they move from acute to rehabilitation care (AT&R). This means that what a patient interprets as one hospital admission could be represented by several discharge codes suggesting separate events. For example, a patient could be admitted to a rural hospital with a stroke, be transferred to base hospital for investigation and initial care, be transferred back to the rural hospital, and then move in to AT&R, thus generating four codes.

There is no way of identifying this apart from tracking by individual NHI. Unfortunately the encryptions for the rural data received from NZHIS were different from the encryptions used for subsequent data we received regarding rural patients discharged from DPH. This could arguably lead to an apparent shorter length of stay

for Otago rural patients; although it would also mean that the DPH contribution to the national figures would be lower than expected. However we have no way of knowing at the level of our analysis how many of the New Zealand-wide discharges represented interdepartmental transfers in larger hospitals, which would counterbalance the effect. The published Ministry of Health (MoH) data analysis has not gone to this level.[9]

We are unable to completely remove normal births from our figures—as some data have the ICD code for normal birth typed as *birth*, and some as *non psychiatric inpatient.* However the large numbers involved and the small changes apparent from the potential confounders that we have been able to study suggest that it may still be reasonable to assume that the data are presenting the correct overall picture, even if not 100% accurate.

The relatively high workload from a small number of patients could also skew the data for a small rural hospital. Our analysis of the three Otago rural hospitals together may negate that effect, but we have no way of knowing how the presence of the hospitals and the local community or primary healthcare services have influenced the nature of the resident population in terms of age and disease prevalence, especially in high-use groups. For example, in a rural area not served by a rural hospital, it may be likely that any people (apart from fit and healthy over-75s) would consider moving to urban centres to be nearer healthcare services.

However, great care should be taken when drawing conclusions from these results. They say nothing about the quality of care directly, which can only be inferred as likely from the figures as shown.

All hospitals, including rural hospitals, are merely parts of a healthcare system and to truly analyse their function, the system and the hospitals' place in it needs to be fully understood. This includes the nature and habits of the primary care system serving the hospital (e.g. accessibility and quality), the relationships between primary or community care and the hospital, and the relationships between the hospital/s under study and any other hospitals they refer patients to. The relationships between rural hospitals and their base hospitals should be considered at both the clinical and managerial levels.

Training of medical and nursing staff and the resources available at the hospital will also impact on the care provided. Furthermore, levels of illness prevalence and social deprivation as well as availability of transport and communications are factors, which may play a significant part in the workload presenting to any hospital.

We can assume that all hospitals in New Zealand are aiming for the same or similar clinical standards when factors such as length of stay and discharge rates are used as surrogates of quality and appropriate healthcare. The data we have used for this study do not directly relate to quality of care or appropriateness of admissions. However it is reasonable to assume that if Otago's rural hospitals were admitting patients inappropriately and caring for them inappropriately then they would likely show either higher discharge rates or increased length of stays.

As these were not the findings in this study it could thus be construed as significant, if circumstantial, evidence for high quality and appropriate care in rural Otago hospitals.

This study makes no reference to costs of care or bed occupancy. Assuming the bed occupancy rate was at a reasonable level, and assuming patients were transferred appropriately for specialist care, then it may be reasonable to infer favourable costs of care at Otago rural hospitals because of infrastructure savings. (The potential savings relate to reduced transfer costs, and the less complex medical and nursing workforce structures which rural hospitals have compared to their base hospital counterparts.)

Our figures suggest that approximately 40% of hospital admissions can be managed at generalist level. It would appear that the Otago rural hospitals provide a refinement of the primary -secondary care gate-keeping role associated with community based general practice.

It would be unwise to extrapolate any conclusions about New Zealand rural hospitals as a whole from this study. However the data do suggest that it is possible for rural hospitals to operate very effectively. Therefore it could be argued that this type of study should be repeated in other parts of New Zealand. Indeed, the Otago rural hospitals data could be used as a baseline to attempt to identify whether other rural hospitals are offering a similar level of service.

If we accept the assumption that this data analysis shows that the Otago rural hospitals offer an appropriate and effective service, then we should see if the same is the case for other rural hospitals in New Zealand. Should we find that a rural hospital does not appear to offer such an appropriate and effective service, rather than suggest down grading or closure, we should examine what features of the local health system are preventing such a hospital from operating at this level—i.e. view this as a system problem rather than blaming the rural hospital.

However, before making changes, we need to research and understand much more about rural hospitals, rural healthcare systems, training of medical nursing and ancillary staff, and interhospital communication and transfer systems in New Zealand—as well as understanding more about the interplay of these factors.

The Dunstan Hospital study[3] suggests a high level of communication and excellent working relationship between DPH and Otago rural hospitals. This is highly likely to contribute to the results we found in our study.

Our results also raise the intriguing possibility that approximately 40% of admissions from urban populations to base hospitals could be handled at a generalist level in a similar way. This may have significant implications for the long-term development of New Zealand's health system, and the training of its medical workforce.

Conclusions

- Otago rural hospitals appear to offer an efficient and appropriate healthcare service.
- Analysis of hospital discharge information from the NMDS is fraught with difficulty. Although it is possible to simply present summaries of discharge codes by various factors such as sex, ethnicity, and age, conclusions drawn from these summaries are dependent on a number of assumptions about the data.
- Local knowledge of hospital utilisation patterns is essential for any analysis using NMDS and census data.

- The over-75 age group generates a significant workload for rural hospitals, so training in care of the conditions and the multiple problems common in the elderly (including an understanding of relevant primary care issues) is likely to be an important facet of any training provided for rural hospital doctors.
- The age-specific and the age-standardised hospitalisation rates of New Zealand (as a whole) and rural Otago are very similar. This suggests that rural Otago is not over-resourced in terms of the number of discharges when compared to the national figures.

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The New Zealand Mobile Surgical Bus Service. What is it achieving?

Kevin Bax, Susan Shedda, Frank Frizelle

Abstract

Aim Equitable access and provision of healthcare is a cornerstone of New Zealand Government health planning. Recent closures of rural hospitals have lead to difficulties with access to surgical services. The mobile surgical service has been developed to help; partly to address this issue as well as to address several other stated goals in the provision of rural heath. This study aims to audit the goals set out for the mobile surgical service and determine if they are been achieved.

Method The following outcome measures were assessed: number and type of procedure, length of stay, complications, services for Māori, upskilling for rural staff, social benefits, impact on child health, improved training with telepresence surgery, and the cost.

Results Over the first 2 years (1 March 2002 to 28 February 2004) of service provision, 1901 procedures were undertaken; 57 patients had complications. The most common complication was wound infection, which occurred in 5% of operations. One in 3 treated patients were Māori and 40% of those treated were 15 years of age or younger. The mobile surgical bus service also appears to be meeting its social benefit, upskilling goals, and educational goals.

Conclusions The provision of specialist services to the rural communities is a difficult problem faced not only in New Zealand. Though still on a trial basis, the mobile surgical service bus appears to be meeting its stated goals to be addressing one of the important goals of the Government health policy: equitable access and provision to surgical care.

People who are better educated, have professional occupations, have higher incomes and do not live in socioeconomically-deprived regions are likely to enjoy better heath and live longer. This association between socioeconomic position and health is well-established.[1]

In general, New Zealand society values equality, including equality of access and provision of health care. Reducing health inequalities, particularly among Māori and Pacific Islanders, is at the centre of the New Zealand Government's health agenda.[2]

Access to secondary and tertiary care for patients in rural communities has deteriorated considerably over the last 20 years in part due to hospital closures in rural communities. As a result of this there has been a decrease in the availability of the procedural services available to these communities within their own environment.

There is also increasing concern about the delivery to the Māori population.[3] To combat these issues a mobile surgical service was developed with the aim to provide mobile interventional surgical services and try and address the issue of equable access to health care to rural communities and ethic minorities. Experiences in other

countries, such as Ecuador and Brazil have shown the potential for mobile surgical service provision in isolated areas.[4,5]

A mobile surgical bus is operated by Mobile Surgical Services (MSS). The bus is a 20-metre long 39-tonne converted truck and trailer unit. It houses modern operating theatre and telecommunication facilities. It was built in Rotorua at a cost of NZ$5.2 million, the capital for which was raised by private investors. The New Zealand Heath Ministry has agreed to fund a pilot service project at a cost of $5 million per year for the next 5 years, a total cost of $25 million. (This budget is for 1000 day case procedures and 50 ½ day telepresence sessions per year.)

MSS produced a proposal document for the New Zealand Health Ministry, in which it was stated that there were 22 potential project benefits; they were:

Timely and community based access to a wide range of day surgical procedures:

- High efficiency
- Reduced capital expenditure in medical services
- Low average lengths of stay
- Improved outcomes of care
- Improved services for Māori
- Safe service
- Reduced financial risk to the Government
- Reduced need for specialists in rural communities
- Integrated care
- Upskilling of local medical staff
- To assist in the facilitation of consistency in clinical practice
- To assist in the facilitation of national consistency in national intervention rates
- Improved transparency, confidence, certainty and stability in health services for rural New Zealand
- Social benefits
- The ability to target services for child health gain
- Be consistent with health initiatives
- Improved training through telepresence surgery
- Provide clinical information, costing and audit
- Explore international opportunities for learning and improving patient care
- Support the patients waiting times fund gaols
- Potential to ‘piggy-back’ other services at marginal cost to rural communities

Many of these goals are impossible to measure, however some are. This study reviews the initial 2 years’ experience with the bus and seeks to determine if it is achieving its stated goals.

Method

Data about the use of the bus is collected prospectively by MSS, who has the service contract for the ‘Bus’. This data was provided by MSS and we analysed it. There was an average of a 30-day follow-up, with a telephone interview by trained nurses, attempted after every procedure (97% successful) (The service contract runs from October 1st to September 30th; however, the first procedure, in the first service year, was completed on March 8th 2002, and so for convenience 1 March 2002 was chosen as the starting point for the 2-year assessment, with 28 February 2004 being the endpoint.)

The outcome measures that we assessed were number and type of procedure, length of stay, complications, services for Māori, upskilling for rural staff, social benefits, impact on child health, improved training with telepresence surgery, and the cost.

Results

The total number of procedures performed during the 2 years was 1901. A third of the procedures were dental. General surgery contributed over a quarter of the procedures, with the Ear Nose Throat (ENT) service performing a little over 10% (Table 1).

Table 1. Number and type of operations undertaken

Type of procedure	Number of cases	Percentage of total cases
Dental	665	35
General Surgery	494	26
ENT	203	10.7
Endoscopies	168	8.8
Orthopaedics	120	6.3
Urology	101	5.3
Gynaecology	81	4.3
Ophthalmology	36	1.9
Plastics	32	1.7

Average length of stays—All procedures performed by the mobile surgical service are day cases; however, many rural patients having day case surgery in metropolitan areas require overnight stays because they, or their caregiver, cannot drive for several hours postoperatively.

Eleven patients required hospitalisation after their surgery in the 2 years; six because of bleeding and the remainder for a combination of medical and social reasons. The longest single hospital stay was 5 days; a paediatric patient, after a dental case.

Safety—Of the 1901 cases performed in the first 2 years, there were 57 complications, in total. Details are provided in Figure 2. The most common complication was infection with 40 cases reported. The General Surgical wound infection rate was 5.0%; which represents 25 out of 494 cases. Of the Other group, which consists of 6 cases, the problems faced by the patients included pain, nausea, wound dehiscence, and urinary retention (Table 2).

Table 2. Complications of operations

Complications	Number
Infection	40
Bleeding	11
Others	6

This is a quality improvement system, which is managed in-house and allows rapid changes when needed. There is a system for reporting and reviewing untoward events, and near misses. To ameliorate the increased risk of operating in a remote setting, and a major problem occurs without the backup of a base hospital, the bus is totally self-

contained, and the surgery is on low-risk patients having low-risk surgery. If a major event occurs, then the patient can be transferred to the nearest base hospital after being stabilised.

Improved services for Māori—In the 2 years, 627 New Zealand Māori and Pacific Islanders underwent procedures; this represents 33% of all patients.

Upskilling of rural staff—Rural doctors (working in the areas that the mobile surgical service visits) have been invited to assist the visiting consultants when procedures are undertaken on their patients. This provides the local doctor with improved understanding of the potential of the service from both a surgical and telepresence point of view. There is also upskilling of the local nurses at small rural hospitals.

When the bus first arrived in rural areas, specific introductory training (using simulation in conjunction with National Patient Simulation Centre at Wellington) was undertaken. Rural staff are encouraged to staff the surgical nurse and recovery positions, therefore upskilling and maintaining the necessary expertise that may have been lost when many of the small secondary surgical centres were closed (visiting consultant staff see above). This contribution is intangible and immeasurable but appears to be a consequence of the delivery of this service to more isolated communities and their health providers.

Social benefits—A rural lifestyle has many benefits but access to health care is often limited by the ability to travel to major centre for more specialised services. Less time off school and work for patients and accompanying caregivers means that there is less disruption to the lives of these members of the community. In addition, less time spent travelling and staying overnight in motels in metropolitan equates to money saved. We have no quantifiable data proving this, however,

The ability to target services for child health gain—There were 754 paediatric patients (under the age of 15 years) seen in the mobile surgical bus service, representing 40% of all patients. Once again, this proportion is higher than the proportion (23%) of under-15s in the New Zealand population (according to the New Zealand census of 2001).

Improved training through telepresence surgery—Each year, 50 ½-day telepresence sessions are budgeted for; whether these sessions are national or international telecommunications is left to the discretion of MSS, and the availability of the necessary connections. In the period studied, 58 telepresence sessions were undertaken of which 12 were international.

The NZ$1 million telepresence facilities are used by the University of Otago for their Diploma of Rural Health Medicine. The virtual assistant has a remote broadcasting station, which is couriered to them; and through a joystick is able to control multiple cameras within the ‘bus’. A microphone and camera connect the assistant to two large plasma screens in the operating theatre via broadband technology. This technology has potential to improve education and service delivery in isolated communities and to allow contact between larger New Zealand hospitals and overseas hospitals.

Cost—Each case is funded NZ$1900, irrespective of the type of procedure performed.

Discussion

MSS reports directly to the Health Ministry concerning the performance of the mobile surgical service. Monthly, quarterly, and annual reports are tabled and sent to the Ministry, for their assessment. Comparative assessment of the service is difficult, as available data from an equivalent mobile surgical service is to make comparisons is limited. Therefore, an analytical, rather than a comparative assessment was undertaken.

MSS are contacted to provide 1000 procedures a year, during the 2-year interval (1 March 2002 to 28 February 2004) the service did 1901 procedures. This disparity between aims and goals is most likely due to the problems inherent with setting up the new service and should improve with more time and experience.

The major advantages of the mobile surgical service are the social benefits it offers rural communities as well as its ability to target Māori and child health issues. Some of these benefits are difficult to measure, but the delivery of services to the rural population is vital.

One in three patients treated were Māori. This is also significantly higher than the 20.1% that New Zealand Māori and Pacific Islanders comprise in the general New Zealand population (according to the 2001 census)—thus indicating that the 'Bus' is perhaps better equipped to target Māori health by virtue of its ability to visit rural and isolated communities.

Recently, Ecuador has instituted a mobile facility and found that the provision of surgical services through this method is sustainable. They also concluded that this was a way of providing a high level of clinical services.[6] This has also been endorsed by the health care delivery in Ecuador.[7]

The mobile surgical service appears to be addressing the important issue of equable access to surgical care.

Telemedicine is an important secondary use of the bus facilities which allows either a surgeon at another New Zealand or overseas hospital to watch and to verbally assist in procedures. Indeed, it appears to an important and perhaps expanding role in the provision of continued medical education and upskilling of services.[8,9]

The major disadvantage of the service is cost. At NZ$1900.00 per procedure, some procedures are expensive however providing equitable access was never going to be cheap. What has not been taken into account is the relative cost of sending rural patients to metropolitan areas for surgical procedures. Also, whether this is the best allocation of rural heath services was not assessed in this study.

Conclusion

The provision of specialist services to the rural communities is a difficult problem faced not only in New Zealand. This has been addressed by the introduction of an innovative service delivery method. Though still on a trial basis the mobile surgical service bus has extended the possibilities available and appears to be addressing one of the important goals of the Government health policy—equitable access to surgical care.

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Patients' complaints about doctors in surgical training

John Jarvis, Frank Frizelle

Abstract

Aim Research looking at the effect of complaints on senior medical staff has shown that while there is important information to be gained from patient criticisms of medical care, they are often not well received by doctors. There is no information on the effects of complaints on junior medical staff and those undergoing vocational training in New Zealand. The aim of this study is to assess the impact of complaints on trainees in general surgery.

Method A questionnaire was devised and sent to all advanced general surgical trainees in New Zealand. There were four sections to the questionnaire covering background, professional life, family life, and personal health. The scale was semantically anchored at not applicable, strongly agree, agree, neither, disagree, and strongly disagree.

Results Following electronic mailings of the questionnaire at three different times, 35 of 58 (60%) questionnaires were returned of which 21 (60%) of the respondents had received at least one major complaint; 10 (29%) indicated they had experienced one complaint; 4 (11%) reported 2 complaints; 3 (9%) had received 3 complaints; and 1 (3%) reported 4 complaints. None of the respondents believed that the complaint had improved their surgical training". Thirty-one (86%) respondents believed that the complaint had made them practice more defensively; 13 (38%) felt that the complaint had a negative effect of future doctor-patient relationships; and 15 (43%) felt a lack of trust with such relationships. Twenty-three (67%) felt decreased enjoyment with their training and 18 (53%) felt the complaint had a negative effect on their family. Twenty-seven (78%) felt depressed over the complaint, with 18 (52%) feeling a lack of support and being alone with the experience.

Conclusion Trainees receiving complaints find them difficult to deal with; they incur an emotional cost on the doctor and possible future doctor patient relationships. Thus it is important that trainee doctors receive support and guidance throughout this difficult and stressful event.

Health professionals throughout New Zealand are faced daily with clinical accountability in their practice. This takes many forms including self and peer assessment and review, and various professional bodies performing assessment and audit. Important information is to be gained from patient criticisms of medical care, however these criticisms are often not well received by the medical profession.[1–3]

Cunningham has repeated pointed out, one of the ways in which society feels it maintains accountability of the medical profession is in the ability to lay complaints.[2–6] This demand, in part, reflects changing societal attitudes to health professionals, often with regular reinforcement from an increased number of high profile cases in the media.

New Zealand has had several possible avenues for patients to complain to including the Medical Council, Coroner's and Civil Courts, Health and Disability Commissioner, the Accident Compensation Scheme (ACC), and in-hospital patient complaint services.[6] The Health Practitioners Competence Assurance (HPCA) Act, passed by Parliament on 11 September 2003, aims to streamline the process of patient complaints about medical care.

Recent data suggests that 1 in 17 New Zealand doctors can expect to receive a complaint each year;[6] and for general surgeons this rate is 1 in 2.5 each year.[7] This means that complaints are a part of life that we have to learn to deal with as doctors. However it is reasonable to expect that a complaint on doctors and the way they practise medicine has some impact.

One of the most complained-about groups are surgeons, particularly general and orthopaedic surgeons.[7] There is no doubt that complaints in New Zealand have increased in frequency over the last three decades,[8] probably reflecting changing population perception and expectations of health professionals as well as the public's enhanced ability to pursue complaints through several channels (often sequentially and at times simultaneously).

Some research has looked at the effect of complaints on senior medical staff, however none shows the effects on junior medical staff and those undergoing vocational training in New Zealand. Such doctors are arguably most at-risk in regard to the detrimental psychological effects of these complaints and the effects these complaints have their practice due to their age, relative inexperience, and lack of (personal and professional) support.

General surgeons have previously been identified as a high-risk specialty in regard to complaints. Therefore, we chose to look at the impact of complaints on general surgical registrars (advanced trainees) in general surgery. Specifically, the aim of this survey was to assess the exposure of general surgical advanced trainees to the complaint process in New Zealand as well as to assess the impact that the experience had upon those trainees in various facets of their life.

Method

A questionnaire was devised and sent to all advanced general surgical trainees in New Zealand.

Participants—Participants were New Zealand-based Advanced Surgical Trainees on the General Surgical scheme of the Royal Australian College of Surgeons (n= 58). No distinction was made for gender, age, demographic characteristics, or university from which initial medical degrees were awarded.

The Survey—Participants were initially contacted via email with a cover letter requested their participation and a file attachment contained the questionnaire. Respondents were asked to complete and return the questionnaire by email. These emails were sent twice over six weeks and then a third time after a study day in which they were encouraged to respond to the questionnaire.

A three-page questionnaire was constructed that gathered information on the impact of major complaints. A major complaint was operationally defined as an HDC, ACC (medical error or misadventure) or institutional complaint requiring written reply and/or enquiry (e.g. DHB complaint).

The survey was divided into four sections. Section 1 of the survey elicited *background information*, including type of practice, year of advanced training, and year of graduation. Data was also collected in regard to the number of major complaints that the respondent had experienced and how many years it was since the last complaint.

A six-category rating scale was used to gather information in Sections 2, 3, and 4. The scale was semantically anchored at Not Applicable, Strongly Agree, Agree, Neither, Disagree, and Strongly Disagree. Section 2 was entitled *professional life*.

Respondents were asked to indicate the effect that the complaint had exerted on several areas of their professional life, including surgical practice and training, relationships with patients and colleagues, and perceived level of consultant support.

Section 3 concerned *family life*, and examined the impact that the complaint had had on the respondents' relationship with their partner and children, and family life in general.

Section 4 investigated the effect the complaint had had on the respondents' *personal health*. Psychological factors such as perceived stress, mood changes, sleep disturbance, and changes in alcohol consumption were explored, in addition to the onset of physical illness or weight change.

Results

Survey return rate and respondent characteristics—Thirty-five of the 58 (60%) questionnaires were returned. The majority of the respondents indicated they were in their second year of advanced training (n=12), there were also replies from first year (n=5), third year (n=8), fourth year (n=5), and fifth year (n=3) trainees (2 did not indicate their year of advanced training). The respondents year of graduation ranged from 1999 to 2000 (5 respondents did not indicate).

Major complaints

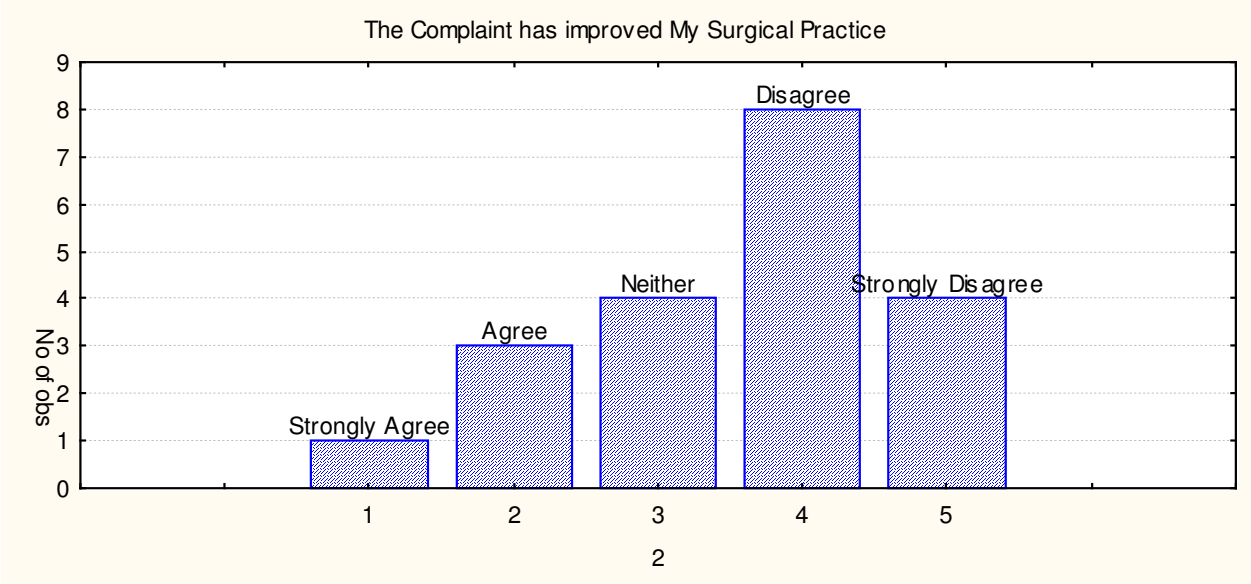
Twenty-one of the respondents had received at least one major complaint; 10 indicated they had experienced one complaint, 4 reported 2 complaints, 3 had received 3 complaints, and 1 reported 4 complaints (an additional 3 respondents indicated that they had experienced complaints but did not report how many).

Of the 21 respondents who had received a complaint, 8 reported that they had received the most recent complaint within the last year, 11 indicated that they had received the latest complaint between 1 and 3 years ago, and 2 respondents reported that more than 3 years had passed since their last complaint.

Impact of complaints

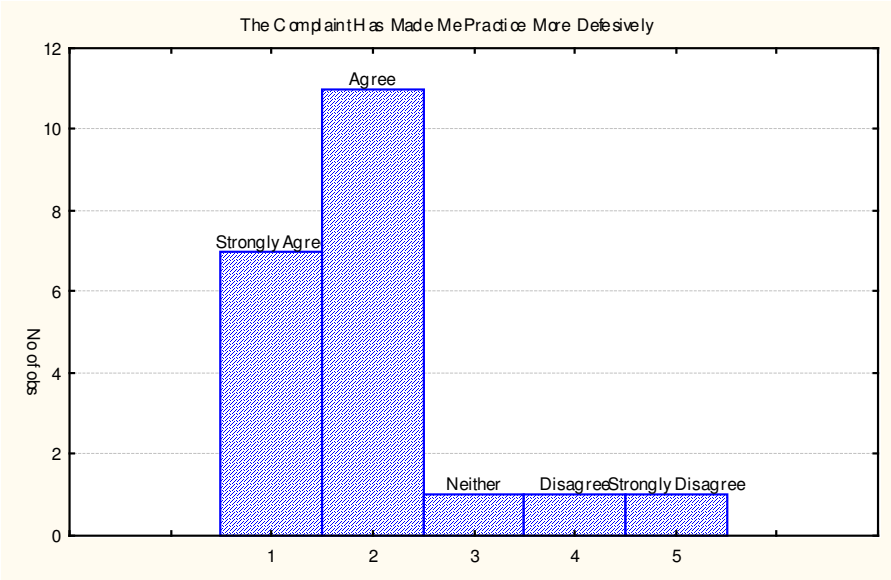
Professional life—Figure 1 illustrates the majority of respondents disagreed or strongly disagreed with the statement *the complaint has improved my surgical practice*. The majority of the sample disagreed or strongly disagreed with the statement *the complaint has improved my surgical training*. None of the respondents believed that *the complaint has improved my surgical training*.

Figure 1. Histogram showing responses to the statement "the complaint has improved my surgical practice"



Respondents generally believed that the complaint had made them practice more defensively (Figure 2). As a consequence of defensive practice, 15 (43%) of the sample indicated they ordered more diagnostic tests and were less confident in their surgical pursuits.

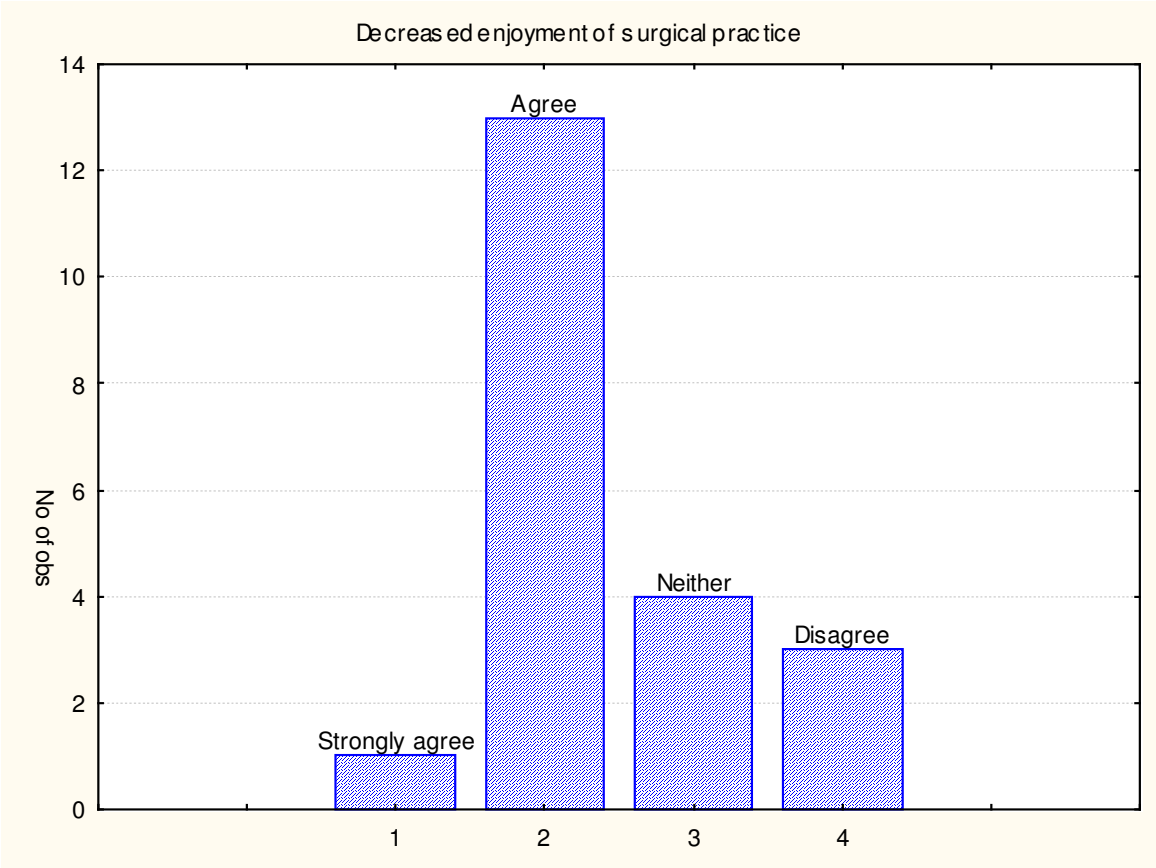
Figure 2. Histogram showing responses to the statement "the complaint has made me practice more defensively"



Attitudes to doctor-patient relationship were assessed post-complainant, with 13 (38%) agreeing or strongly agreeing that there had been a negative effect; in the remaining 21 (62%) doctors, no-one strongly disagreed that there had been a negative effect. Fifteen (43%) respondents specified that they agreed with the statement that the complaint/s had caused loss of trust in their patients while 12 (34%) disagreed or strongly disagreed.

Many doctors in the survey sample experienced decreased enjoyment of their surgical practice following the experience of a complaint (Figure 3), and a minority gave some consideration to quitting their surgical training and practice due to the complaint/s.

Figure 3. Histogram showing responses to the statement "following the complaint you have decreased enjoyment from your surgical practice"

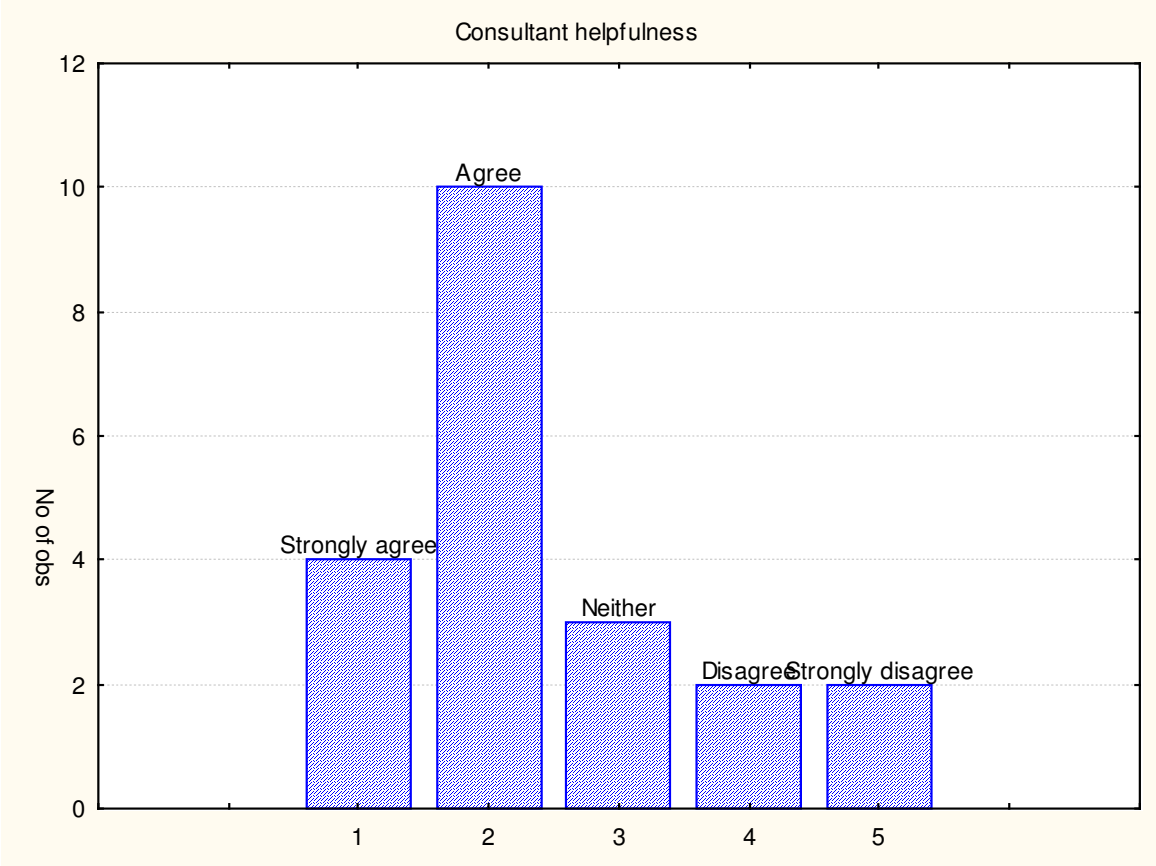


The effects of complaints on collegial relationships were analysed. The majority (15; 43%) of those doctors completing this survey question indicated that they felt the complaint/s had not impaired collegial relations, while 10 (29%) felt that some impairment of relations had occurred.

With respect to supervisor-trainee realtionship,13 (38%) of the sample were wary of their consultant/s with whom they worked with at the time of the complaint.

Interestingly, 23 (66%) of the same sample was positive about the support of their consultant/s at the time of the complaint/s (Figure 4). Eight trainees agreed they felt like a scapegoat for what had happened during the complaint.

Figure 4. Histogram of responses to the statement "I found the consultant/s I worked for at the time of the complaint/s supportive"

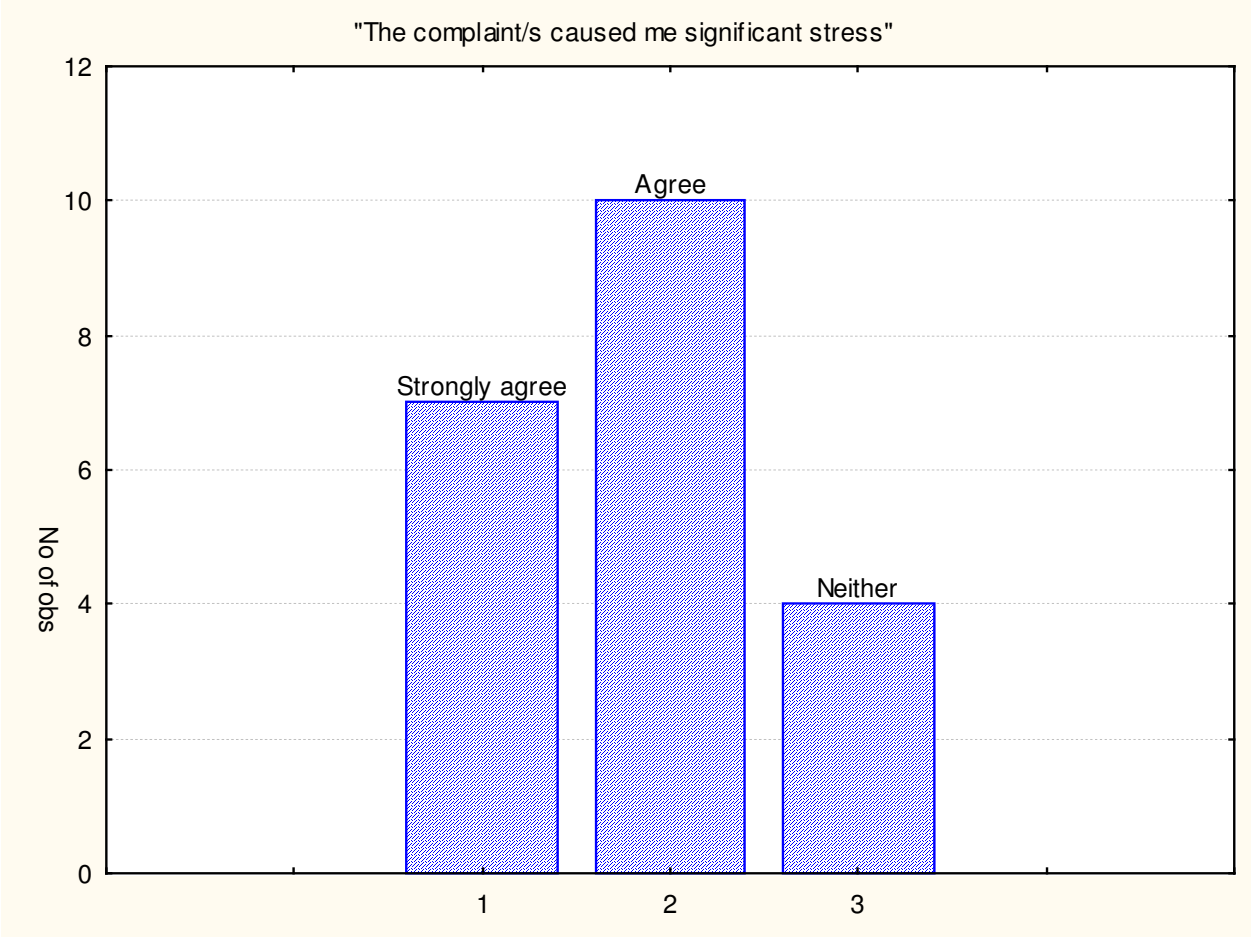


Private/family life—Nineteen trainees chose to respond to the section gauging the effects that the complaints had on their family life. Fourteen (74%) trainees who completed this section felt the complaints had taken up time they would normally spend with their families. While 10 (53%) of the sample indicated a negative effect on family life, only 3 (16%) disagreed with this. The effect of the complaint/s on the relationships of the trainee with their spouse and/or children was queried where applicable; 35% (6/17) trainees agreed, strongly or otherwise, that there had been an effect on their spousal relationship.

Personal health—None of the 21 trainees responding in this section of the survey disagreed with the statement that the complaints had caused them significant stress, with 17 (81%) either agreeing or strongly agreeing (Figure 5). Identical agreement was obtained when a statement that the complaints made the trainees feel angry. Loneliness and a sense of lack of support were encountered by 11 (52%) of those trainees complained against, and 57% agreed or strongly agreed that the complaint had made them feel depressed.

Eleven (52%) trainees agreed that the complaints had caused them many sleepless nights while two (10%) trainees felt that the complaints had lead to an increase in their alcohol consumption. No trainee agreed that they had had any weight change of 5% or more, had physical illness, or required medication as a result of the complaints.

Figure 5. Histogram of responses to the statement "the complaints/s caused me significant stress"



Discussion

The complaints system has a purpose, and that is to maintain trust between society and the medical profession, act as a voice for patients, provide the opportunity for reconciliation and closure between doctor and the complaint, and to maintain standards of patient care.[10]

The perception of the handling of any complaint depends on one's vantage point to the proceedings. Van Horne[9] highlights this by explaining each participant's view of a disciplinary process. From the complainant's viewpoint, the investigating body is overly cautious and biased towards the health professional. If one is a member of the concerned investigating body then there is no doubt that the body is just and fair to all concerned.

To be the subject of the body's investigation is to feel vulnerable and persecuted. To the media the body is insular and slow to criticise or punish the health professional concerned. This study investigates the health professionals stance and, to a certain extent, the basis of why their perception of a complaint may be created in their New Zealand practice.

Previous research in New Zealand on the effects of complaints has suggested that the immediate effects include an intense negative emotional response, reduced ability to consult with speed and confidence and to tolerate uncertainty, and hostility towards the complaint with subsequent loss of trust of other patients.[10]

In the longer term there has been reported doctors having persisting emotional responses such as depression or anger, some had an alter perception of themselves as doctors and an erosion of goodwill towards patients.[10] This is consistent with American reports that doctors see a complaint as an assault on the doctor's sense of self and personal integrity.[11] Canadian,[12] British,[13] and European[14] reports likewise point out the influence complaints have on a doctor-patient interaction. These reports however all look at specialist practise not those still undergoing vocational training.

Professional development is the aim of vocational training in general surgery and part of any education is to learn from both positive and negative experiences. The responses to the survey indicate that the complaints process is not generally felt to positive experience (regardless of how beneficial to training or professional practice it may turn out to be).

The impact of a complaint on clinical practice is somewhat predictable with 86% of those who were subject to complaints indicated that they practiced more defensively, and half of these doctors ordered more tests. Ordering more and sometimes unnecessary tests, to affirm clinical decisions, and/or not performing certain high-risk procedures, have been shown to be part of defensive practice.[15]

Within a health system with limited resources such practice has significant implications for resource utilisation and consequently the health of the population in the wider sense. Interestingly, only one-third of respondents felt that their practice had become self-focussed, although the majority of defensive practice is to avoid risk of complaint rather than prevent patient harm.

This professional climate clearly comes at a price with decreased enjoyment of practice, consideration of quitting, and a lessening of professional relationships both at the consultant-trainee and patient-trainee interfaces a consequence.

Family life is an area that most individuals are fiercely protective of yet this is one area that has been identified as being affected in a negative way by the stressors accompanying the complaints process.[16,17] As this survey shows, time normally allocated to family can be taken up by the complaints process and interpersonal relationships are affected. Indeed, there were only a few individuals who did not perceive the effects of the complaint process in a negative way, confirming that this may be an area of surgical practice that is harder to 'leave at work'.

Perhaps the clearest demonstration of the impact a complaint can have is found in the high rates of stress (81%) and anger (81%) they caused in this survey. These mirror the results of Montgomery et al[17] who found similar rates of anger in practicing psychologists. Indeed complaints and malpractice claims have long been known to be

a traumatic emotional stressor, causing high levels of anxiety to the involved practitioner.[1,15,17–21]

Anxiety and emotional stress can be seen in the degree of loneliness, disrupted sleep, and depressive symptoms experienced by the survey respondents. The severity of the depression was outside the scope of assessment of this study; however it is interesting to note that there was little evidence of potential flow-on effects of weight change, physical illness, increased alcohol consumption, or use of prescription medication.

It is apparent from the results obtained by this survey that the complaints process in New Zealand has a considerable impact on surgical trainees. There is dissatisfaction with the process, a fact that has previously been demonstrated.[6,10] The cause of this dissatisfaction is possibly multifactorial with the poor adaptation of the medical profession to the changed patient-doctor relationship, and the current 'managerialism' and consumerism increasing public power in the complaints process,[21] or even the frustration of the complexity of a complaints system.[6]

Whatever ones vantage point in the complaints process it should be clear that all involved want a fair and just system, with a single entry point, as suggested in the Queenstown report.[6] The new system under the New Zealand HPCA Act should lead to an improvement as it does away with repetitive claims, reinvestigation of cases with previously 'innocent' findings to find guilt on a lesser level of proof, cannot be anything but damaging to the heath professional, families, and complainants involved in the complaint.

Trainees in surgery and other fields need to be supported through the complaints process if the process is to have a constructive and not a destructive influence on their practice. It is important for the college and the hospitals to have systems in place to support these trainees and for consultant staff and other colleagues to be mindful of the stress that complaints cause to junior staff and not to add to this stress.

Complaints about doctors undergoing vocational training are important as they can be an educational experience to the trainee doctor in regard to the event itself and also in regard to learning how to handle and deal with complaints. They also allow trainers to determine if there is a problem that means the trainee may not be suitable for further training. Regardless of these facts, when complaints occur it is important that trainee doctors receive support and guidance throughout this difficult and stressful event in their lives.

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International medical graduates' training needs: perceptions of New Zealand hospital staff

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Abstract

Objective To determine the opinion of New Zealand doctors and nurses on the possible training needs of international medical graduates (IMGS) in New Zealand hospitals.

Design A postal questionnaire sent to hospital doctors and nurses.

Methods All doctors working at Wellington, Kenepuru, and Hutt Hospitals in the greater Wellington region, and nurses working in acute medical wards at the same hospitals, were asked to complete a questionnaire based on the Northern Clinical Training Network and Capital Coast District Health Board resident medical officer assessment forms regarding an overseas-trained doctor they had worked with in the last year.

Results The response rate for the doctor's questionnaires was 68/174 (39.1%), with 51 of these from New Zealand doctors rating an international medical graduate. The response rate for the nurses was 58/60 (96.7%). Areas where the median score of the questionnaire was unsatisfactory (less than three out of five on an ordinal scale rating performance) were clinical documentation; communication with patients, families, and other health professionals; knowledge of hospital policies and procedures, and medicolegal matters; and some aspects of patient management. There was no difference in median ratings between doctors and nurses.

Conclusions More specific training may improve the performance of overseas-trained doctors in the New Zealand health system. A further study of the perceived needs of the overseas-trained doctors themselves may be useful.

A large proportion of medical practitioners who work in New Zealand are graduates of an overseas medical school. Indeed, the most recent figures from the Medical Council of New Zealand (MCNZ) estimate that 34% of the medical workforce has an overseas qualification.[1]

Within the hospital system, 17% of house officers, 33% of registrars, and 50% of medical officers have an overseas qualification.[1] The MCNZ website does not specify the proportion of overseas medical graduates working in New Zealand from countries that do not have reciprocal registration arrangements with New Zealand.[1]

All medical practitioners must meet standards set by the MCNZ. International Medical Graduates (IMGS) from Australia, the United Kingdom, and North America obtain the right to practice medicine readily in New Zealand. This could reflect similar standards of training and practice for these countries or reciprocal agreements between both countries.[1]

Doctors from Australia, the United Kingdom, and North America are exempt from sitting the English examination (as the medium of instruction in the medical schools they have trained at is English.)[1] IMGS from all other parts of the world have to sit both written and oral examinations. Additionally, they have to pass an English examination to practice medicine, although there are some exceptions.[1] For the purposes of this study, IMGS refers to doctors trained in countries that do not have reciprocal registration arrangements with New Zealand.

In recent years, a specific training programme called *The Bridging Programme* has been introduced to help prepare some IMGS for the New Zealand registration examination (NZREX).[2] However even after passing the NZREX or achieving entry into the New Zealand health system through other means, IMGS may experience other difficulties such as differences in practice, lack of familiarity with the New Zealand hospital system, cultural differences, and language barriers.

Fortunately, most IMGS overcome these difficulties and adapt. Unfortunately, for some doctors, the road to this is a long and difficult one. Often an important phase of entry into more independent practice within the New Zealand health system is a period of time spent in public hospitals under supervision of intern supervisors, in conjunction with reports from colleagues within the health system.

In this study we were interested in identifying the training needs for IMGS based on the reports of colleagues within the health system as well as determining if there were any differences between doctors' and nurses' ratings.

The aims of the study were to:

- Identify key areas that IMGS working under supervision in New Zealand hospitals need to focus upon when working in New Zealand.
- Make recommendations based upon those identified areas, which will allow hospital service leaders to establish a programme to help these IMGS to have a more equitable entry into the New Zealand health system.

Methods

This is a pilot study, conducted in acute care hospitals in greater Wellington region. With the agreement of the service and/or clinical leaders and the team leaders, anonymous self-addressed envelopes containing a questionnaire were posted to the consultants, registrars, and house surgeons as well as the charge nurse/team leader, clinical nurse specialist, and three senior registered nurses (as identified by the charge nurse/team leader) in general medical and general surgical areas.

Senior registered nurses, for the purposes of this study, were those with more than 4 years of post-registration experience. All doctors, regardless of whether they had a New Zealand or overseas qualification, received the questionnaire.

The questionnaire was based on the Resident Medical Officer (RMO) run review form from Capital and Coast District Health Board (CCDHB) and the Northern Clinical Training Network (NCTN) questionnaire.4 The questions that cover a number of dimensions of hospital practice were each rated with a response indicating a RMO performs at a poor level (rating=1) to an excellent level (rating=5). A level of '3' is considered satisfactory.

New Zealand doctors (NZD) were considered to be either New Zealand-qualified doctors or IMGS who had worked in New Zealand for 5 years. The latter were considered likely to have integrated successfully into the New Zealand health system. A copy of the questionnaire is available from the authors on request. Potential areas of improvement were identified by median scores of less than '3'.

Ratings by doctors and nurses to the same questions were compared using the Mann-Whitney test, using a p value of 0.10 to identify potential differences.

Results

The response rate for the doctor's questionnaire was 68/174 (39.1%) and for the nurses questionnaire it was 58/60 (96.7%); 51 of the doctor's questionnaires were from NZDs, and one of these doctors had not worked with an IMG in the last year. The doctors scored four questions and nurses scored two questions with a median score of less than '3'. The remaining questions had a median score of '3'.

No question had a median score of more than '3'. Doctors and nurses median scores were not different at a type 1 error rate of less than 0.1. Five questions had median scores of less than '3' for either doctors or nurses. They were documentation (clinical clerking, adequacy of records, legibility, accurate drug charts); communication ability with patients and their families; communication with other healthcare professionals; professional knowledge (hospital policies and procedures, medicolegal matters); and patient management (management decisions, response to calls, emergency care).

Discussion

This small study found the perceptions of the hospital nurses of IMGS were satisfactory. The low response rate from doctors could reflect the reluctance of doctors to comment on fellow colleagues and tackle the sensitive issue of medical performance questions. However, the study identified potential areas for improvement including communication (both with patients, their families, and health professionals), documentation, knowledge of the health system, and some aspects of patient management.

Less than satisfactory communication skills were not due to poor English skills. The strength of our study is that it directly involved colleagues of IMGS who work with them daily. Our study reflects only doctors and nurses in the greater Wellington area who may have a different experience from those in other parts of New Zealand.

Although the questionnaire appears to have face validity, its reliability and responsiveness to both poor and excellent practice is not known. Additionally, in an effort to maintain confidentiality, the respondents were not asked to specify their own background or the IMG they were assessing. This could have included doctors from countries with reciprocal registration arrangements with New Zealand being inadvertently assessed as IMGS. However we think that the comments made addressed our target group.

Improvement in the aspects of practice identified in this study might partly be achieved by establishing a 6-week pre-employment training program similar to that of trainee interns. A pre-employment program for IMGS has been successfully trialled in Australia.[3] This may address the 'professional knowledge', 'patient management', and communication issues identified in our study. Another way of addressing the communication issues might be to establish regular performance reviews with the assigned supervisor.

As this is a pilot study, we believe a follow-up study specifically for IMGS would be useful as it may get a better understanding of the experiences of IMGS in New Zealand and it may identify their perceived needs.

We recommend that the MCNZ publish statistics on those IMGS working in New Zealand who are from countries that do not have reciprocal registration arrangements with New Zealand—as it may benefit any future studies on this topic.

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The Community-Referred Radiology scheme: an evaluation

Peter Crampton, Anuj Bhargava

Abstract

Aims To evaluate the Community-Referred Radiology (CRR) scheme.

Methods The study involved: (1) interviews with local stakeholders; (2) analysis of the number, type, and cost of referrals as well as sociodemographic characteristics of patients using the CRR database (for the year October 2003–October 2004); and (3) review of referral criteria, by an independent radiologist, of a random sample of 100 referrals.

Results The scheme was widely used, and was viewed as being highly satisfactory by general practitioners. There were 117 types of radiology investigation ordered. Chest X-ray was the most requested investigation. Women constituted 65.5% of users. Māori had a lower rate of referral compared with New Zealand (NZ) European. The average cost of investigation in the NZ European and the 'Not stated' groups was higher than in other ethnic groups. Six (6.1%) of referrals did not align with the National Radiology Referral Guidelines.

Conclusions The CRR scheme is perceived as being a popular, well-run, and streamlined service. The comparatively low rate of radiology referral for Māori people and people living in the most deprived areas as well as the lower average cost of their tests warrant further investigation. A number of recommendations are made aimed at further enhancing the scheme.

Radiological investigation is a necessary basic component of primary health care; yet primary health care access to radiology services in New Zealand is inconsistent and is frequently hampered by long waiting times (in the case of outpatient referrals) or considerable financial barriers to access (in the case of private referrals).

The Community-Referred Radiology (CRR) scheme was introduced in the Wellington region in December 2000. Private radiology clinics were funded by Capital and Coast District Health Board (CCDHB)—via the Wellington Independent Practitioners' Association (WIPA)—to carry out radiology procedures (at low or no cost to the patient) for patients referred by general practitioners (GPs). These radiology referrals were restricted to those not already covered by Accident Compensation (ACC) or maternity funding and that were consistent with the National Radiology Referral Guidelines (NRRG).[1] Eligible clients were those who were entitled to government-funded health benefits.

Prior to the advent of the CRR scheme, community-referred patients were restricted to either (1) paying full radiology charges at a private radiology facility, or (2) being referred to one of the local hospitals for an emergency department or outpatient department appointment in order to access hospital radiology services at no charge.

The rationale behind the CRR scheme was primarily to increase access to radiology services by making the procedures available from more service providers at no cost or

reduced cost to patients in the CCDHB region. It also aimed to indirectly promote more efficient use of hospital resources particularly by saving time at outpatient clinics.

The scheme was initiated in the year 2000 after attention was drawn to the history of poor access to radiology services especially for low-income patients.[2] At the end of the first 7 months of operation of the CRR scheme, an evaluation was conducted from a clinical point of view.[3] It investigated clinical behaviour of GPs, and analysed radiology utilisation and costs. It related these to patient consultation, age, sex, and census population data, and reviewed guideline implementation.

The results indicated the scheme was accomplishing its goals of improved access, by diminishing waiting times, increasing service accessibility to low-income people, reducing patient-travel time, and decreasing outpatient referrals.

The purpose of the study reported here was to evaluate the CRR scheme with a focus on the number, type, and cost of referrals; the sociodemographic characteristics of patients; and the appropriateness of referrals—in order to inform CCDHB's ongoing planning and funding decisions concerning the scheme.

The specific aims of the study were to:

- Investigate use of the CRR scheme in the year October 2003–October 2004 by patient sociodemographic characteristics: age, sex, ethnicity, locality, socioeconomic deprivation (NZDep), and Community Services Card (CSC) status;
- Investigate the range and frequency of procedures funded by the CRR scheme;
- Detect any obvious geographical or procedure outliers in terms of expenditure and referral patterns;
- Obtain opinions from local stakeholders about the quality of, and scope for improvement of, the CRR scheme; and
- Examine individual diagnostic procedures for indications and alignment with guidelines and best practice.

Methods

The study was conducted between November 2003 and February 2004 and included three stages:

- Interviews with local stakeholders (WIPA), primary health organisation (PHO), and district health board (DHB) representatives;
- Analyses (using the CRR database) of the number, type, and cost of referrals, and the sociodemographic characteristics of patients; and
- Review by an independent radiologist of the referral criteria for a random sample of 100 referrals.

Interviews with local stakeholders—Ten interviews were carried out by telephone with representatives from WIPA, CCDHB, and Wellington-region PHOs. The interviews lasted 15–20 minutes and opinions were gathered on the effectiveness of the programme, benefits for stakeholders, and user charges (including their impact on referral rates and utilisation). Alterations suggested by the stakeholders to enhance the effectiveness of the scheme were also recorded. A semi-structured interview schedule was used, and written notes were transcribed and analysed to answer the study questions.

Analysis of sociodemographic characteristics of patients using the CRR scheme—CRR referrals data collected by WIPA for the year 8/10/2003–8/10/2004, for all GPs in the Wellington area, were

entered into a database using SPSS version 13 software. The data comprised information about each referral that had been processed through the CRR scheme, including age, sex, ethnicity, locality, CSC status, NZDep, radiology procedure code, request date, and date of service provision. The database did not include a unique patient identifier, so (to take into account multiple visits by the same patient) it was assumed that referrals bearing identical demographic characteristics (age, sex, locality, and ethnicity) were the same person.

To compare utilisation of the CRR scheme while controlling for differences in access/utilisation of GPs, consultation data (the total number of consultations by ethnicity and NZDep quintile) for the year beginning October 2003 were obtained from each Wellington-area PHO. For one PHO, the breakdown of consultations by ethnicity and NZDep quintile was available only for one-quarter of this time period and therefore an estimate was made of the year's total consultations by multiplying quarterly numbers by four. The number of CRR referrals per 100 consultations (by ethnicity and NZDep quintile) was then calculated.

Analyses of patient demographics were carried out including number of visits per patient, age group, gender, ethnicity, CSC status, NZDep, and locality. Analyses of investigations were carried out including frequency and cost of investigations, and most frequent investigations by age group, sex, ethnicity, location, and CSC status.

Statistical tests for differences in referral rates by ethnicity and deprivation were calculated using poisson regression, and for differences in the log of referral costs using multivariate analysis of covariance (with independent variables: age, sex, ethnicity, NZDep2001). All statistical analyses were carried out in SAS v9 software.

Ethnicity was classified using the hierarchical method where each person was allocated to only one ethnic group on the basis of a priority order.[4,p.33] Socioeconomic position was measured using the NZDep2001 index of socioeconomic deprivation, a census-based small-area index of deprivation.[5] The index scale used here is from 1 to 5, where 1 = the least deprived 20% of areas, and 5 = the most deprived 20% of areas.

Review by an independent radiologist of referral criteria for a random sample of 100 referrals — A database of 100 randomly selected radiology referral forms collected by WIPA for the year 8/10/2003–8/10/2004 was reviewed by an independent radiologist. Information obtained from the referral forms included: patient's age, sex, type of X-ray requested, clinical indications for the radiological test, and results as recorded by the radiologist.

The independent radiologist commented on:

- Consistency of the referral with the National Radiology Referral Guidelines [1];
- Clinical need for the procedure; and
- Evidence of cost-shifting from ACC to the CRR scheme.

Ethics approval—Ethics approval was obtained from the University of Otago Ethics Committee.

Results

Interviews with local stakeholders—Clinical representatives (GPs) for PHOs unanimously viewed the CRR scheme as a well-run and streamlined service. In particular, they approved of the ease of access to radiology services for people who previously found access difficult for financial and geographical reasons. Most GPs recognised their improved ability to diagnose and manage conditions and to make more appropriate referrals to secondary care. It was considered that these improvements had led to better patient outcomes.

There were mixed opinions about the National Radiology Referral Guidelines; some GPs referred to them more than others. Comments were made about the need for refining and clarifying some areas within the guidelines.

GPs noted that private specialists would sometimes request them to arrange radiology investigations through the CRR scheme. They noted that this seemed contrary to the original idea of the scheme being GP-driven.

Some GPs expressed difficulties with the unavailability of surveillance investigations (e.g. mammography for postsurgery breast cancer patients). Private specialists, however, were known to have used the scheme (through GPs) for this purpose.

Some GPs, especially in regions with older populations and where access was difficult (e.g. Kapiti area), wanted echocardiography to be included under the CRR scheme with the idea of easing the load on hospital cardiology services.

The CRR scheme did not necessarily cover the full cost of investigations, necessitating in some instances patient co-payments. Though co-payments under the CRR scheme were not perceived by GPs to be a deterrent for patients, the subject of ACC co-payments was often mentioned. X-rays referred under ACC tended to have higher patient co-payments than those referred under the CRR scheme and this was seen as a barrier to patients receiving appropriate clinical care for accident-related problems.

The clinical representative for one PHO which served an older population suggested that there was a need for greater funding of the CRR scheme in the PHO's area as its large elderly population had high demands for radiology services.

The administrative representative from WIPA stated that the CRR scheme required much time and energy to organise and to liaise with the various agencies involved. The administrative representative reported that the scheme was running to budget but that there were some recurring costly loopholes that may have threatened the scheme's financial viability in the short to medium term.

Particularly, the use of the scheme by specialists (through GPs) was perceived as a problem. Also, there was a perceived need for a budget to cover surveillance of ongoing medical conditions (for example, regular monitoring for multiple myeloma and regular postoperative breast cancer mammograms).

The representative from CCDHB reported that the CRR scheme had eased demand on hospital radiology services and that the hospital radiology waiting times had decreased dramatically as a result.

Sociodemographic characteristics of patients using the CRR scheme—A total of 17,854 people received at least one radiology referral. The following results apply to patients rather than referrals. Table 1 shows the distribution of patients by number of investigations. The majority (65.5%) of patients were women and there was an increase in the number of users with increasing age up to the age of 80 years (Figure 1). A valid CSC was held by 51.4% of patients. Table 2 shows the patient distribution by ethnicity.

Table 2 shows consultation data (for all PHOs) and X-ray referral rates. Differences in referral rates between all ethnic groups were significant ($p<0.0001$) except for the differences between Asian/NZ European ethnicities and the Pacific Island/'Not stated' ethnicities.

Māori had a lower rate of radiology referral under the CRR scheme than NZ Europeans; Pacific people had a higher rate than NZ Europeans; and Asian people had a rate similar to that of NZ Europeans. Referral rates were lower for patients living in NZDep quintile 5 (most deprived) areas compared with those living in NZDep quintile (least deprived) 1 areas ($p<0.0001$) (Table 3).

Table 1. Patient distribution by number of investigations

Number of investigations per person	Number of patients	Percent of patients
1	14,593	81.7
2	2621	14.7
3	507	2.8
4	95	0.5
5	22	0.1
6	11	0.1
7	1	0
8	3	0
9	1	0
Total	**17,854**	**100**

Figure 1. Patient distribution by age and gender

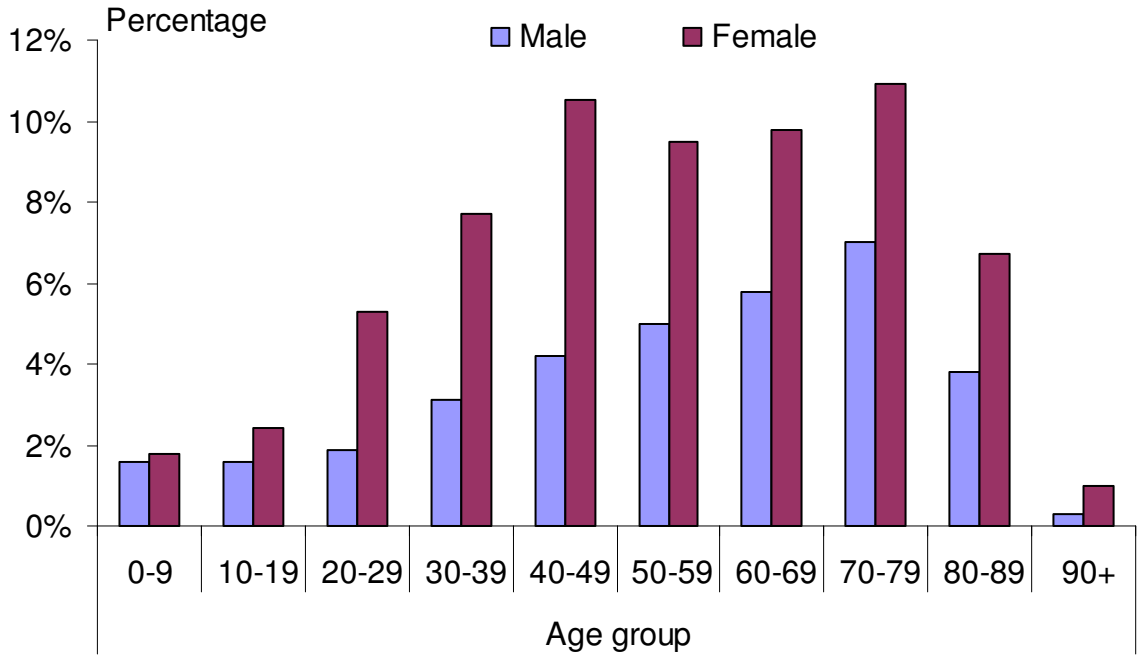


Table 2. Radiology referral rates by ethnicity

Ethnic group	Percent of total consultations	Number of referrals per 100 consultations
Māori	8.8	1.5
NZ European	67.0	1.9
Pacific Island	4.3	2.3
Asian	4.3	1.8
Other	3.5	1.0
'Not stated'	12.1	2.3

Table 3. Radiology referral rates by NZDep2001

NZDep2001 quintile*	Number of referrals per 100 consultations
1	1.7
2	2.0
3	2.3
4	1.8
5	1.2

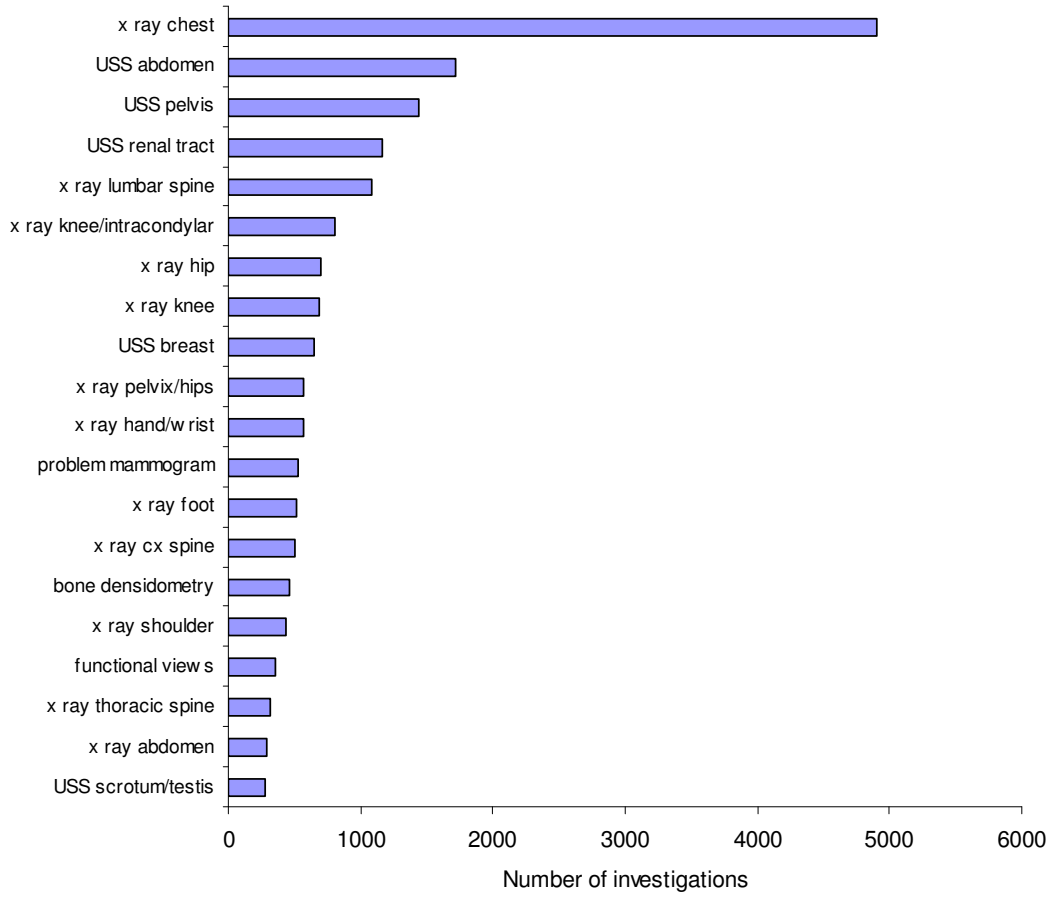
*1 = least deprived 20% of small areas; 5 = most deprived 20% of small areas; cases with missing and unknown NZDep values were excluded from this analysis.

Radiology investigations—In total, over the 1-year period, there were 21,952 referrals made to the CRR scheme. There were 117 types of radiology investigation ordered. Of these, 36 were ordered more than 100 times. Chest X-ray was the most requested investigation, whilst radiological investigations were ordered only once. Figure 2 shows the 20 most popular investigations.

Overall, investigations incurring the most expenditure for the scheme were the most frequent tests, with the exception of CT and MRI scans which, while not commonly requested, contributed significantly to the overall cost of the scheme (together, MRI and CT referrals accounted for 5.4% of the total cost of the scheme).

Controlling simultaneously for age, sex, NZDep2001, and ethnicity, the average cost per investigation under the CRR scheme varied significantly by ethnicity ($p<0.0001$) and by NZDep2001 ($p<0.01$). Average costs in the NZ European group were significantly higher than in all ethnic groups ($p\leq0.05$ in each case) except the 'Not stated' group (Table 4). The average cost per investigation was significantly higher for patients living in NZDep2001 quintile 1 areas compared to quintile 5 areas ($p=0.004$) (Table 5).

Figure 2. Top 20 investigations ordered*



*USS = ultrasound scan; functional views are for weight bearing joints (e.g. x-ray knee).

Table 4. Cost of investigations by ethnicity

Ethnic group	Geometric mean of cost per investigation (NZ$)
Māori	78.46
NZ European	82.04
Pacific Islands	73.97
Asian	76.74
Other	76.78
'Not stated'	80.54

Table 5. Cost of investigations by NZDep2001 quintile

NZDep2001 quintile*	Geometric mean of cost per investigation (NZ$)
1	82.48
2	80.80
3	82.65
4	81.79
5	77.43

*1 = least deprived 20% of small areas; 5 = most deprived 20% of small areas.

Table 6. Referrals not meeting National Radiology Referral Guidelines for referral

Type of investigation requested	Reason for not meeting referral guidelines	Comment by independent radiologist
USS pelvis (transvaginal)	Not aligned with Guidelines	Request doesn't comment on physical findings (e.g. >90kg), parity or family history, which might allow study to comply with guidelines
Ultrasound pelvis & renal tract	Not aligned with Guidelines	Not within the Guidelines in this age group if renal function normal
Nasal sinus	Not aligned with Guidelines	Plain films for sinus disease are inappropriate because the present standard is CT or nothing; exception is possible for foreign bodies in children
Ultrasound female pelvis	Eligible for ACC	Could have been performed under ACC regulations
Cervical spine	Eligible for ACC	Date of injury unknown; on the basis of information provided this should have been covered by ACC
Knee joint	Eligible for ACC	History of injury, therefore eligible for ACC coverage
CT chest >40 views	Specialist referral	Specialist referral, radiologist's recommendation; outside the scope of the Guidelines
MRI head complex	Specialist referral	Appropriate referral on clinical criteria, especially from an ophthalmologist, but outside the scope of the present Guidelines
Ultrasound abdomen	Specialist referral	Appropriate referral on clinical criteria, especially from a gastroenterologist, but outside the scope of the present Guidelines
Bone densitometry	Specialist referral	Appropriate referral on clinical criteria, especially from an endocrinologist, but outside the scope of the present Guidelines
CT abdomen and pelvis >40 slices	Specialist referral	Appropriate referral on clinical criteria, especially from a gastroenterologist, but outside the scope of the present Guidelines

Review by an independent radiologist of referral criteria for a random sample of 100 referrals—Of the 100 referral forms, 1 was not under the CRR scheme and thus was excluded from the analysis, and 6 failed to meet the National Radiology Referral Guidelines—3 because they did not align with the Guidelines and 3 because they appeared eligible for ACC cover (based on the information provided) (Table 6).

A further 5 were annotated as *OK but not applicable* as they were appropriate clinically but had come from specialists and therefore were beyond the scope of the Guidelines (Table 6). Overall the independent radiologist found the referrals in the sample were clinically sensible and consistent with currently recognised 'good practice'.

Discussion

Clinical representatives for PHOs (GPs) unanimously regarded the CRR scheme as a well-run and streamlined service. Over 95% of patients referred under the CRR scheme were referred just once or twice. One person had nine referrals. The majority (65.5%) of patients were women. Not surprisingly there was an increasing number of X-rays requested with increasing age, up to age 80. Six (6.1%) of referrals did not align with the National Radiology Referral Guidelines, and 5.1% had come from specialists and were therefore not eligible for the CRR scheme.

There were 117 types of radiology investigation requested during the 12-month period, with chest X-ray being the most frequently ordered investigation. The average cost of investigation in the NZ European and the 'Not stated' groups was higher than in other ethnic groups, and the average cost of investigation in the NZDep quintile five group was lower than other quintile groups.

Māori had a lower rate of referral (referrals per 100 consultations) compared with NZ European, and there was a relatively high referral rate for Pacific people. Referral rates were lowest for patients living in NZDep quintile 5 (most deprived) areas. These findings are broadly consistent with findings that show relatively low consultation, investigation, and intervention rates for Māori in primary and secondary settings.[6–8] There are no data related to inequality of access to radiology prior to the implementation of the CRR scheme, and it is hoped that the scheme has somewhat reduced inequalities.

An Australian survey carried out in 1999–2000, which included information about radiology referrals from a sample of 1047 GPs, found that chest X-ray was the most common investigation requested (13.3% of investigations), followed by plain X-ray knee (5.1%), mammogram (4.6%), plain X-ray lumbar spine (3.4%), X-ray ankle (2.7%), and X-ray shoulder (2.7%).[9] In the ultrasound category, USS pelvis (4.6% of all referrals), abdomen (3.2%), obstetric (2.7%), and breast USS (2.5%) were the most common procedures.

CT brain (1.7% of all referrals), CT head (1.4%), and MRI (0.3%) were similarly less common in Australia. GPs were not permitted to order MRIs in Australia barring a few special circumstances. In Australia, 59.4 % of radiology referrals were for females. Because of an absence of an ACC-like agency in Australia and the inclusion of maternity and screening referrals these data are not directly comparable with CRR scheme data from the Wellington region however.

Scope for enhancing the CRR scheme—The evaluation identified several areas that require action to further enhance the scheme, and it highlighted several issues that warrant further investigation:

- The main aim of the scheme is to enhance primary care access to radiology, hence referral to the scheme by specialists may be considered undesirable. This issue requires further review to explore options including: allocating a separate budget for specialist use of the scheme; developing criteria to determine specialist access to the scheme; or implementing mechanisms in an effort to prevent specialist use of the scheme.
- The inclusion of surveillance and screening investigations and other services such as mammography under the CRR scheme would enhance the relevance and usefulness of the scheme from a primary care perspective. The costs and benefits of expanding the scheme to include these investigations warrant further consideration.
- While cost-shifting from ACC to the scheme is not a large problem, there should be ongoing monitoring of cost shifting, and mechanisms for discouraging cost shifting should be explored.
- There is a relatively urgent need to update and refine the National Radiology Referral Guidelines for use in the CRR scheme to make them more up-to-date and GP-friendly. Indeed, this point was emphasised by a radiologist who remarked:

> I'm alarmed to see that the guidelines haven't been touched since approved by our committee; our recommendation was that they be reviewed in 2001; now 4 years ago! If you don't think radiology has changed much in that time cast your eyes over the output from a 16 (or 64) slice CT scanner sometime; you'll be astounded.

- The comparatively low rate of radiology referral for Māori people and people living in the most deprived areas and the lower average cost of their tests warrant further investigation.

Study limitations—The findings of this study should be interpreted in the context of the following limitations. A small number (two) of key informants declined to be interviewed and hence their views are not reflected in the results.

About 14% of radiology referrals had missing ethnicity data, which may have biased the representation of various ethnic groups in the results. For one PHO, the breakdown of consultations by ethnicity and NZDep quintile was available only for one-quarter of the year and therefore an estimate was made of the year's total consultations by multiplying quarterly numbers by four; some imprecision will have resulted from this method of estimating total annual referrals.

Due to lack of additional clinical information about the patients, the independent radiologist was not in a position to comment in detail on the alignment of the referrals with clinical 'best practice' (for example, the appropriateness of referring an 84-year-old woman for bone mineral density assessment is dependent on comorbidities, or lack of them).

Conclusions

From both clinical and administrative points of view, the CRR scheme is perceived as being a popular, well-run, and streamlined service. The comparatively low rate of radiology referral for Māori people and people living in the most deprived areas and the lower average cost of their tests warrant further investigation.

Referral to the CRR scheme by specialists is considered undesirable and it needs to be reviewed. The inclusion of surveillance and screening investigations and other services (such as mammography under the CRR scheme) warrants further consideration. Refinement of the National Radiology Referral Guidelines for use in the CRR scheme is also required to make them more up-to-date and GP-friendly.

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An unusual cause of stroke

Rebecca Ratcliffe, Lim Jones, Nicole McGrath, Michael Reardon

Stroke is common in New Zealand, and cerebrovascular disease is by far the most common aetiology. However sometimes a patient who presents with a stroke without cerebrovascular risk factors makes one realise that there are other causes of stroke, sometimes with some serious familial implications.

Case report

A 58-year-old New Zealand European man presented with a history of sudden onset of left hemiplegia. On arrival at hospital he was conscious and had a Glasgow Coma Score (GCS) of 15. He had a complete flaccid left-sided hemiplegia with no visual field loss, speech abnormality, or parietal sensory signs. Prior to this presentation he had been fit and well. He was normotensive, a non-smoker, and had a random cholesterol of 4.5 mmol/L. His father had died suddenly at the age of 50 years and according to the family he had memory problems prior to his death. Our patient worked as an operator in an oil refinery.

A computed tomography (CT) brain scan (Figure1) showed diffuse white-matter changes, and a subsequent magnetic resonance imaging (MRI) scan of his brain showed extensive bilateral white-matter changes in the subcortical brain tissue of primarily frontal, parietal, and brain stem areas (Figure 2). He also had a 2.6-cm hyperintense lesion in the right thalamus consistent with his recent infarct.

An inpatient carotid Doppler ultrasound was normal. A lumbar puncture was normal except for an elevated protein of 0.98 g/L with no oligoclonal bands. Because of his MRI scan abnormalities and a lack of vascular risk factors, a diagnosis of *cerebral autosomal dominant arteriopathy with subcortical infarcts and leucoencephalopathy* (CADASIL) was considered.

A mutation analysis of the NOTCH3 gene was carried out and this showed an Arg141Cys mutation detected in exon 4, confirming the diagnosis of CADASIL.

He was transferred to our rehabilitation ward and after a month he had gained limited function of his left leg and was able to mobilise with a walking stick independently. He was discharged home with no obvious cognitive decline or behavioural abnormality. His inpatient mini mental state examination was 30 out of 30. His two daughters have been referred to genetic counselling. The patient's two sisters have also expressed a wish to have genetic counselling carried out.

Figure 1. CT brain scan showing diffuse and extensive white-matter changes in the subcortical areas of the brain

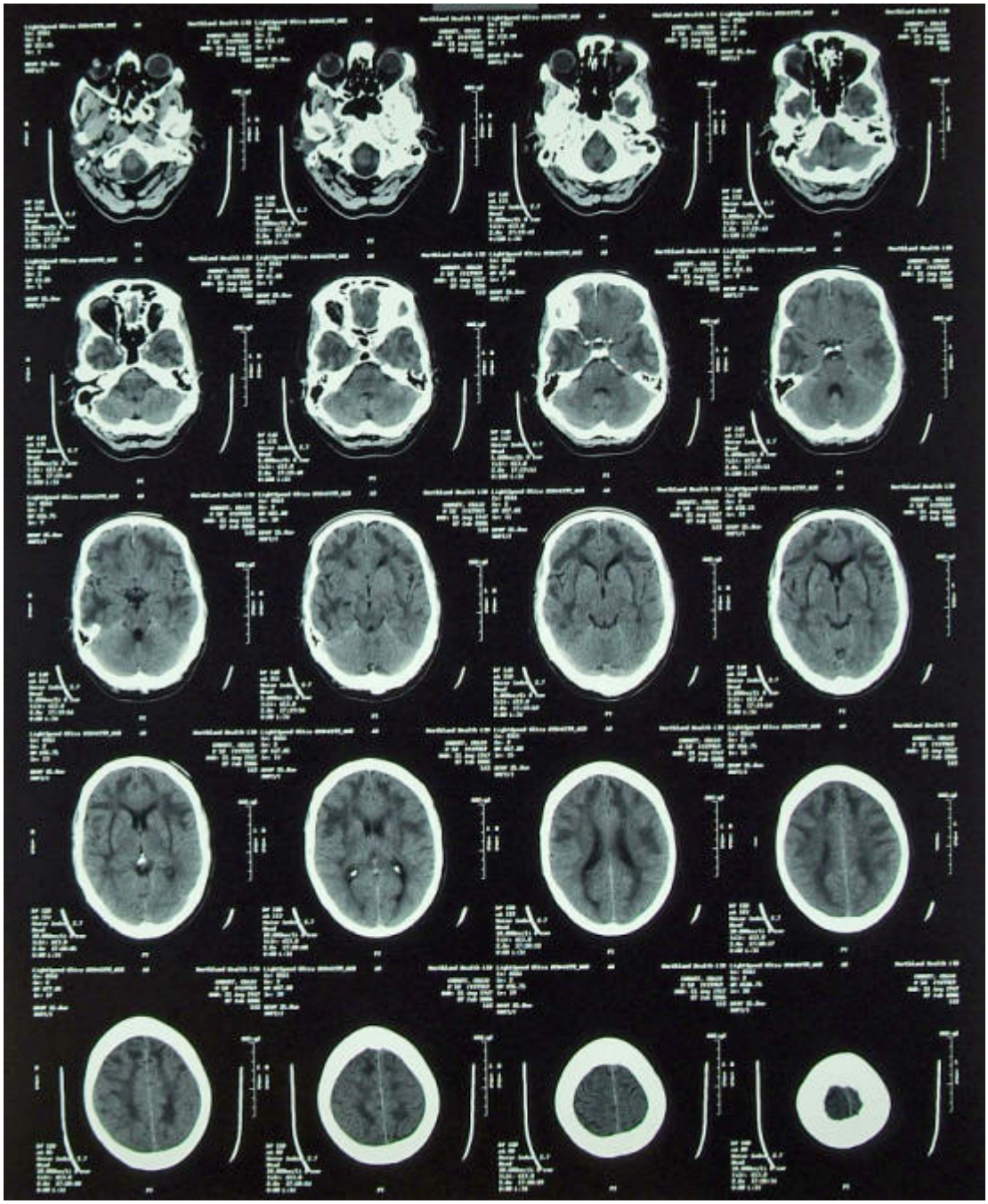
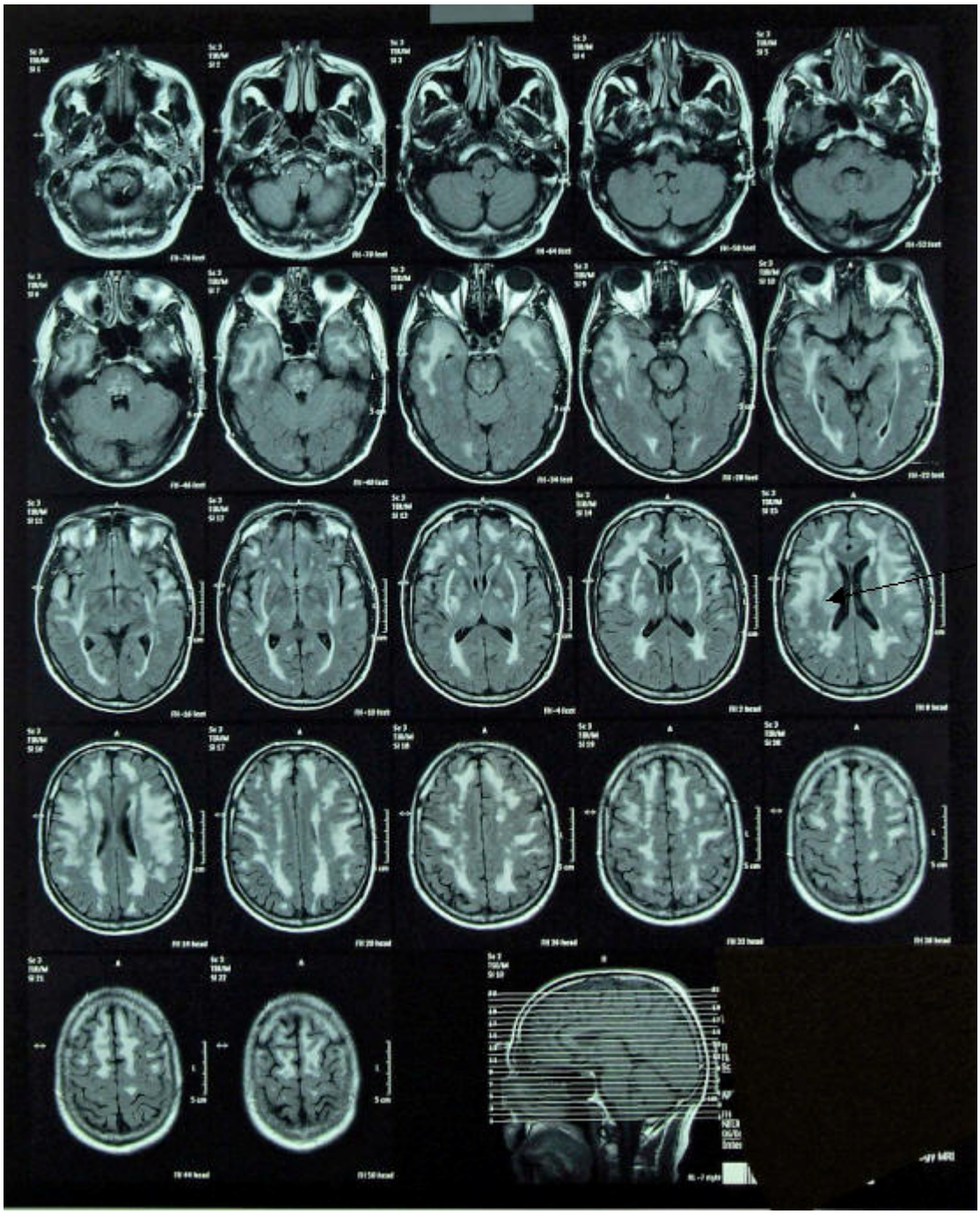


Figure 2. Extensive periventricular and deep white-matter abnormalities in this T2 flair MRI sequence. There is also an infarct in the right internal capsule area (dark arrow)



Discussion

CADASIL is a hereditary microangiopathy caused by a mutation in the NOTCH 3 gene on chromosome 19. While the total number of reported families with CADASIL is greater than 400 worldwide,[1] it is assumed that the incidence of the disease is much greater. It is characterised by a history of migraine headaches (30–40% of individuals), and mid-adult (30–60 years) onset of cerebrovascular disease progressing to dementia.

Amberla et al[2] observed a deterioration of working memory and executive function in individuals with NOTCH3 mutations in the prestroke phase. In symptomatic patients, white-matter hyperdensities are symmetrically distributed and located in the periventricular and deep white matter.[3] The frontal lobe is the site with the highest lesion load.

A NOTCH 3 gene mutation is detected in more than 90% of CADASIL patients. NOTCH3 is a 2,321 aminoacid type 1 transmembrane protein that is believed to be involved in the specification of cell fate during development.[4] Almost all mutations in CADASIL to date involve the loss or gain of a single cysteine residue in the NOTCH3 gene. Indeed, in our case he had a cysteine replacing an arginine residue in exon 4 of the NOTCH3 gene.

The pathogenesis of arterial disease in CADASIL is still not entirely clear. However NOTCH3 protein is uniquely present in vascular smooth-muscle cells. The abnormal protein may make the vascular smooth-muscle cells degenerate to produce the typical granular osmiophilic depositions (GOM), which can be seen in skin biopsies under an electron microscopy. However these are difficult to find and not always present in patients with CADASIL.

The loss of vascular smooth-muscle cells and related vascular-wall changes may be responsible for affecting the tone, elasticity, and reactivity of the affected cerebral arteries.[5] The arteries most severely affected in CADASIL are the medullary arteries, which supply the deep white matter and basal ganglia. They are end-arteries with very few collaterals. Damage of these vessels leads to ischaemic insults producing stroke-like episodes and ultimately to cognitive decline and death. The mean age of death has been observed to be between 54 and 64 years[6] and men tend to die earlier than women.[7] At the time of death, 77% of patients in one study were demented.[8.]

Acute encephalopathy,[9] psychiatric disorders, epilepsy,[7] and early myocardial infarction have been described with CADASIL.

CADASIL is inherited as an autosomal dominant disease and in our index case he had no obvious family history. However his father had died suddenly at the age of 50 years and the cause for this is not clear. *De novo* mutations have been reported with the condition.[10] Penetrance of the disease is probably 100% but expression varies in age of onset, severity of the clinical symptoms, and the progression of the disease. Our index case has two daughters who have no children yet and they have expressed a wish to seek testing and counselling regarding the disease.

There are few treatment options for patients with CADASIL. Most physicians prescribe aspirin to prevent strokes, however there is no evidence for its use in CADASIL. Indeed some CADASIL patients have been shown on MRI scan to have

cerebral microbleeds,[11] and angiography and anticoagulants are contraindicated in this condition. Most physicians control cerebrovascular risk factors such as hypertension and hypercholesterolaemia. Acetazolamide has been shown to increase cerebral blood flow in haemodynamic studies of CADASIL patients,[12] and has been mentioned as a potential drug treatment.

A diagnosis of CADASIL should be considered in patients who present with subcortical strokes, especially in those with a history of migraine. It should also be considered in patients whenever an MRI scan reveals significant white-matter changes in the subcortex and basal ganglia.

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An unusual manifestation of Meckel's diverticulum: strangulated paraumbilical hernia

Albert Tiu, Dominic Lee

Meckel's diverticulum is the most common congenital abnormality of the small bowel, occurring in 1% to 4 % of the population, with a male preponderance.[1] It is a relatively rare cause of clinical problems in the adult population.[2] Herein we report a case of a strangulated Meckel's diverticulum within a paraumbilical hernia which has not previously been documented within the English medical literature.

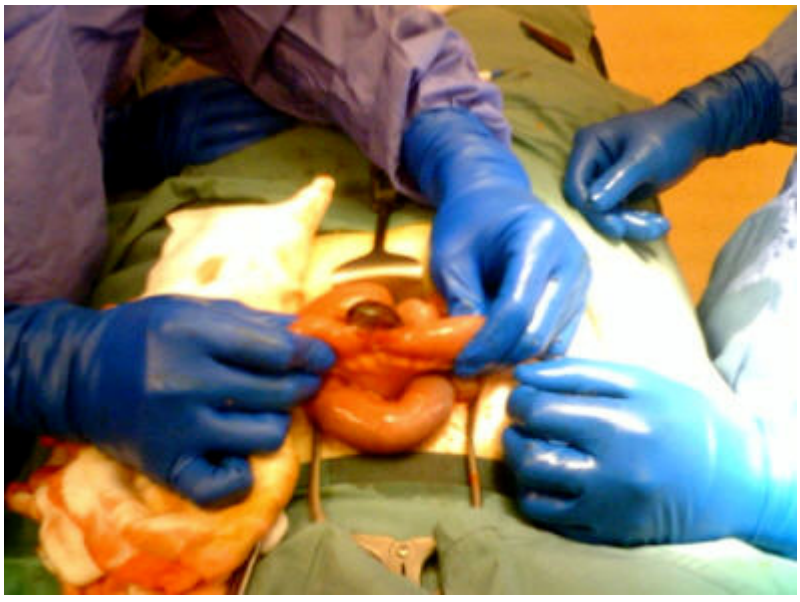
Case report

An overweight 55-year-old Caucasian woman presented to the emergency department with a 6-hour history of abdominal pain following some trivial lifting. The pain was initially colicky but became more generalised with radiation to the back. This was associated with nausea and vomiting and a lump in her upper abdomen; there were no fever, chills, or rigours.

She had no previous abdominal surgery. She was comfortable on examination when a tender paraumbilical lump was palpated measuring 4×4 cm with a negative cough impulse and no bowel sounds. The rest of the abdomen was soft. Further investigations revealed a normal blood laboratory profile, with a small air fluid level on abdominal X-ray without small bowel dilatation or gas under the diaphragm.

A diagnosis of a strangulated paraumbilical hernia was made, and the patient was scheduled in the operating theatre.

Figure 1. Strangulated Meckel's diverticulum within the paraumbilical hernia



A minilaparotomy was performed during which a tight paraumbilical hernia defect was found with a strangulated knuckle of small bowel. On opening the hernia sac, a dusky, discoloured, non-perforated Meckel's diverticulum was noted (Figure1). This was resected and a primary hand-sewn end-to-end anastomosis of the small bowel was performed. The paraumbilical hernia was repaired primarily using interrupted prolene sutures and reinforced with an onlay prolene mesh.

The patient made an uneventful recovery and was discharged home on the second postoperative day. The histopathology was consistent with an acutely inflamed Meckel's diverticulum with evidence of ischaemic necrosis. No heterotopic tissue was identified.

Discussion

Meckel's diverticulum represents a true diverticulum of the ileum containing all three layers of the bowel wall. Meckel's diverticulum develops if the omphalomesenteric duct, which connects the developing midgut with the yolk sac, fails to obliterate, which normally occurs by the 8th week of gestation.[3]

Heterotopic tissue, including gastric mucosa and pancreatic tissue, is present in 50% of patients. Although Meckel's diverticula have been described as proximal as the ligament of Treitz, most are within 100 cm of the ileocaecal valve. Patients may develop complications of ulceration, obstruction, bleeding, acute inflammation, and intussusception.

Hernia entrapment has been described with Meckel's diverticulum in the medical literature, such as strangulated femoral and inguinal hernia.[4,5] However the present case highlight the unusual presentation of Meckel's diverticulum which is strangulated within the paraumbilical hernia.

This case report adds another interesting clinical dimension to the varied spectrum of Meckel's diverticulum-related complications; it calls for judicious management based on the clinical context.

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Evolution of the New Zealand Childhood Immunisation Schedule from 1980: a personal view

Stewart Reid

Abstract

A personal view of the evolution of the New Zealand immunisation schedule (from the perspective of someone who has been involved in the decision-making process since 1980) is presented in this article. The rationale behind changes to vaccination strategies to control pertussis, hepatitis B, polio, measles, mumps and rubella, and *Haemophilus influenzae* type b are presented. Finally brief comment is made on the National Immunisation Register and the likely vaccines to be introduced into the schedule in the foreseeable future.

I first became involved in the committee which advises Government on immunisation policy in 1980 and have remained involved since then, chairing the committee in its various incarnations for much of the time since 1985. I am therefore in a unique position to describe the rationale behind the various changes in immunisation policy which have taken place in the last quarter century.

In 1996, a history of the New Zealand Immunisation Schedule was published.[1] This information is also summarised in the New Zealand Immunisation Handbook by both vaccine and schedule.[2] Dow and Mansoor[1] stated that their account "only provides a superficial explanation for the reasoning behind each change". I propose to provide greater detail on the rationale behind the changes I consider most important.

In my opinion, the key changes to the vaccine schedule, since 1980, have been to pertussis vaccination, with an increase from two to five doses and a change from whole cell to acellular pertussis vaccine. In addition, the introduction of hepatitis B, measles, mumps and rubella (MMR), and *Haemophilus influenzae* type b (Hib) vaccines and the change from oral (live) polio vaccine (OPV) to inactivated polio vaccine (IPV) have also been significant.

With these changes, there have been consequential changes to the combination vaccines used and the timing of the schedule. Finally the recently introduced National Immunisation Register (NIR) is arguably the most important development in immunisation in New Zealand in the last 25 years. (Group B meningococcal vaccine, MeNZB, is not covered in this article as it is a vaccine that has been introduced specifically for epidemic control and is not considered part of the routine childhood immunisation schedule.)

Pertussis (whooping cough)

In 1980, the pertussis schedule was for two doses of pertussis vaccine at 3 and 5 months of age. A third dose was added in 1984, a fourth dose in 1996, and a fifth dose in 2002. The change to acellular pertussis vaccine was made in 2000, and the timing of the five-dose schedule was altered in 2006, with the fourth dose changing from the second year of life to age 4 and the fifth dose from age 4 to age 11.

The initial schedule, introduced in 1960, was of three doses of plain (i.e. no aluminium adjuvant) diphtheria, tetanus, and pertussis (DTP) vaccine administered at 3, 4, and 5 months of age. When vaccine with aluminium hydroxide adjuvant became available in 1971, the 4-month dose was omitted as it was felt that the two doses of adjuvant vaccine would provide similar protection to three doses of plain vaccine and exhibit fewer adverse effects.[1]

In 1982, when the standard schedule was two doses, there was a large epidemic of pertussis with several deaths.[3] There were two aspects to the debate which took place in the Epidemiology Advisory Committee. Firstly was the number of doses in the schedule inadequate? It was pretty clear that this was the case and a third dose administered in the first 6 months of life was required.

Secondly, when should the third dose be administered? In general, it was felt it should be administered as early as possible and 4 weeks of age was considered. At that time, most general practitioners (GP) were involved in maternity care and most mothers and infants attended their GP for a postnatal visit at 6 weeks of age. Accordingly, 6 weeks was chosen as it was thought high coverage of this first dose would be achieved.

This decision led to the unique timing (6 weeks plus 3 and 5 months) of the New Zealand infant immunisation schedule. The decision created an unforeseen and recurring problem for the licensure of most vaccines in New Zealand as almost no vaccine studies utilise the New Zealand schedule. For licensure of most vaccines, it has therefore had to be assumed that if a vaccine provides protection (when administered at 2, 4, and 6 months and at 2, 3, and 4 months) then it will provide similar protection when administered at 6 weeks plus 3 and 5 months.

The fourth dose of pertussis vaccine was added in 1996 by utilising the combination vaccine DTPH (diphtheria and tetanus toxoids, whole cell pertussis vaccine, and *Haemophilus influenzae* type b conjugate vaccine). It had become clear that three doses of pertussis vaccine in infancy were insufficient to control all pertussis in the community.

Children who have received three doses of vaccine are well protected against typical pertussis till at least the age of 4 years.[4] However, as immunity from either pertussis disease or vaccination wanes over time, it is possible that older siblings in a household could be infected with pertussis and pass on the infection to infant siblings not yet old enough to have been protected by vaccination. It was anticipated that a fourth dose at 15 months would provide protection against milder disease and increase the effectiveness of the vaccine course and the duration of immunity.[4]

In 1992, a coverage survey was conducted[5] which indicated low rates of on-time coverage for those aged less than 2 years. This 1996 schedule change, using the combination DTPH vaccine, involved the deletion of the 18-month, 5-year, and 15-year visits without reducing the number of doses of any vaccine.

Vaccine doses previously administered at age 5 and 15 years were combined and given at age 11. A dose of OPV was given at 6 weeks instead of 18 months, so that the primary course of three doses of OPV was completed in the first 6 months of life.

It was anticipated that this “streamlining” of the schedule would allow GPs and practice nurses to concentrate on delivering the three visits in infancy and the fourth at

15 months, thus leading to an increase in on-time coverage, whilst the public health service would administer the 11-year visit in schools.

The 1980, 1984, 1994, 1996, 2000, 2002, and 2006 schedules are shown in Table 1.

Table 1. New Zealand Immunisation Schedules

1980

	DTP	OPV	Measles	DT	Rubella	Tetanus
3 months	X	X				
5 months	X	X				
12 months			X			
18 months		X		X		
5 years		X				
11 years					Girls only	
15 years						X

1984

	DTP	OPV	Measles	DT	Rubella	Tetanus
6 weeks	X					
3 months	X	X				
5 months	X	X				
12–15 months			X			
18 months		X		X		
5 years		X				
11 years					Girls only	
15 years						X

1994

	DTPH	Hep B	OPV	MMR	DT	Hib	Td
6 weeks	X	X					
3 months	X	X	X				
5 months	X		X				
12–15 months		X		X			
18 months			X		X	X	
5 years			X				
11 years				X			
15 years							X

1996

	DTPH	Hep B	OPV	MMR	Td
6 weeks	X	X	X		
3 months	X	X	X		
5 months	X	X	X		
15 months	X			X	
11 years			X	X	X

2000

	DTaP	Hib-HepB	Hep B	DTaP-Hib	OPV	MMR	Td
6 weeks	X	X			X		
3 months	X	X			X		
5 months	X		X		X		
15 months				X		X	
4 years					X	X	
11 years							X

2002

	DTaP-IPV	Hib-HepB	Hep B	DTaP-Hib	MMR	Td
6 weeks	X	X				
3 months	X	X				
5 months	X		X			
15 months				X	X	
4 years	X				X	
11 years*						X

2006

	DTaP-IPV	Hib-HepB	Hep B	Hib	MMR	dTap
6 weeks	X	X				
3 months	X	X				
5 months	X		X			
15 months				X	X	
4 years	X				X	
11 years*						X

* IPV administered at this visit to children who have not already received 4 doses of a polio vaccine.

The change to acellular pertussis vaccine in August 2000 was made necessary by a failure in supply of the DTPH vaccine. However, it simply brought forward a planned change; acellular pertussis vaccines are significantly less reactogenic than whole cell vaccines and provide comparable protection.

During the 1990s, several major studies of the efficacy of acellular pertussis vaccines were published and supported the licensure of these vaccines, including those used in New Zealand.[6–9] This change in vaccine also resulted in a huge reduction in the number of antigens administered to infants; whole cell pertussis vaccine has about 3000 individual antigens whilst the acellular pertussis-containing vaccine, Infanrix,™ has only three antigens.[10]

A change in the Hib vaccine, and its combination with hepatitis B vaccine, avoided an increase to three in the number of injections required at each vaccination visit. (See also below under Hib.)

In 2002, a fifth dose of pertussis vaccine was added at 4 years of age. The rationale for this change was to further extend the duration of protection conferred by the vaccine course making it less likely that older siblings would bring pertussis into a household and infect a very young infant.

In 2006, five doses of a pertussis containing vaccine will continue to be administered, but the timing will change. Data from the Italian efficacy study, in which Infanrix™ was one of the vaccines, indicate that protection following three doses in infancy is

stable for about 6 years.[11] This means that the dose in the second year of life is redundant and can be omitted. The dose at 4 years therefore becomes the fourth dose, and the fifth dose is administered at 11 years to further extend the duration of protection.

The vaccine administered at 11 years is the adult formulation of diphtheria tetanus and acellular pertussis vaccine, with a reduced content of diphtheria toxoid and the pertussis antigens

Hepatitis B

In 1985, the first plasma-derived hepatitis B vaccine was offered to babies born to high-risk, HbeAg-positive mothers. In 1987, the use was extended to all *surface* antigen (HBsAg)-positive mothers and all newborns in districts deemed to be at high risk, mostly in the north of New Zealand. Then, in 1988, a universal vaccination programme was introduced using firstly, four "low" doses of plasma-derived vaccine and, from December 1989, three "full" doses of recombinant vaccine, as is currently used.

The reason for this slow progress was fiscal. Milne and Moyes[12,13] had drawn attention to the high rate of hepatitis B in New Zealand and, in particular, Sandor Milne promoted hepatitis B vaccination, putting considerable pressure on the Ministry of Health and Government to fund a programme. However plasma-derived hepatitis B vaccine, which was highly immunogenic, was also very costly resulting in this cautious introduction.

Milne and Moyes[14] conducted studies using low-dose, plasma vaccine: 2 µg instead of 10 µg. This lower dose, although stimulating a high rate of seroconversion, induced a lower antibody titre than three doses of 10 µg. The Committee, at the time, was concerned about the lower antibody levels but was persuaded to recommend a universal low-dose regimen with a fourth dose at 15 months when Milne and Moyes demonstrated that the fourth dose stimulated very high titres indeed.[14]

In hindsight, the Committee was wrong to be so concerned about the height of the antibody response as it is now accepted that having seroconverted (attained a titre of > 10 MIU/ml) against hepatitis B is sufficient to confer long-term protection against clinical disease.[15]

The other key point that has been discussed over the years is whether there should be a universal birth dose of hepatitis B vaccine. In general, universal vaccine programmes work better than targeted programmes—i.e. fewer eligible individuals miss out. The argument for a universal birth dose is that this is the best method of ensuring that those at greatest risk (i.e. babies born to carrier mothers) are protected.

The argument against a universal birth dose is that as the majority of children do not require it, many providers and parents would opt not to give it, and this would result in confusion and poor overall coverage. This latter argument has, to date, prevailed in New Zealand.

Oral polio vaccine – inactivated polio vaccine

In 2002, the preferred polio vaccine was changed from oral (live) polio vaccine (OPV) to inactivated polio vaccine (IPV). There is no doubt that OPV has been responsible for the eradication of wild polio from the Western Pacific region, including New Zealand.[16] However indigenous cases of clinical polio have continued to occur in New Zealand with four confirmed and two probable cases since 1962.[17]

The confirmed cases have all been caused by vaccine-derived strains which can, in rare instances, revert to neurovirulence and cause clinical polio. Indeed, in countries where OPV is used with high coverage, clinical polio is almost always caused by strains derived from the vaccine virus. The rate at which this occurs is about 1/750,000 first doses of OPV.

Of the two cases which occurred in New Zealand in 1998, one was in a child who had received two doses and the other in an unimmunised mother following her infant's first dose of vaccine. These two cases led to the then Vaccine Advisory Committee firming up on its previously considered recommendation to change from OPV to IPV. The availability of a combination DTaP-IPV vaccine avoided the need to increase the number of injections required at each vaccination visit to three injections.

Measles mumps and rubella – MMR

Prior to 1990, single antigen measles vaccine was given to all children at 12–15 months and rubella vaccine was given to girls in school year 7 (children aged approximately 11 years). MMR vaccine was introduced in 1990 when it was given to all children at 12–15 months. A universal second dose at 11 years, replacing the so-called schoolgirl rubella vaccine programme, was introduced in 1992. In 2001, the timing of the second dose was changed from 11 years to 4 years.

There is little doubt that, with sufficiently high coverage, especially for the first dose, the two-dose strategy in place now is likely to lead to the elimination of indigenous measles, mumps, and rubella in New Zealand, as has been seen in Scandinavia.[18] However it has been a long road dominated by considerations of how best to control congenital rubella and measles, with the control of all rubella and mumps secondary considerations.

Rubella vaccine was offered from 1970 to all children at 4 years of age. Because uptake was poor in boys, this was changed to vaccination targeted at girls at age 11 in school year 7, prior to reproductive age. This was the UK approach to the control of congenital rubella. The argument supporting this strategy being that if high coverage was achieved, which it was in New Zealand, continued exposure to wild rubella would ensure that, for those vaccinated, immunity would be regularly boosted, thus providing protection to a high percentage of women in pregnancy.

Continued exposure to wild rubella would occur because no-one under age 11 and no males were vaccinated. The alternative strategy, used in the US, was universal childhood vaccination reducing the likelihood of anyone, in particular a pregnant mother, being exposed to rubella.

Both strategies significantly reduce, but do not eliminate, congenital rubella syndrome. In New Zealand, it became accepted that, because not all year-7 girls

would be vaccinated and not all those vaccinated would respond, there would always be a small number of women in pregnancy susceptible to rubella.

Because rubella continued to circulate, there would continue to be cases of congenital rubella syndrome. The solution for New Zealand (and incidently the UK and the US) was therefore to adopt the Scandinavian universal two-dose strategy, with a first dose in the second year of life and a second dose at either 4 to 6 years or 11 years.

The purpose of the second dose was to immunise those who had either missed out on, or failed to respond to, the first dose. This strategy ensured that, with high coverage, the maximum percentage of the female population was immune and for those who either failed to be vaccinated or failed to seroconvert, the likelihood of them confronting wild rubella was remote. The two-dose strategy also enabled excellent control of measles and mumps with the second dose providing an opportunity to vaccinate those who had missed out on, or failed to respond to, the first dose.

The second dose was given at age 11 because of the high coverage which had been obtained in the schoolgirl rubella programme. The timing of this second dose was changed to 4 years in 2002 because computer modelling demonstrated that this timing made control of measles, and eventual elimination, easier.[19,20] Very high coverage with both doses (in particular the first dose) is essential, however. It is unlikely there will be any change to the MMR strategy for the foreseeable future, though if coverage is low, catch-up campaigns may be required.

Haemophilus influenzae type b – Hib

Hib vaccination was first introduced in 1994 when it was administered as a component of the quadrivalent vaccine DTPH. The preferred Hib vaccine changed in 2000 and was administered as a Hib-hepatitis B combination vaccine.

Prior to vaccination, Hib was a common cause of invasive bacterial disease. Early Hib vaccines were derived from the polysaccharide capsule of the organism, polyribosylribitol phosphate (PRP). These vaccines were poorly immunogenic in infants aged less than 2 years and, like other polysaccharide antigens, did not induce immune memory. Indeed, if invasive Hib disease occurs in a child aged less than 2 years, the child is likely to remain susceptible.

The solution to this problem was to attach (conjugate) the PRP to a protein carrier. This meant that infants could mount an immune response against the PRP and develop immune memory—i.e. the conjugated vaccine would stimulate a better immune response than the organism induces in infants.

Furthermore, conjugate Hib vaccines induce a high level of mucosal antibody-lowering carriage rates, and reducing the likelihood of susceptible individuals being exposed to the organism. This means that the effectiveness of the vaccine in practice may be greater than would be predicted from the efficacy observed in a clinical trial and the coverage attained in a community.

The first Hib vaccine introduced to the New Zealand Childhood Immunisation Schedule was HbOC in which the protein conjugate was a mutant diphtheria toxin, the so called CRM_{197}. It was highly immunogenic after three doses in infancy and a booster dose given in the second year of life. This vaccine has been shown to be

protective, with efficacy of 100% after three doses in a clinical trial conducted in a community in Northern California.[21]

The decision to introduce Hib vaccine was not difficult given that New Zealand had, prior to vaccination, in excess of 100 cases of invasive Hib disease each year and that there was a highly efficacious and safe vaccine available. Its introduction in 1994 had been delayed by around 2 years, pending the availability of the combination DTPH vaccine (Tetramune), to avoid the necessity of giving three injections at a single visit.

HbOC reduced the incidence of Hib in New Zealand very significantly but the percentage of cases occurring in those aged less than 6 months of age increased.[22] Because of this, when the supply of DTPH failed, the opportunity was taken to change to a vaccine containing PRP conjugated to an alternative protein carrier, PRP-OMP, which provides earlier protection because it induces a protective immune response following the first dose.

PRP-OMP is a Hib vaccine in which PRP is conjugated to the *Neisseria meningitidis* outer-membrane protein. Only two doses are required in infancy, and a significant immune response occurs after a *single* dose. Efficacy, calculated in a trial conducted in an American Indian Navajo community, was 100% until 15 months of age in any child who had received either one or two doses in infancy, and 95% for all children with a single failure occurring at 15.5 months of age.[23]

Because of its first-dose response, this vaccine should be used for at least the initial dose(s) in any community in which there is a significant burden of disease in those aged less than 6 months, as in New Zealand. Since the introduction of this vaccine, the percentage (and number) of cases under 6 months of age has reduced (Immunisation Handbook 2006; in press).

New Zealand has always administered a booster dose of a Hib vaccine in the second year of life to boost antibody levels, to extend protection till at least age 5, covering the highest risk years, and to provide the best control of the disease.[24,25] The precise vaccine used has generally been determined by the combination vaccine most suitable for administration at 15 months. Currently, a tetanus toxoid conjugate (PRP-T) is administered at 15 months as a single-antigen vaccine. This vaccine is preferred because a single booster dose at 15 months produces high antibody titres.

The National Immunisation Register

The National Immunisation Register (NIR) is one of the most important developments in immunisation in New Zealand in the past 25 years. In New Zealand, it has been rolled out, district by district, from 2005 onwards, enrolling children from birth. It will allow the accurate measurement of coverage, and should assist with an increase in coverage by identifying individuals and pockets of low coverage where greater effort can be targeted. It will provide important data for the future development of New Zealand immunisation policy, which has been hampered by not having up-to-date reliable coverage data.

If a vaccine programme fails to adequately control its target disease, this may be because either the vaccine is not efficacious or the programme not effective. Without accurate coverage figures, it is not possible to make this distinction.

The NIR was essential for the safety monitoring of MeNZB™ vaccine. It uses the same unique identifier, the National Health Index number (NHI), as used by providers in hospital and primary care, thus enabling the tracking of adverse events following immunisation. It also enabled the identification of those who had subsequent doses following an adverse event, providing re-challenge data, which is seldom available for adverse events following immunisation.

The NIR could potentially be a very valuable tool for the monitoring of the safety of all vaccines in New Zealand, particularly for conditions which require hospitalisation, because of the ability to link the hospital-discharge database to the immunisation data base using the same unique identifier.

The future

There are many new vaccines under development and it will be an ongoing challenge to decide whether to incorporate them into the routine schedule. It is likely that more vaccines will be promoted by vaccine-manufacturing companies for private administration, and this will present a challenge for those in primary care to be sufficiently well-informed to advise parents and caregivers well.

On the immediate horizon are pneumococcal conjugate, group C meningococcal conjugate, varicella, rotavirus, and human papilloma virus (HPV) vaccines. As well as the clinical justification and the cost-benefit rationale for these vaccines, there are the administration difficulties. Rotavirus vaccines are oral vaccines and so their administration should not cause too many problems. HPV vaccine, the second cancer-preventing vaccine after hepatitis B vaccine, will be administered in adolescence (prior to sexual activity), and this may meet some resistance. Varicella is likely to be administered as a component of a combination MMRV vaccine.

While using MeNZB, three injections are required to be administered simultaneously at each of the first three visits. As well, both pneumococcal and meningococcal vaccines require at least two intramuscular doses in infancy and they are not yet available as combination vaccines. It is therefore very likely that the addition of these new bacterial vaccines will result in a further increase in the number of injections required at each visit. Such recommendations will have to be very carefully considered by policymakers.

Conclusion

The past 25 years have proved to be a very interesting time in the evolution of the New Zealand Immunisation Schedule, with many changes. It is likely that the pace of change will increase and that vaccination will be available and offered against a larger number of vaccine-preventable diseases. The creation of the NIR will help ensure that New Zealand gains the maximum benefit from the introduction of new vaccines.

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PHARMAC and the statin debacle

Chris Ellis, Harvey White

Abstract

Statins are lipid-modifying drugs which dramatically lower the total and low-density lipoprotein cholesterol levels and have been shown in large clinical trials to reduce the rate of vascular events, including heart attacks, strokes, and death. For every 1% reduction in the LDL cholesterol level, the relative risk for major coronary heart disease events is reduced by approximately 1%. Since the landmark Scandinavian Simvastatin Survival Study (4S) was published in 1994, multiple further clinical trials have reinforced the benefits of treating large numbers of patients with statins with the emphasis on achieving low LDL cholesterol levels (currently 1.6 mmol/L) for the optimal management of patients at very high risk. However PHARMAC's actions since statins were first available have significantly impaired the optimal management of New Zealand patients. A review of the methods employed during the statin era, is a useful exercise in understanding how PHARMAC functions and emphasises the point that rather than achieving low-cost prices for drugs, PHARMAC simply impedes the timely delivery of modern medicines to New Zealand patients.

Of all of the examples of mismanagement of medicines by the Pharmaceutical Management Agency Limited (PHARMAC), arguably the worst episode has been their woeful handling of the statin drugs. It is probable that PHARMAC's bizarre and shortsighted approach has caused more harm and premature death to New Zealand patients than any of their other manoeuvres.

Cardiovascular disease remains the commonest single cause of death, and major morbidity in New Zealand and the entire Western world, and the widespread use of statin lipid-modifying medications, elsewhere, has revolutionised the prevention of heart attacks and strokes, peripheral vascular disease, and death.

In New Zealand, this preventative approach has been significantly hampered by PHARMAC's shortsighted policies of limiting patient access to these medicines, which, in our view, has been an extraordinary chapter of patient neglect and public deceit.

Statin background

Since their initial introduction into clinical trials more than 20 years ago, statin drugs have dominated the treatment of dyslipidaemia with their marked ability to lower the total and low-density lipoprotein (LDL) cholesterol levels. At the top therapeutic doses, the early yeast-derived statins (pravastatin, simvastatin, and lovastatin) would lower LDL cholesterol by 33–45%, with the later drugs (fluvastatin, cerivastatin, atorvastatin, and rosuvastatin) lowering the LDL cholesterol by 33–58%.[1]

Over time it became clear that whatever cholesterol lowering was achieved by a 10 mg dose of a statin, that a "rule of 6's" prevailed with a further 6% cholesterol lowering seen with a doubling of the statin dose to 20 mg, a further 6% with a

doubling to 40 mg and an approximate further 6% with an increase in dose to 80 mg. However, the cholesterol-lowering ability of individual statins *did* significantly differ: the weakest statin being fluvastatin, the strongest being rosuvastatin.[1]

Reduction of cardiovascular risk

There is a direct relationship between the fall in LDL cholesterol, and the reduction in cardiovascular (CVS) risk. For every 1% reduction in the LDL cholesterol level, the relative risk for major coronary heart disease events is reduced by approximately 1%.[2] A meta-analysis of 90,056 participants in 14 randomised statin trials has shown that statin therapy can safely reduce the 5-year incidence of major coronary events, coronary revascularisation, and stroke by about 20% for each 1 mmol/L reduction in LDL cholesterol achieved.[3] This benefit was largely irrespective of the initial lipid profile or other presenting characteristics. The absolute benefit related to an individual's absolute risk of such events *and* to the absolute reduction in LDL cholesterol achieved. Current research is now refining the optimal LDL cholesterol level, which should be achieved for patients at highest CVS risk.

The landmark Pravastatin or Atorvastatin Evaluation and Infection Therapy-Thrombolysis in Myocardial Infarction 22 (PROVE-IT TIMI 22) trial[4] has now identified that a LDL cholesterol level of 1.6 mmol/L is the current target for patients with a prior myocardial infarction, at very high risk of a further CVS event. Several related trials have suggested that a significant slowing of the progression of atherosclerosis, stabilisation or even regression of atherosclerosis is seen in patients if a low LDL cholesterol target is achieved.[5,6]

The National Cholesterol Education Program Adult Treatment Panel 3 (NCEP ATP 3) United States Guideline has now recognised this level and incorporated it into their guidelines for patients at very high CVS risk,[2] although, unfortunately, 2 years after the publication of the PROVE-IT TIMI 22 study, the Ministry of Health-funded New Zealand Guideline Group[7] has not yet responded to this scientific advance.

Early use of statins in New Zealand

In New Zealand, clinical trials of simvastatin (Zocor) began in Christchurch in May 1986,[8] and the use of statins was strongly encouraged for patients with coronary heart disease.[9] In October 1989, simvastatin was approved for specialist prescription supply with supplementary pharmaceutical benefit under section 99 (D) of the Social Security Act 1964.

To comply with Department of Health criteria, patients had to either have proven familial hypercholesterolaemia, total cholesterol levels exceeding 8.0mmol/L, or manifest coronary disease. Access then remained severely restricted for many years during which time overseas angiographic trials demonstrated a significant benefit with the use of statins in high-risk individuals.[10]

In 1994, the landmark Scandinavian Simvastatin Survival Study (4S) reported the outcome of 4444 patients with a history of prior myocardial infarction or chronic stable angina, with a total cholesterol between 5.5 mmol/L and 8.0 mmol/L, in whom there was a reduction in total mortality of 30% over 5.4 years (p=0.0003) for patients randomised to a mean dose of 27 mg of simvastatin.[11]

In 1996, the Cholesterol and Recurrent Events (CARE) trial reported the outcome of patients with a prior myocardial infarction and a total cholesterol level below 6.2mmol/L (LDL cholesterol 3.0 to 4.5 mmol/L) in whom there was a 24% (95% CI: 9 to 36%) reduction in fatal coronary events or a non-fatal myocardial infarction over 5 years (p=0.003) for patients randomised to treatment with 40 mg of pravastatin compared with patients randomised to placebo.[12]

PHARMAC's strategy of denying the use of new medicines to New Zealand patients by delaying their introduction into New Zealand is exemplified by their statin policy at this time. For 2½ years after the publication of the 4S study, and 9 months after the CARE trial, PHARMAC would only fund treatment with a statin for ischaemic heart disease patients who had a cholesterol level of 7.0 mmol/L or above, and then only following an application by a hospital specialist.[13]

For no rational reason, re-application had to be made after 2 years. PHARMAC's policy went against repeated specialist advice[14,15]—and high-risk New Zealand patients received inadequate treatment as a result. Cohorts of young patients (<40 years) undergoing revascularisation procedures at Green Lane Hospital were found to have a mean total cholesterol of ≥6.0 mmol/L, with a mean level of ≥7.0 mmol/L in more than 20% of surviving patients.[16,17]

A further cohort of 641 myocardial infarction patients from Auckland were assessed from December 1995 to January 1997, and only 14% were taking a statin, largely a reflection of the lack of access resultant on PHARMAC's restriction of statin use.[18] General practitioners were not permitted to prescribe statins (or fibrates) for their patients, and the development of effective vascular preventative strategies in the community were delayed by years due to PHARMAC's rationing policies.

PHARMAC's delayed response to the early statin studies

Finally, 2½ years after the publication of the 4S study, PHARMAC relented. They announced that from 1 July 1997, health authority funding would be available for patients with a level of cholesterol of ≥6mmol/L.[19] This also applied to general practitioners whose role in implementation of prevention strategies is critical.

However, PHARMAC's willingness to ignore evidence-based medicine, and simply use a cheaper, unproven option, was exemplified by their statin decision at this stage. Funding was only available for the weakest of the statins (fluvastatin)[20] which had no proven mortality or patient outcome benefit to support its use, and which was not then even registered in New Zealand for secondary prevention use after an ischaemic event.[21]

Despite sustained, critical medical comments,[21–26] PHARMAC failed to respond to these data as well as data from other randomised clinical trials, preferring instead to claim success with their policies by letter[27–30] and by inaction. With the enforced patient switch to the weaker fluvastatin, cholesterol levels inevitably rose,[31–33] and there were reports of an increase in patient CVS events.[34]

Despite protestations from PHARMAC,[29] it is inconceivable that there was not an increase in CVS events and death following the decision of 1 July 1997, which raised cholesterol levels in so many patients. PHARMAC's defensive reaction, coupled with their total disinterest in trying to audit these very significant changes, is a further

indictment of their policy, demonstrating an appalling lack of care for New Zealand patients.

From 1 June 1998, atorvastatin, a more potent statin,[35] although at the time without extensive long-term safety or patient outcome data, was given full funding but patients prescribed pravastatin and simvastatin, which at the time had the scientific evidence for benefit, were still subject to a patient part charge.

Treatment of coronary artery bypass graft patients

Dyslipidaemia is known to cause accelerated coronary graft atherosclerosis and occlusion[36] with improved outcomes with lipid-modifying therapy.[37] The post coronary artery bypass grafting trial was published in January 1997. It randomised 1351 patients who had undergone coronary artery bypass surgery with a baseline LDL cholesterol level between 3.4 and 4.5 mmol/L to "moderate" or "aggressive" management of LDL cholesterol using lovastatin and, if needed, cholestyramine therapy.[38]

At an average of 4.3 years, the patients managed with "aggressive" treatment (mean LDL cholesterol range 2.4 mmol/L to 2.5 mmol/L) had less progression of graft atherosclerosis (27% vs 39% progression; $p<0.001$) than those who were randomised to receive "moderate" treatment (mean LDL cholesterol range 3.4 mmol/L to 3.5mmol/L).

Unfortunately, once again, patients in New Zealand could not benefit from this scientific advance, until, nearly 2 years later. Then, from 1 December 1998, PHARMAC lowered the level of cholesterol at which it would partly or fully subsidise statin therapy for patients with ischaemic heart disease to ≥5.5 mmol/L, and for revascularisation patients (previous coronary artery bypass grafting or percutaneous coronary angioplasty) to ≥4.5 mmol/L.[18]

The LIPID Study

The Long-term Intervention with Pravastatin in Ischaemic Disease (LIPID) Study enrolled 9014 Australian and New Zealand patients aged 31 to 75 years of age, with unstable angina and post myocardial infarction with 'normal' cholesterol levels of 4.0 to 7.0 mmol/L. The 1998 publication demonstrated a reduction in death from coronary heart disease of 24% ($p<0.001$), compared with placebo.[39]

Patients from all age groups benefited from pravastatin treatment with a similar relative risk reduction, but in terms of absolute benefit, elderly patients of ≥70 years gained proportionally more benefit, being at higher initial risk.[40] The LIPID trial also demonstrated a reduction in the rate of stroke for patients randomised to pravastatin treatment.[41]

The Heart Protection Study

By far the largest statin trial, The Heart Protection Study (HPS), enrolled 20,536 British subjects: 13,386 with coronary disease and 7,150 (35%) without overt coronary disease. Of these "non coronary" subjects, 1820 had cerebral vascular disease, 2701 had peripheral vascular disease, and 3982 had diabetes mellitus; they were selected because they were at "high risk" of developing vascular disease.

Patients with a total cholesterol of 3.5 mmol/L and above were randomised to simvastatin 40 mg daily or placebo. This therapy was extremely well tolerated and safe, and resulted in a 24% risk reduction of vascular events including myocardial infarction and death. This study provided a major extension to the statin knowledge at that stage, indicating that patients aged between 40 and 80 years, with either coronary, cerebrovascular or peripheral vascular disease, or those at high risk of developing vascular disease due to pre-existing diabetes mellitus, and with cholesterol levels of 3.5 mmol/L or above, would benefit from a statin drug.[42]

Some progress at last from PHARMAC in 2002

Despite expert medical commentary,[25,26] and these data from randomised clinical trials, PHARMAC failed to respond but persisted with their belief that they were providing a good service via their annual reports.[43,44]

During this period, PHARMAC employed a favourite tool to help them to ration the use of statins: the 'Special Authority' form. This had to be laboriously completed for each patient prior to waiting to see if the application was successful, and funding allowed, and was nothing but a crude bureaucratic hurdle to the appropriate use of statins.

In addition, PHARMAC actively discouraged the use of statin treatment for patients aged over 70 years, adding a cost-assessment aspect to the special Authority Form asking prescribers to "reassess patients at age 70 and decide whether continued treatment with a lipid modifying agent is justified, given the costs and benefits for that patient".[45] Progress with patient management was slow.

However, from May 1999, simvastatin was available without additional patient cost, and from November 1999, simvastatin was funded after a commercial arrangement between Merck, Sharp and Dohme (MSD) and PHARMAC.

Finally on 1 April 2002, through a pricing arrangement with MSD, simvastatin became available at a fully funded level *without* the need for special approval and without any scrutiny of baseline cholesterol level. At last clinicians were able to implement the clinical messages of the 4S, CARE, LIPID, HPS Study and other data, viz: that there should be no cholesterol value set as an entry point for therapy in patients with ischaemic heart disease or at high risk for cardiovascular disease.[46]

PHARMAC and atorvastatin in 2004

By 2004, atorvastatin was established as the strongest statin in New Zealand, with extensive clinical trials,[4,47–49] and consequently with the largest worldwide sales. With a cholesterol-lowering ability of 55% at the 80 mg dose,[1] it was optimal therapy for the patients with particularly high cholesterol levels, and CVS disease risk. Furthermore, atorvastatin was the only statin proven to be of benefit when used early for patients presenting with a heart attack,[47] and was prescribed to approximately 42,000 patients in New Zealand by 2004.

Unfortunately, on 30 March 2004, PHARMAC issued a consultation document[50] which recommended 'grandfathering' current patients on atorvastatin 80 mg, but they planned to forcibly switch approximately 39,000 patients to simvastatin, which was to remain fully-funded after 1 June 2004.

Many clinicians and patients were aghast with these further changes, which would result in worse lipid control for many thousands of patients, in particular those on ≥20 mg atorvastatin.[1] Many patients had initially been treated with simvastatin or pravastatin before being forced to switch to fluvastatin in 1997, then were changed to the stronger atorvastatin, and were now to be switched yet again back to simvastatin!

The problems with patient compliance with the ever-changing medication were not considered, but for patients this was a very real issue. Pfizer then discussed the possibility of the company leaving New Zealand, taking with them atorvastatin and other medications vital to the care of New Zealand patients. Many clinicians worked hard to persuade PHARMAC and the Ministry of Health to allow atorvastatin to be available for at least those patients prescribed 40 mg or more—approximately 12,000 patients. The two authors of this paper met the Minister of Health, Mrs Annette King; the situation was discussed in Parliament.[51]

Acrimonious comments and articles featured in the press for several weeks. Eventually PHARMAC backed down, and were forced to continue to fund patients on ≥40mg atorvastatin, but not before the experience had led Pfizer to withdraw NZ$40 million/year of research funding from medical research in New Zealand.[52]

PHARMAC's role during 2004 to 2006: the atorvastatin/ezetimibe issues

Since 1 June 2004, PHARMAC has funded treatment for patients with the generic simvastatin, Lipex (MSD), but has persisted with its rationing of atorvastatin. For many patients, simvastatin therapy remains an excellent choice and PHARMAC funding was certainly welcomed by patients and doctors.

Lipex (simvastatin) is highly effective and cheap. However, for patients with a high cholesterol level, the target LDL cholesterol of 2.5 mmol/L, or 1.6 mmol/L for those at the highest risk, simply cannot be achieved. Simvastatin can achieve an approximate 42% LDL cholesterol lowering at the 80 mg dose.[1] For these patients, atorvastatin, which can achieve 55% cholesterol lowering at the 80 mg dose,[1] is required. However, the authorisation form now available to try to gain funding for atorvastatin is complex, and cumbersome. Patients need to take 80mg of simvastatin for 2 months, and then still fail to meet the decreed levels of LDL cholesterol (2.5 mmol/L, or 2.0 mmol/L for those with prior CABG surgery), before consideration is given to the funding of the application.

The 80 mg dose of simvastatin is known to produce more side-effects than simvastatin at lower doses, some of which are potentially very dangerous[53,54]—but patients, and their doctors, are required to first take this otherwise unnecessary risk of these side effects, in order to satisfy the current PHARMAC requirements to access funding for atorvastatin.

In contrast to the New Zealand situation, in Australia, the Pharmaceuticals Benefits Advisory Committee (PBAC), which is equivalent to PHARMAC in New Zealand, has accepted the science that atorvastatin is more effective at lowering cholesterol than simvastatin, and currently pay a 12.5% premium for patients who are taking atorvastatin.[55]

It seems that PBAC were convinced by the prior and recent major trials of atorvastatin published in 2004 and 2005, which have continued to indicate both the effectiveness of atorvastatin, and the need to pursue a treatment strategy of achieving very low LDL cholesterol levels for patients.[56–58] The Incremental Decrease in End Points Through Aggressive Lipid Lowering (IDEAL) study[58] of 8888 patients has shown that atorvastatin 80 mg is the modern standard and more effective than the 4S strategy of simvastatin 20 mg or 40 mg[11] for patients with coronary heart disease.

The development of ezetimibe, a cholesterol absorption-blocking agent, has been a significant advance for treating patients. Ezetimibe 10 mg added to any statin drug, at any dose, will further lower LDL cholesterol by approximately 15–20%.[59–63] PHARMAC has allowed some limited access to this important agent, but cynically will only fund the treatment with ezetimibe on its own, or for patients who are prescribed simvastatin, and not atorvastatin.

This refusal to allow two funded medicines to be used *together* exceeds PHARMAC's previous nonsense, breaking new ground in their absurd rules, for what is a clear example of commercial pressures and rationing, rather than a response to science and clinical experience.

High-risk patients, who could potentially gain an approximate 70% LDL cholesterol reduction with the combination of atorvastatin 80 mg (55%) and ezetimibe 10 mg (15%), may only gain an approximate 57% reduction with a combination of simvastatin 80 mg (44%) and ezetimibe 10 mg (15%).[1,59–63] Hence patients at very high risk, with an LDL cholesterol of 3.5 to 4.0 mmol/L and above (approximately a total cholesterol of 6 to 6.5 mmol or above) are currently not usually able to achieve the LDL target of 1.6 mmol/L at which they have the best chance of avoiding a further heart attack, stroke or death,[4] unless they are able to themselves pay for the most powerful lipid combination of atorvastatin and ezetimibe.

PHARMAC's failures

The combined science and worldwide knowledge over the last 20 years has indicated that there is a need to deliver prolonged statin treatment, with substantial LDL cholesterol reductions, in all patients at high risk of any type of major vascular event.

PHARMAC's role in allowing New Zealand patients access to these important medicines has been truly awful. A review of their rationing methods clearly shows that the principle cost saving that they employ, is simply to deny and delay patients access to modern medicines. PHARMAC then supplement this strategy with a range of tactics, including misrepresentation of scientific data, the ability to ignore evidenced-based medicine when it suits them, major bureaucratic hurdles to the access of medicines, and frequent switching of funding of various drugs, with a significant resultant impact on patient trust and compliance with the use of their medicines.[64–67]

Furthermore, PHARMAC have a continuous and clever public relations section, which assails the credibility and integrity of doctors, and have often personally and publicly attacked those who have attempted to present scientific evidence, and to discuss in a rational manner, issues of enormous importance to New Zealand patients and taxpayers. Hence New Zealanders have now lost an environment in which the

New Zealand Ministry of Health and the community can hold sensible and reasonable discussion, as to what medicines can, and truly cannot, be afforded.

We agree with Professor Begg and his Christchurch colleagues in that we need to speak out against PHARMAC and be advocates for our patients.[67]

Summary

All countries have to struggle to keep their pharmaceutical budget at a manageable level, and all countries in the Western world have devised bodies and strategies to try to make available appropriate pharmaceuticals for their populations.

New Zealand's desire to get a 'fair price' for pharmaceuticals is far from unique; what *is* unique is the approach that PHARMAC has developed over the years.[64–67]

PHARMAC's handling of statins has been a complete debacle. We strongly believe that the New Zealand Ministry of Health, and Parliament, must now look to significantly reform the structure, strategy and goals of this wayward organisation. New Zealand patients have suffered long enough and they deserve better.

Potential conflicts of interest: Professor Harvey White has been the Principle Investigator or a steering committee member of a number of clinical trials for which funding has been provided by pharmaceutical companies which market lipid-modifying drugs including Bristol Myers Squibb, Merck Sharpe and Dohme, Pfizer, and Astra Zeneca. He has also been a member of advisory boards for Pfizer and Astra Zeneca. He has been a member of the three National Guideline committees on the management of dyslipidaemia.

Dr Chris Ellis has been an Investigator in a number of clinical trials and participated in educational meetings for which funding has been provided, by pharmaceutical companies, the Health Research Council of New Zealand, the National Heart Foundation of New Zealand, and PHARMAC. He has also been a member of advisory boards for pharmaceutical companies which market lipid-modifying drugs, including Merck Sharp and Dohme, Astra Zeneca and Pfizer, and has been on advisory committees for the National Heart Foundation of New Zealand, and a representative on the Executive Committee of the New Zealand Branch of the Cardiac Society of Australia and New Zealand.

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(**Interim response from PHARMAC:** PHARMAC rejects Dr Ellis' and White's claims, and will be responding in forthcoming issues of the *Journal.*)

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Six cases of cancer of the sigmoid flexure

This case report was written by R. Gordon Macdonald, M.D., LR.C.P.E., &c., Surgeon, Dunedin Hospital, and published in the New Zealand Medical Journal 1906, Volume 5 (19), p48

During the past twelve months I have operated upon six cases for the relief of obstruction of the bowels. In four of the cases a correct diagnosis was made previous- to the operation, and in two of the cases no definite conclusion was arrived at. The two failures were the most interesting of the series.

The first was a woman of about fifty years of age. I saw her in consultation with Dr. McPherson. She gave a history of chronic constipation of some years' duration, but her general health had not materially suffered. Nothing could be recognised by any practicable examination. Injections and purgatives gave-temporary relief, but she soon relapsed into her old condition. Eventually, the case became urgent and she was. admitted into the Hospital. I operated upon her by the median incision, not knowing where the obstruction was or what it would prove to be.

On searching the abdomen, I came upon a small hard mass in the lumen of the bowel at the sigmoid flexure. It was imperative that the bowels should be relieved, so I performed colotomy and awaited developments. She made an excellent recovery, but gradually developed the usual characteristics of malignant disease. She declined further operative measures, went home and died about three months after the operation.

Case 2 was that of a strong healthy man, also of about fifty years of age, whom I had known for several years. Excepting for one or two attacks of influenza, I had never known him to complain. He suddenly became unwell with symptoms of obstruction of the bowels. I recommended injections and purgatives, and he rapidly recovered. Two or three days afterwards I was again hurriedly summoned to find him complaining of sharp pain in the abdomen. Dr Colquhoun was now called into consultation, but neither of us could arrive at a definite conclusion as to the cause of the pain and obstruction in his bowels.

The question of cancer did not enter my mind, nor do I think it entered Dr. Colquhoun's mind, for it was never mentioned. Urgent symptoms supervened, and he was removed to a hospital. I again operated by the median method. As soon as the abdomen was open, a faecal odour was at once perceived. Evidently peritoneal perforation had taken place and the peritoneal cavity become infected. On introducing my finger and searching for a cause I at once came upon a hard mass in the lumen of the bowel at the sigmoid flexure, and a perforation at its upper border.

The cavity was carefully washed out and a colotomy performed, but the man died on the following day. In. this case there was no history of constipation nor derangement of the general health. The man went about his usual business until the day previous to his removal for operation.

The other cases gave the ordinary history of chronic constipation and general failure of health, &c. A correct diagnosis was made in each case, and operations successfully performed. The two failures made a strong impression upon my mind as to the possible causes of urgent bowel symptoms in those advancing in years.

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Stability of the harm avoidance personality trait in late-life depression.

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Abstract: Research in the personality trait of harm avoidance using the Temperament and Character Inventory (TCI) in older people with depression is very limited. One of the properties of a personality trait is that it should be relatively stable over time. The aim of this study is to investigate whether the personality trait of harm avoidance is stable over a 12 months period in a group of older people with depression. 32 (86%) of the initial 37 older people with depression with their harm avoidance personality trait measured 12 months ago were interviewed to have this personality trait re-measured using the TCI. There is no statistically significant difference between the initial mean harm avoidance score of 17.3 and the repeated mean score of 17.1 (p=0.85). This study provided evidence for harm avoidance being a stable personality trait as proposed in the Cloninger's psychobiological model of personality.

Comparison of suture ligation and clip ligation for the treatment of patent ductus arteriosus.

Parkash Mandhan, Udaya Samarakkody—Spencer Beasley, Stuart Brown, Kiki Maoate, Askar Kukkady and Russell Blakelock. Department of Paediatric Surgery, Waikato Hospital, Hamilton—Department of Paediatric Surgery, Christchurch Hospital, Christchurch

Purpose: We reviewed the experience of the two centres with the surgical treatment of patent ductus arteriosus (PDA), and compared the two techniques, suture ligation (SL) and clip ligation (CL).

Material and Methods: Retrospective review of the clinical and operative records of 63 newborn patients who had surgical closure of PDA at two centers, Hamilton and Christchurch, from 2000 to 2005. Thirty-two patients had SL and thirty-one CL. All patients had open thoractomy for PDA ligation. A two-tailed Student's t test was used to calculate the 95% confidence intervals for length of operation, intra and postoperative problems.

Results: The diagnosis was made by echocardiography in 58 (93%) patients and all procedures were performed semi-urgently. Both groups were similar in age and gender. The average length of procedure was 55.78 ± 13.7 minutes for SL and 30.83 ± 8.7 for CL. Six neonates had intra-operative bleeding in SL group. In the SL group, 4 patients had significant post-operative complications (pneumothoracies and chylothorax) in comparison to one in the CL group (pneumothorax). The differences in the operative time was statistically significant (p value <0.05), however there were no differences in the intra-operative and postoperative complications between the two groups because of the relatively small numbers of patients in each study group.

Conclusion: This study demonstrates that there is a significant reduction in the operative time in using the method of CL as opposed to the SL in the surgical closure of PDA in neonates.

Quality of life in the elderly. Dr PSDV Prasadarao, Dr Gary Cheung & Weibo Sun, Mental Health Services for Older People (MHSOP), Waikato Hospital, Hamilton

Abstract: New Zealand population is ageing. Research exploring quality of life (QOL) among older people may have implications in developing and delivering services and in enhancing their QOL. Enhancing QOL can promote subjective well-being in the Elderly, may prevent deterioration of physical and mental health, and reduce the need for more intensive and expensive health care. Efforts in enhancing QOL may lead to positive health gains through better treatment adherence and positive outlook towards life and illness that in turn may postpone functional decline. There is a paucity of research in this area, prompting the present pilot study to explore quality of life among older people.

The present research was a cross-sectional exploratory study utilising convenience samples. The aims were to: 1) assess the QOL among older people who are living a) on their own and b) in the retirement villages with supported environment, and to find out if there is any difference between these two groups; 2) assess the role of life satisfaction on QOL among older people; and 3) assess the role of perceived health status on QOL among older people. Individuals over 65 years with adequate cognitive functioning were included. Subjects included: Group-I (N=49) : individuals living in a supportive environment and with structured group activities; Group-II (N=54) : individuals living on their own with no exposure to supportive activities. Variables, namely, health status (Health conditions Checklist of the Multilevel Assessment Instrument; Lawton, 1972), life satisfaction (The Life Satisfaction Index-A; Neugarten et al., 1961) and quality of life (QuiLL Questionnaire; Evans et al., 2005) were studied. Findings and implications were discussed.

Expression of *Sonic Hedgehog* cascade during hindgut development. Parkash Mandhan, Spencer Beasley, Tracy Hale, Leigh Ellmers, Justin Roake, Michael Sullivan, Children's Developmental & Cancer Genetic Research Group, Department of Surgery and Paediatrics, University of Otago, Christchurch

Purpose: In normal hindgut development, sonic hedgehog (shh) cascade is required to play a crucial role in anorectal morphogenesis in vertebrates. The aim of this study was to determine the expression pattern of shh and its downstream genes during hindgut development in ETU exposed embryos with anorectal malformations (ARM).

Material and Methods: Pregnant Sprague-Dawley females were administered 1% ETU (125 mg/kg) on the tenth day of gestation (D10). Embryos were collected between D12 and D16 from experimental and control group. Developing hindgut was dissected from each embryo and dissected tissues were immediately frozen in liquid nitrogen. RNA was isolated using Trizol method and first strand cDNA was synthesised using Random hexamer primers. Reverse transcriptase polymerase chain

reaction (RT-PCR) was done to determine the expression of shh and its downstream genes.

Results: Reverse transcriptase (RT) polymerase chain reaction (PCR) was done to determine the transcripts of Shh in each sample and quantitative real-time PCR was carried out to show relative quantitative expression of Shh at each time point. Shh was detected in all samples confirming that Shh is active during the process of hindgut development in fetal rats. Relative quantitation demonstrated that Shh expression shows time-dependent changes in the developing hindgut of ETU-exposed rat embryos, and when results were compared with control samples, there was significant decrease in expression on gD14 and 15, when the cloaca normally separates into the rectum and urethra occurs in the rat fetus.

Conclusion: Our preliminary data shows that shh plays vital role during the process of hindgut development, and on D14 and D15, when there is time of separation of cloaca into hindgut and urogenital tract, shh is down regulated thus possibly contribute for the ARM.

Isolation of myostatin in human volunteers and age related correlation of serum levels. TM Vasudevan, R Kambadur#, J Conaglen*, K Foulkes. Department of Vascular Surgery, *Endocrinology, Waikato Hospital, #Human Genomics, AgResearch, Ruakura

Background: Myostatin is a TGF beta super family member produced in normal skeletal muscles in animals. It is a negative regulator of skeletal muscle mass. Following isolation of the mostatin gene, myostatin knock out animals show significant increase in muscle bulk without changes in body weight.

Aim: To estimate myostatin levels in normal human volunteers in various decades of life and correlate the levels to lean body mass (LBM) and serum creatinine levels.

Methodology: 120 healthy volunteers were recruited following approval from the local ethics committee. 10mls of venous blood was extracted after overnight fasting for estimation of serum lipids, creatinine and myostatin levels. Volunteers performing vigorous physical exercises were excluded along with people on medications and pre-existing diseases or disabilities. Serum myostatin levels were measured by ELISA. standardisation.

Results: 60 samples were analysed to date. Myostatin was present in measurable quantities in all volunteers. Mean levels were maximal in the 5^{th} decade (14.47mMol/L). Peak levels of myostatin was more prominent in men (14.97 vs 14.12mMol/L) although not statistically significant. There was no significant correlation of serum myostatin with age, BMI, LBM.

Conclusion: Serum myostatin is present in measurable quantities in humans The role of myostatin in disease processes like muscular dystrophy and muscle wasting due to malignant illnesses is being determined in an ongoing study.

***Chlamydia trachomatis* in New Zealand. Geoff Spencer, Jane Morgan**

Aims: To make crude regional and national estimates of *Chlamydia* prevalence in New Zealand, based on *Chlamydia* diagnoses for the year 2003.

Methods: A survey of all accredited medical-testing laboratories in New Zealand was carried out.

Results: Fifty of 53 laboratories responded; 10 were unable or unwilling to provide testing data for the survey. Of the data provided, 7.57 % of all *Chlamydia* tests in 2003 were positive. Because of data limitations, we were unable to calculate regional or national Chlamydia population-based figures. Data limitations and issues included lack of ethnicity data, issues of duplicate testing, centralised testing, non-standardised testing methodologies, funding and commercial sector reluctance to share data in a competitive environment.

Conclusions: New Zealand lacks robust epidemiological prevalence data for sexually transmitted infections and urgent improvements to the national surveillance framework are needed. The issues identified in our survey suggest such improvements will only occur if bacterial sexually transmitted infections become notifiable conditions.

An investigation into the medication usage and cost for diabetic patients in a rural town in New Zealand. Antonia Zechner[1], Grace Joshy[2], David Simmons[2]. [1]Dept of Economics, University of Waikato, Hamilton; [2]Waikato Clinical School, University of Auckland, Hamilton

Improvements in diabetes care due to a multi-faceted intervention in a rural Waikato town will be monitored and costed over the next 2 years. Medicine costs are both an expense to patients and the government as subsidies. A mail survey was undertaken to provide insight into the range of medicine costs faced by diabetes patients. The information collected was: name of medication, dosage of that medication, number of doses taken, and frequency of dose taken. The Pharmac database covering a three month period was used to access the medication costs of those patients who filled in the survey.

204 (63%) patients responded (57% European, 31% Maori, 52% Female). 246 different medications were identified as being used within the rural cohort. There was however an overlap of medication listed under both generic and brand name. The medication covers prescription drugs, over-the-counter (OTC) medication, supplements, herbal and traditional medication. Antihyperglycaemic medications (AHM) were taken by 64% of patients and medications for non glycaemic risk factors and cardiovascular disease medications (NGRFCVDM) were taken by 87% of patients. Twelve patients (5.9%) took no medication. The average number of different medications was 4.4± 3.1. The most common drugs used were: Lipex 96 (47.1%), Accupril 89 (43.6%), and Metformin 68 (33.3%). The median (interquartile range) AHM costs were: out-of-pocket $3.00(0-9), subsidies $64.38 ($33-271) and total costs $67.54 (40-274). The cost for NGRFCVDM were $6.00(0-15), subsidies $221.88(112-393) and total costs $215.38(105-385). The median (interquartile range) costs for all drugs were: out-of-pocket $52.10 (29-76), subsidies $525 ($264-1003) and total costs $583 (323-1179).

We conclude that in this rural town, out of pocket expenses for medications are a small fraction of the total costs, and that AHM are a quarter of the cost of NGRFCVDM.

Glycaemic control and antibody status among patients with newly diagnosed Type 1 diabetes. Doron Hickey, Grace Joshy, Peter Dunn, David Simmons, Ross Lawrenson

Abstract: The aim of the study was to compare the risk of admission to hospital and poor glycaemic control by antibody status among newly diagnosed patients with Type 1 diabetes in the Waikato. A cohort of patients under the age of 25 at diagnosis were identified from the Waikato Diabetes Service diabetes database. Patient information extracted included: gender, date of birth, ethnicity, year of diagnosis, age at diagnosis, initial and current treatment, height, weight, lipids and HbA1c. The primary outcomes of interest were: admission to hospital, admission for DKA and most recent HbA1c. A total of 164 people were diagnosed with diabetes between 1997 and 2002. 133 (81%) were diagnosed with type 1 diabetes and 27 (16%) with type 2 diabetes. Of the 133 type 1 patients, 85 (64%) had an anti-GAD measurement and 65/85 (76%) were positive. 24 patients had one or more admissions for DKA. Logistic regression suggested gender and IA2 positivity but not anti-GAD were related to the latest HbA1c but there was no association between level of antibodies at diagnosis and subsequent risk of admission to hospital. Our follow study up shows that admission to hospital with DKA was a relatively rare event and only occurred in 18% of patients. Because of the small number of admissions with DKA we did not show any statistically significant associations with antibody status at diagnosis but high levels of anti-IA2 are associated with improved glycaemic control suggesting it is a good prognostic indicator.

High dose oxygen therapy in vascular surgery. PJ Puckridge, H Saleem, C Holdaway, TM Vasudevan, D Ferrar

The administration of high dose oxygen therapy (FiO2 80%) intra-operatively and immediately post operatively has been successful in halving wound infections in colorectal surgical patients1 through increasing tissue oxygenation. This high dose oxygen therapy has been administered safely without worsening respiratory function2.

Infra-inguinal bypass surgical patients have high rates of wound infections with potential disastrous consequences. These patients have baseline tissue oxygen tension that is reduced below normal3-10. This pathological hypoxaemia worsens during surgery, which may make the tissue defences unable to control bacterial lodgement within the surgical wound. However it is unknown whether delivery of high dose oxygen will change the tissue oxygenation in the vascular patient.

Consequently we commenced a pilot project with the hypothesis that high dose intra-operative oxygen administration to patients undergoing infra-inguinal arterial surgery will result in increased tissue p02 as evidenced by TcpO2 measurements.

Method: Consecutive non-randomised patients undergoing infra-inguinal arterial surgery were recruited. Relevant demographic information was collected. Transcutaneous partial pressure of oxygen (TcpO2) was measured using A TCM3

monitoring system (Radiometer, Copenhagen) attached to the foot. A baseline measurement was recorded pre-operatively.

Intraoperatively with arterial clamps in place FiO2 was set at 30% and after equilibration complete a measurement obtained. FiO2 then changed to 80% and further measurement obtained. Post operatively the patients had TcpO2 once again measured with FiO2 at 30% and 80% while in recovery. A final reading was taken prior to discharge. For comparison arterial blood gases were taken at the same times. Induction of anaesthesia and surgery was performed in the usual manner. Analysis of the results was performed using standard statistical methodology.

Results: Nine patients have been recruited at this time. There were significant differences in arterial oxygen concentration intra-operatively and postoperatively between FiO2 30% and FiO2 80%. Tissue oxygenation showed no difference intraoperatively while arterial clamps in place. A trend towards higher results with use of high dose oxygen (FiO2 80%) postoperatively was seen with P value approaching significance (P=0.10).

Conclusion: The administration of high dose oxygen to vascular surgical patients undergoing lower limb arterial surgery results in a non-significant trend for increased oxygen concentrations in the tissue of the foot. These results suggest the administration of high dose oxygen intra-operatively in patients with peripheral vascular disease may be beneficial but further research is required.

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Initiating oral medication for erection problems: changes couples experience.
Amy Williamson (Psychology Department, University of Waikato); John V Conaglen (Waikato Clinical School, University of Auckland); Helen M Conaglen (University of Waikato)

Background: Understanding how a couple's sexual function dynamics alter with the initiation of oral medication treatment is important for the ongoing use of such treatments by couples with erection problems.

Method: This study investigated how couples were affected by the man's erectile dysfunction (ED) and the impact on both the men and women of subsequent medical treatment of the ED. Following a medical screening process, 30 couples were randomised to receive either Viagra or Cialis oral medication for the man's erectile problems.

Questionnaires rating the men's (International index of Erectile Function, IIEF), and women's sexual functioning (Female Sexual Function Inventory, FSFI), sexual desire (Sexual Desire Inventory, SDI-2), relationship factors (Psychological and Interpersonal Relationship Scales, PAIRS), and adjustment (Dyadic Adjustment Scale, DAS) and quality of life (Comprehensive Quality of Life, COMQoL), were completed at baseline and following treatment.

Results: On the quality of life measure the men showed a significant increase in satisfaction with all areas of life (material, health, productivity, intimacy, safety, place in community and emotional wellbeing.) The women however showed a decrease in their satisfaction regarding level of productivity. The men's IIEF scores showed improvements in erectile function, orgasmic function, intercourse satisfaction and overall satisfaction, while the women improved levels of arousal, orgasm and satisfaction. Both men and women showed significant increases in levels of confidence within their sexual relationship on the PAIRS measure. The women also showed improvement in their GSI and PST scales of the SCL-90-R, indicating a decrease in the breadth, level and intensity of symptoms of psychopathology.

These changes in quality of life, sexual function, psychopathology and relationship scales will be discussed.

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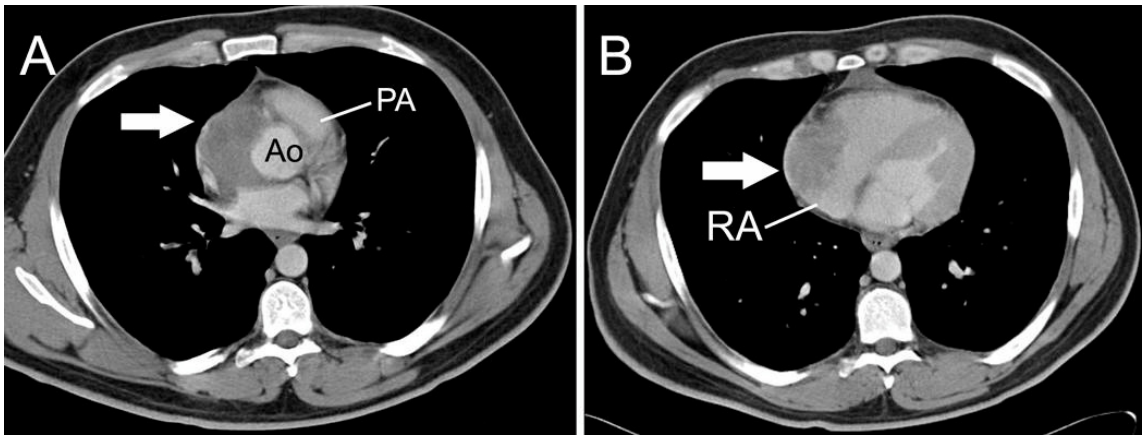
Seminoma with extensive metastases to the right atrium

Constantin Marcu, Kristen Andresen, Richard Salzano, Thomas Donohue

A 43-year-old Caucasian male presented with mild dyspnoea on exertion 2 years after treatment for stage IB testicular seminoma. Chest radiography demonstrated multiple, bilateral lung nodules. Computed tomographic (CT) imaging showed pulmonary nodules and a filling defect, measuring 5×4 cm, in the right atrium extending through the atrial wall into the anterior mediastinum (Figure 1AB).

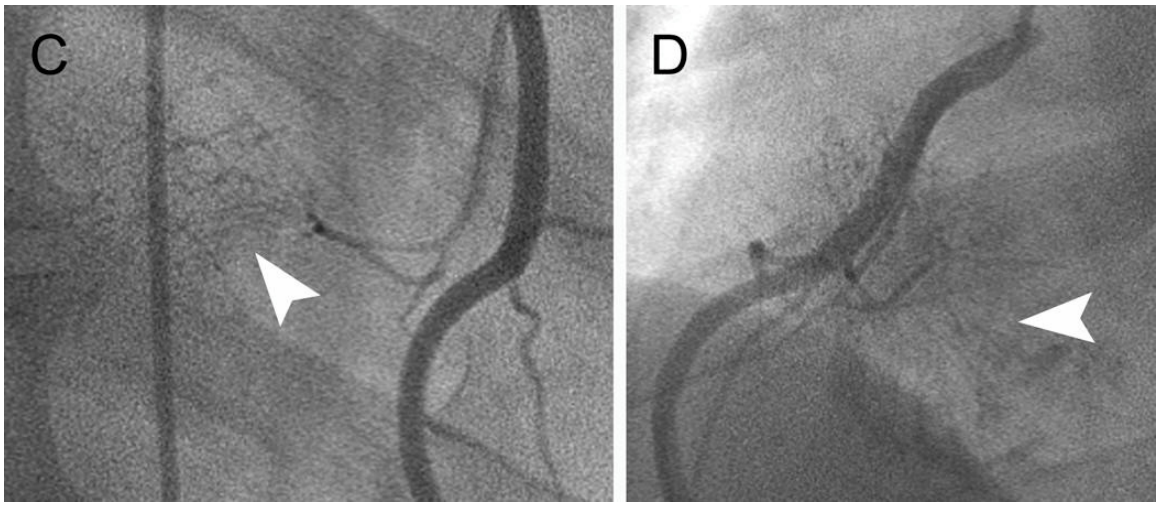
Figure 1AB. Chest computed tomographic (CT) scan with intravenous contrast. A: Transverse plane at the level of the ascending aorta. Hypodense mass-tumour (arrow) outside the ascending aorta. B: Four-chamber view of the heart. Tumour (arrow) inside the right atrial (RA) cavity.



PA=pulmonary artery; RA=right atrium; Ao=aorta.

No periaortic or intrathoracic adenopathy was demonstrated. Percutaneous lung nodule biopsy was nondiagnostic. Mediastinotomy under cardiopulmonary bypass was planned because of concerns of possible right ventricular inflow obstruction from the right atrial mass. Presurgical coronary angiography demonstrated normal coronary arteries and a large “tumour blush” in the region of the right atrium (Figure 1CD).

Figure 1CD. Right coronary angiogram. Right coronary artery in a 30-degree right anterior oblique (panel C) and left anterior oblique projection (panel D), with "contrast blush" indicating the presence of a highly vascular structure (tumour) in the right atrial region (arrowhead).

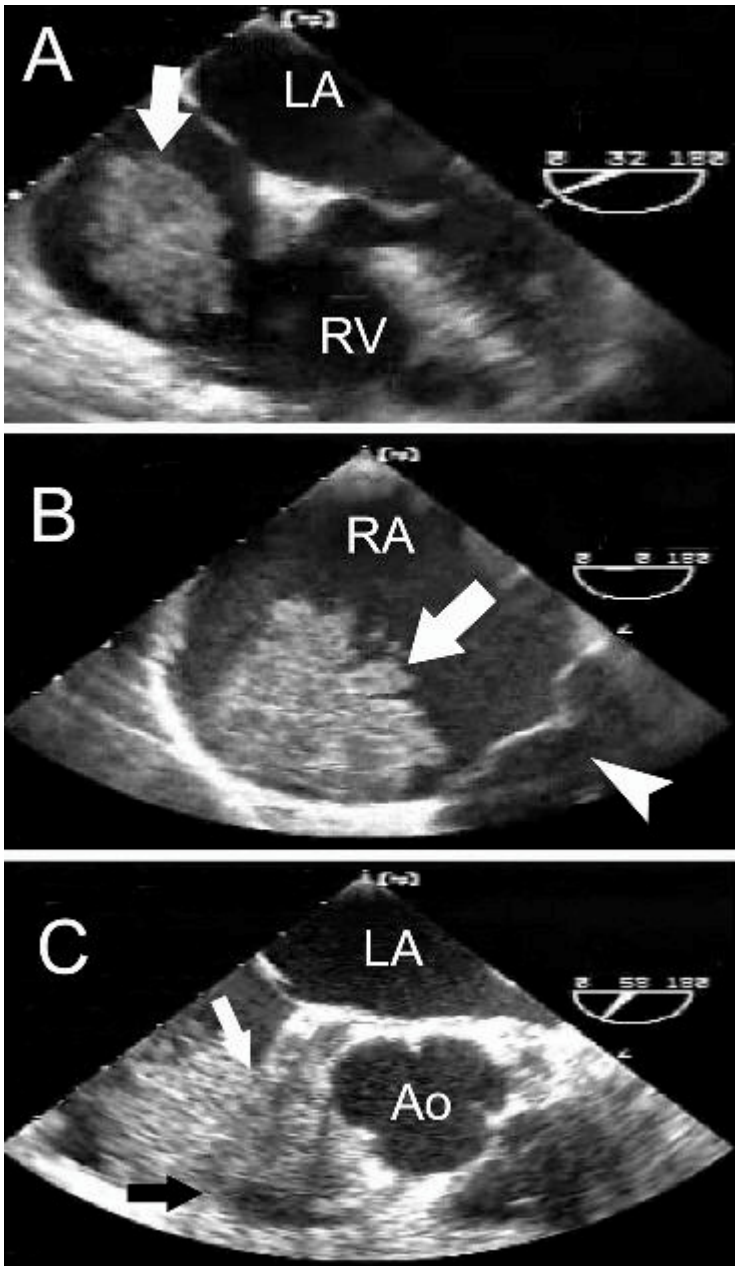


An intraoperative transoesophageal echocardiogram (TOE) showed a mobile echogenic structure in the right atrium extending through the atrial wall, into the mediastinum (Figure 2ABC).

The specimen was excised from the anterior mediastinum and recurrent seminoma was confirmed on pathology. Surgical debulking was not indicated, and chemotherapy with cisplatin, bleomycin, and etoposide was started. After one course of chemotherapy, a follow-up TOE revealed a ~50% reduction in the right atrial mass size without further evidence of extracardiac extension (Figure 3ABC).

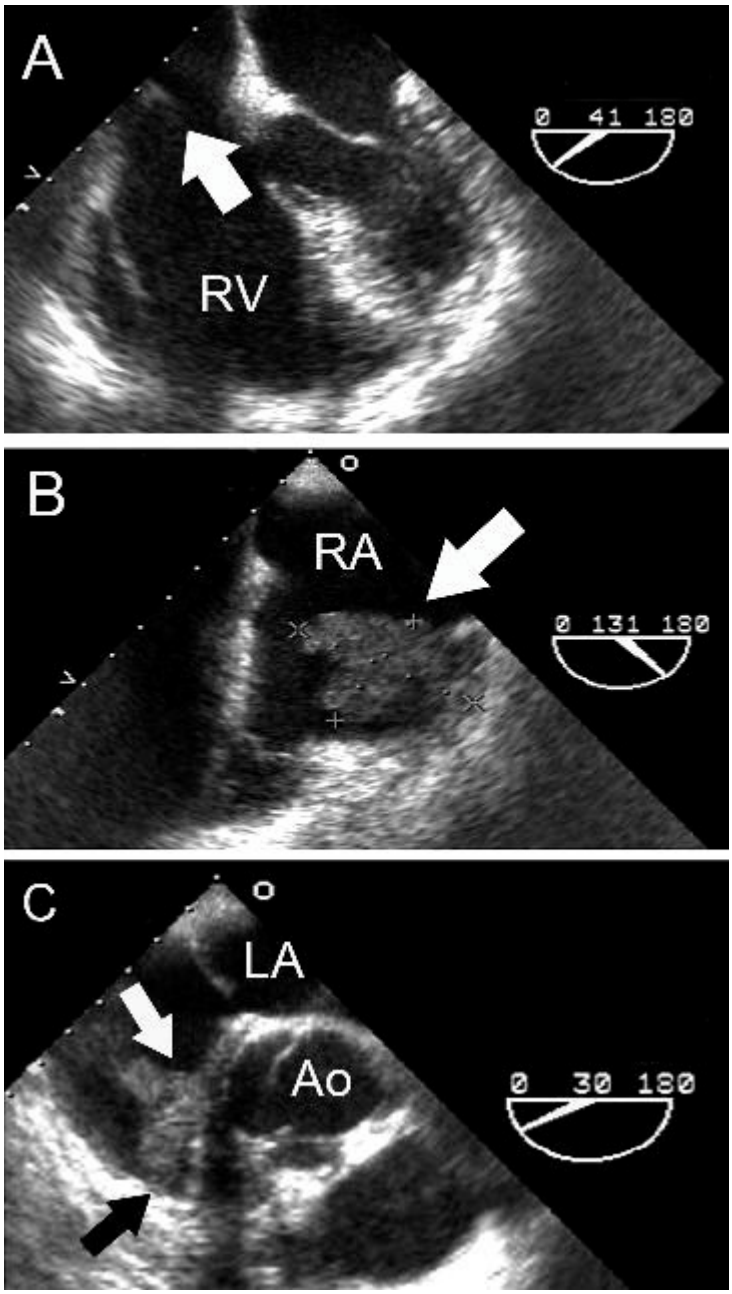
The patient will undergo three additional courses of the same chemotherapy regimen.

Figure 2ABC. Transoesophageal echocardiogram. A: Four-chamber view with tumour inside the right atrium (arrow). B: Right atrium with an irregular mobile echogenic structure representing tumour (arrow). Tricuspid valve (arrowhead). C: Short axis view of the aorta and right atrium. Tumour inside the right atrial cavity and spreading through the atrial wall (white and black arrows) anterior to the aorta.



LA=left atrium; RV=right ventricle; RA=right atrium; Ao=aorta.

Figure 3ABC. Transoesophageal echocardiogram after one course of chemotherapy. A: Four-chamber view with remnant tumour (arrow); B: Right atrium (RA) containing the tumour; C: Short axis view of the aorta (Ao) and right atrium with tumour decreased in size and without extracardiac extension (white and black arrows).



RV=right ventricle; RA=right atrium; LA=left atrium;. Ao=aorta.

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2.4 million health professionals needed

Who said that? Well it was WHO (World Health Organization) actually. The WHO has estimated that an extra 2.4 million doctors, nurses, and midwives are needed in the world. In particular in 57 countries, mainly in sub-Saharan Africa and South East Asia. And why? Because, on average, a fifth of the doctors trained in 10 sub-Saharan countries leave to work in rich countries including Australia, Canada, the United Kingdom, France, Germany, Portugal, Finland, and the United States.

The WHO didn't include New Zealand but I bet we get our share of the sub-Saharans. If you want to know more, view the report at www.who.int/whr/en

BMJ 2006;332:809

Stroke management in New Zealand

In 1997, a group of physicians in Auckland carried out a survey on physicians' opinions on the management of ischaemic stroke. And recently they have published a follow-up survey done in 2004. Their report is based on the response of 174 physicians who managed patients with an acute stroke. The survey shows that there has been a significant increase in the number of respondents who believe stroke units are beneficial. Use of low-dose aspirin, statins, and (where appropriate) control of hypertension also appreciably increased. It seems reasonable to assume that the stroke unit ethos is at the core of these changes. At the time of the 2004 survey, only 6 of 40 NZ hospitals that admitted people with strokes had a stroke unit. The authors will be pleased to know that the second largest city also has had a stroke unit since 2004.

Internal Medicine Journal 2006;36:276–80

Calcium, vitamin D, and the risk of colorectal cancer and fractures—again

Recently (NZMJ 31/3/06; http://www.nzma.org.nz/journal/119-1231/1911/) we reviewed two papers reporting on trials conducted by the Women's Health Initiative (WHI). They concerned calcium with vitamin D supplementation in postmenapausal women—testing the hypotheses that such supplementation would lower the incidence of both colorectal cancer and hip fractures. The conclusion was that neither aim was achieved and there was an increase in renal stones. Dosages used were 1000 mg of calcium carbonate and 400 IU of vitamin D daily.

Subsequent correspondence has criticised the trials. The main point being that the dose of vitamin D was too low—should have been 800 IU daily. Another correspondent said that calcium citrate, being more soluble, would have been better. It was also suggested that the cancer prevention trial was too short. The WHI author's response—maybe.

N Engl J Med 2006;354:2285–8

Folic acid and the foetus

There is general consensus that folic acid supplementation during pregnancy substantially reduces the risk of neural tube defects. Hence the recommendations for women to take 0.4 mg of synthetic folic acid daily in addition to consuming food folate during pregnancy—and before pregnancy. Why before? Because closure of the neural tube normally happens around 24 days after conception—i.e. before the woman has realised that she is pregnant.

There are three ways of achieving this aim—folic acid supplements, voluntary use of foods fortified with synthetic folic acid and mandatory fortification of basic foods (e.g. cereals) on a national basis.

Which works best? In the USA, Canada, and Chile, mandatory fortification of flour substantially improved folate and homocysteine status, and neural tube defects rates fell by between 31% and 78%. Australia and New Zealand have also opted for mandatory fortification with similar results. And elsewhere? Well, for example, in most European countries no decline in defects has been recorded in recent years.

So much for freedom of choice (and ignorance).

Lancet 2006;367:1352–61

Venous thromboembolic disease in pregnancy

Venous thromboembolic disease (VTE) is a potentially fatal disease that has a two to fourfold increased incidence during pregnancy and is a leading cause of maternal mortality.

Diagnosis is fraught with difficulties—first there is the leg swelling and shortness of breath that are commonly seen in normal pregnancy. The D-dimer test is useless in pregnancy and worst of all most of the diagnostic imaging techniques involve ionizing radiation which exposes both the mother and foetus to finite radiation risks. However, this does not apply to ultrasound of the lower limb deep veins of the legs. If this non-invasive test is positive, no further tests are necessary as anticoagulation is indicated.

But what if it is not? The authors point out that despite recent advances in imaging of suspected pulmonary embolism and the ascendency of CTPA as the definite "one-stop" test, lower-limb ultrasonography and perfusion scintigraphy still retain a valuable role for evaluation of pregnant patients.

And there is general consensus that the risks of undiagnosed VTE coupled with the risks arising from inappropriate use of anticoagulation therapy during pregnancy outweigh the risks of radiation exposure from imaging studies.

A very good paper.

Clinical Radiology 2006:61:1–12

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PHARMAC and EpiPen for anaphylaxis

In response to the 'Special Series' article by Dr Penny Fitzharris and colleagues on the EpiPen® delivery device for anaphylaxis (http://www.nzma.org.nz/journal/119-1233/1965/), we acknowledge the risks and anxiety related to anaphylaxis.

In essence, EpiPen is a device designed to deliver a cheap product (adrenaline) and improve compliance; however the evidence to hand suggests that this is anything but the case. Its cost utility of $650,000 per quality-adjusted life year gained (when last estimated) reflects this lack of effectiveness in practice, with health gains being less than 1/30th of medicines that PHARMAC typically funds.*

Notwithstanding the very high price charged for a relatively simple device by the supplier, the relatively poor cost-effectiveness is driven by the inefficient and inappropriate usage of the device.

As the authors acknowledge, empirical data suggest that many patients do not know how to use the auto-injector device – let alone a caregiver or bystander unconversant either with the device, the disease process or the indications for urgent use. Overall, it seems that less than a third of patients and parents alike have adequate knowledge of the indications and how to use the device (see endnote†), with similarly infrequent use in practice in children when needed.‡[1] Overseas evidence suggests that patients are reluctant to self-administer,§ many potential prescribers are unversed in its use,** and schools may not have adequate first aid measures to safely manage young children at risk.††

There is also good evidence that patients at significant risk who have been prescribed this device do not carry it with them—or carry expired devices—thus negating the point of prescribing it.‡‡ Although allergy diseases impact on quality of life,[2,3] there is some evidence too that indicates that EpiPen auto-injectors do not appear to reduce the anxiety surrounding anaphylaxis.[4]

PHARMAC is committed to achieving the best population health outcomes within the funding provided.[5] We have a finite health budget and competing needs, and funding one item can mean not being able to fund something else. If funded, annual expenditure on EpiPen could reach $1 million by the year 2010. An ampoule of adrenaline costs $5.25, so it is fair to ask why an auto-injector device costs patients $120 to $190.

Again acknowledged by the authors, it is likely that many patients will carry this device even though they don't need it. As well, there are issues of possible over-use for non-anaphylactic symptoms.§§ Such use is in the context of small but important device-related risks of adverse events.***

PTAC most recently considered the funding of EpiPen at its November 2005 meeting, including cost-effectiveness, continuing to recommend that it be listed with a medium priority. The full PTAC minutes can be found at http://www.pharmac.govt.nz/pdf/1105.pdf

We agree that simply restricting access to defined specialists could risk serious inequities for those patients unable to access or afford them – without necessarily fully addressing other aspects of effective use. Along with access, any future programmes that funded EpiPen would need at least to demonstrate appropriate targeting—alongside rigorous education and anaphylaxis management plans,[6–9] etc. including training.[10]

Adrenaline ampoules, syringes and needles continue to be available fully funded for patients. PHARMAC will remain open to the funding of Epipen devices and examining any further evidence or proposals for a workable system.

Peter Moodie
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PHARMAC

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Externally contracted to PHARMAC as Senior Advisor (epidemiology and public health medicine)

Sean Dougherty
Therapeutic Group Manager
PHARMAC

Endnotes:

* Comparative health gains (measured in quality-adjusted life years (QALYs)) relate here to the QALYs gained for the same net spending of DHB funds. Net spending of DHB funds in turn is the combination pharmaceutical costs and nominal savings to other DHB services (http://www.pharmac.govt.nz/pdf/pfpa.pdf).

The cost per QALY of pharmaceuticals funded by PHARMAC within the last five years has generally been less than $20,000, i.e. for every $1 million net spent at least 50 QALYs would be saved. By contrast, every $1 million spent on EpiPen would save 1½ QALYs (i.e. $650,000 per QALY).

† Overseas studies[1,11—13] have consistently estimated that fewer than half of patients and parents are able to demonstrate proper use of the device. When parents were asked to indicate the symptoms of anaphylaxis, 'the majority reported skin rash and shortness of breath but few parents reported specific symptoms that may have indicated upper airway obstruction or hypotension.[1]

‡ In practice, EpiPen seems to be infrequently used in children when needed, e.g. in a retrospective survey in Australia, the device was used in only 29% of recurrent anaphylactic reactions in children prescribed it.[1]

§ 23% of adult patients in one series stated that they would probably not be brave enough to self administer adrenaline—half would seek medical assistance and the other half would ask another person.[14]

** Studies in primary and secondary care settings overseas have shown that most doctors are themselves uncertain about the correct method for use of auto-injectors.[17]

†† Children, especially the very young, will need to have at least one person at their school able to operate the device when needed. One paper[11] found that 77% of children had a device kept at the school, but in 19% of these nobody had ensured that the school had adequate knowledge of both the method of administration and the symptoms of anaphylaxis.

‡‡ In overseas studies, only 50–75% of patients had a device at all times,[14–17] with lower rates in another retrospective series (22% at the time of anaphylactic episodes). In another study,[11] while 86% of families claimed to carry a device at all times, only 71% of this group had one at the time of the

clinic-based survey. In addition, 10% of devices were expired—so only 55% of all patients had an unexpired device with them at the time.

§§ In one series, for example, 19% of parents of patients with previous severe anaphylaxis stated they would give adrenaline with the onset of isolated hives, and 11% stated they would give adrenaline without the onset of any symptoms.[11]

*** As patients are often not familiar enough with the device to select the correct end,[11] patients may be at risk of injecting adrenaline into their thumbs – potentially fraught, both because the adrenaline has not been correctly administered when it is needed, and because patients can experience digital ischaemia with consequent sequelae. Although this is a small risk, it again highlights the importance of patient education.

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PHARMAC and erythropoietin for cancer patients

Associate Professor John Carter and Dr Jennifer Clay recently described the role of erythropoietin for the treatment of anaemia in cancer patients (http://www.nzma.org.nz/journal/119-1234/1989/). PHARMAC is currently assessing the cost-effectiveness of widening access to erythropoietin, and we hope that the following observations will help debate.

Efficacy and safety of erythropoietin for anaemia associated with cancer treatment

As Dr Carter and Clay point out, many trials have assessed the efficacy of erythropoietin for chemotherapy-induced anaemia. An updated meta-analysis,[1] based on 57 trials, has reported that treatment with erythropoietin significantly reduced the likelihood of red blood cell (RBC) transfusions by one third and improved haematologic response three-fold.[*] However, it is not certain whether erythropoietin improves survival. Two large RCTs have found that erythropoietin-treated patients had significantly worse survival than untreated patients.[2,3] (see endnote [†]). The meta-analysis[1] commented that uncertainties still remain as to whether erythropoietin affects survival, and the authors caution the use of erythropoietin in combination with thrombogenic chemotherapeutic agents or for cancer patients who are at high risk for thromboembolic events.

Trials are currently underway to further assess the impact of erythropoietin on survival, and until these are available, conclusions cannot be drawn.

International guidelines

The authors refer to the American and British/European guidelines on the use of erythropoietin in cancer.[4,5] The National Institute of Health and Clinical Excellence (NICE)[6] has also produced guidelines on the use of erythropoietin for anaemia induced by cancer treatment. The NICE appraisal committee recommended that erythropoietin not be used for this indication except in the context of ongoing or new clinical trials. It considered that further research is needed to confirm the risks and benefits associated with erythropoietin (specifically mortality), to identify subgroups in whom the possible risks are acceptable, and also the impact of treatment on health-related quality of life.

PTAC's recommendation

The Pharmacology and Therapeutic Advisory Committee (PTAC) considered the efficacy of erythropoietin when used to treat anaemia associated with cancer treatment in February 2006. The Committee noted the increasing body of evidence supporting its use for this indication, including a Cochrane review[7] that indicated that on average patients receiving erythropoietin reduced their transfusion requirements by only one unit of blood.

At this stage, PTAC has recommended no change to the Pharmaceutical Schedule criteria. A copy of the full PTAC minute can be found at http://www.pharmac.govt.nz/latest_PTAC_minutes.asp

Cost-effectiveness of erythropoietin

PHARMAC is currently assessing the cost-effectiveness of erythropoietin compared with blood transfusions for the treatment of anaemia. This analysis will consider any potential cost-savings associated with erythropoietin (such as admission to day procedures units for blood transfusions), and any potential gains in quality of life associated with erythropoietin compared with blood transfusions.[‡]

It should be noted that the US cost-effectiveness analysis referred to by Dr Carter and Clay actually reported a cost per quality-adjusted life year (QALY) of US$111,000–US$214,000. In comparison, the cost per QALY of pharmaceuticals funded by PHARMAC within the last five years has generally been less than NZ$20,000.

Hospital Exceptional Circumstances

The authors refer to the Hospital Exceptional Circumstances (HEC) process, which was established at the request of DHB hospitals to control spending in hospital budgets. HEC allows for the funding of community-based treatments for patients currently in DHB hospitals who are awaiting discharge, where there is no other funding available in the Pharmaceutical Schedule. Funding for HEC is from the DHB hospital's budget. The criterion for funding is that the pharmaceutical must be cost-saving to the hospital. A panel of clinicians considers over 1000 applications each year, with the turnaround time being 48 hours. Further information on HEC can be found on the PHARMAC website at http://www.pharmac.govt.nz/pdf/ECInfoSheet.pdf

PHARMAC considers the HEC panel has been consistent in its recommendations regarding erythropoietin (see endnote [§]). PHARMAC and the HEC Panel are working to improve the clarity of eligibility criteria, and welcome clinicians' direct contact if concerned about consistency.

Conclusion

PHARMAC staff are currently investigating the cost effectiveness of using erythropoietin instead of blood transfusions, and we will keep the sector informed of developments.

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Endnotes:

* Erythropoietin statistically significantly reduced the risk for RBC transfusions (relative risk [RR] = 0.64, 95% CI 0.60 to 0.68; 42 trials with 6510 patients) and improved haematological response (RR = 3.43, 95% CI = 3.07 to 3.84; 22 trials with 4307 patients). However, treatment with erythropoietin increased the risk of thromboembolic events (RR = 1.67 (1.35-2.06); 35 trials with 6769 patients). Erythropoietin's effects on overall survival were uncertain (hazard ratio = 1.08, 95% CI 0.99 to 1.18; 42 trials with 8167 patients).

† Henke et al. (Lancet 2003)[2] reported that among 351 anaemic patients with head and neck cancer undergoing radiotherapy, those who received erythropoietin had a significantly worse overall survival (RR=1.39, p=0.02). The combined endpoint of local/regional tumour progress and death reached by 64.4% of patients receiving erythropoietin and 53.8% of placebo patients (p=0.008). The higher mortality rates in patients receiving erythropoietin was attributed to the high haemoglobin levels (above 14 g/dL in women and 15 g/dL in men), increasing the risk of potentially fatal thromoembolic events (vascular disorders including hypertension, haemorrhage, venous thrombosis, pulmonary embolism and cerebrovascular events, were observed in 11% of patients in the erythropoietin group and in 5% of the placebo group). It was also considered that patients' tumours may have expressed erythropoietin receptors, leading to an effect on tumour growth.[8]

Similarly, the BEST multicentre trial (Lancet Oncol 2003)[3] that investigated the use of erythropoietin as an adjunct to chemotherapy among 939 patients with metastatic breast cancer undergoing first-line therapy was terminated early because survival at 12 months was significantly worse in the group that received erythropoietin than the group that received chemotherapy alone (70% versus 76%; P = .017). The mortality rate during the first 4 months of study was attributed to an increased incidence of thrombotic and vascular events in the erythropoietin group versus control (1% versus 0.2%) and an increase in incidence of disease progression in the erythropoietin group versus control (6% versus 3%).

‡ A wider implication of the funding of erythropoietin is the impact on the cost of blood and blood products in the longer term. This is an issue relevant to the Ministry of Health and DHBs who fund blood transfusion services.

§ To date, the HEC Panel has received twenty-one applications or reapplications requesting the funding of erythropoietin for patients with anaemia who require blood transfusions. A number of these applications have been for patients with chemotherapy-induced anaemia and myelodysplastic syndrome. Nine patients have been recommended for funding (with another case awaiting further information). Most of these patients were unable to receive blood transfusions due to: intolerance to desferrioxamine (treatment for iron overload); development of multiple antibodies resulting in inability to transfuse RBCs; poor venous access; or rare blood group and persistent anaemia despite transfusion.

Eight of the eleven cases that were not recommended for funding were patients who had personal or religious objections to receiving blood transfusions or blood products, rather than clinical need. In these cases, blood transfusions were fully funded alternatives that would have been less costly for hospitals. Patients not wishing to use the funded alternative have the option to self-fund or seek funding from elsewhere. The other three patients (two with ribavirin-induced anaemia, one with myelodysplasia) were not recommended for funding because the panel considered there would not be savings to hospital budgets.

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More from PHARMAC on long-acting insulin analogues: insulin glargine now funded

Further to PHARMAC's response in the *Journal* on long-acting insulin analogues (http://www.nzma.org.nz/journal/118-1224/1716/), insulin glargine (Lantus) will now be funded on the Pharmaceutical Schedule from 1 July. Insulin glargine will be available under Special Authority for those patients who have failed to control their diabetes with conventional insulins or who are allergic to conventional insulins. Details of the Special Authority requirements are described below.

In addition, people with a Special Authority approval for insulin glargine will also be able to have a free Owen Mumford Autopen to inject the treatment. With the Owen Mumford Autopen, insulin is delivered automatically by sliding a side-mounted button instead of having to manually press a plunger. Owen Mumford claims that this means that whatever the dose size or needle gauge, it takes the same amount of minimal force every time to inject, without causing any unnecessary pressure or bruising at the injection site.

One injection with insulin glargine lasts for up to 24 hours, compared with up to three injections a day with conventional insulins. The criteria for subsidising insulin glargine will see about 3200 patients using the treatment within three years, or about 10% of all people currently using insulin. The funding of current insulin products such as insulin costs about $19 million per annum; we estimate that insulin glargine will mean further expenditure of more than $5 million over the next five years.

Peter Moodie
Medical Director
PHARMAC

Conflicts of interest: None declared.

Special Authority for Subsidy

Initial application only from a relevant specialist. Approvals valid for 1 year for applications meeting the following criteria:

Either:

1 Both:

1.1 Patient has type 1 diabetes and has received an intensive regimen (injections at least three times a day) of an intermediate acting insulin in combination with a rapid acting insulin analogue for at least three months; and

1.2 Either:

1.2.1 Patient has experienced more than one unexplained severe hypoglycaemic episode in the previous 12 months (severe defined as requiring the assistance of another person); or

1.2.2 Patient has experienced unexplained symptomatic nocturnal hypoglycaemia, biochemically documented at <3.0 mmol/L, more than once a month despite optimal management;

Or

2 Patient has documented severe, or continuing, systemic or local allergic reaction to existing insulins. Note this does not include hypoglycaemic episodes.

Renewal only from a relevant specialist or general practitioner. Approvals valid for 1 year for applications meeting the following criteria:

Either:

3 Patient is continuing to derive benefit due to reduced hypoglycaemic events whilst maintaining similar or better glycaemic control;

Or

4 Patient's allergic reaction has significantly decreased, or resolved, following the change to long-acting insulin and patient is continuing to benefit from treatment.

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Criticism of New Zealand Medical Association's position on the minimum purchase age for alcohol—and NZMA response

Dear NZMA,

My father, Dr SJL Black, is now 93 and can hardly hear. This seems to be the position the NZMA is taking towards the evidence for changing the drinking age back to 20. I can't believe your view.

Please read the *New Zealand Herald* headline *Crisis of the child drunks* (Saturday 3 June 2006) and see the evidence that is in front of New Zealand. Drinking in under-18-year-olds is increasing and so are the associated health problems for this age group.

Perhaps this is what you want? What is your reasoning for this view? Perhaps you should reconsider the influence the alcohol industry has on your association. It's pretty obvious to the general public.

Forgive me for my rudeness, but it merely reflects the arrogance and ignorance of the position you have chosen to take.

I personally think it is quite disturbing. I'll discuss your position with reference to the drinking age change back to 20 when I next visit my dad in 2 weeks.

I know he'll be listening.

Shannon Black
MA Student, University of Auckland

Response

The reasons for the NZMA's decision not to support re-raising of the legal purchase age for alcohol from 18 top 20 were given in my recent letter (NZMJ 19 May 2006; http://www.nzma.org.nz/journal/119-1234/1994), and will not be spelt out again here.

I believe Shannon Black has reinforced our point. We agree that there are gross problems in New Zealand at present with drunkenness in under-18-year-olds. These "child drunks" are under the current legal age, and raising it further will not make the supply of alcohol to them any more illegal than it is already. We need a different approach.

For the record, the NZMA has no improper relationship with, or influence from, the liquor industry. Our only interest in this matter is in the health and wellbeing of our patients, the young people of New Zealand.

Ross Boswell
Chairman, NZMA

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Dirt Filth and Decay in a New World Arcadia

Pamela Wood. Published by Auckland University Press, 2005. ISBN 1869403487. Contains 272 pages. Price $44.99

This unique book offers an intriguing cultural exploration of the meaning of dirt in an early nineteenth century colonial settlement. It also presents a scholarly and informative social history of sanitation and public health in early Dunedin.

While the early settlers arrived seeking a better life in a new pristine land their struggle with disposing of growing amounts of pollution and waste makes for a compelling account of the harsh realities of early pioneering life. The author clearly illustrates how the tension between competing theories about the origins of disease underpinned many of the difficulties the early settlers experienced in mounting an effective public health response.

Written by a nurse historian, the book provides a well-referenced insight into colonial New Zealand, based on work undertaken as part of her PhD thesis. The text is rich with quotations and early photographs obtained from original documents.

The unusual topics for chapters in the book: sewage, slums, abattoirs, and cemeteries each present case studies that describe the stuttering attempts by health workers and local authorities to develop organised public health services. The unifying theme is how the formation of a municipal response to city waste parallels the emerging maturation of Dunedin into a modern city.

The book is vividly descriptive, however more comparisons with other cities in New Zealand, and more detailed contrasts with the evolving sanitation movement in Europe, would have further enhanced its account. Ideally it should be read in conjunction with other descriptions of early New Zealand public health, such as those by MacLean or Dow, that present a wider picture less focused on a single city and subject.

Nonetheless, the book provides a very informative and enlightening read and it can be well recommended to anyone interested in either early New Zealand history or the origins of public health services in New Zealand.

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McGraw-Hill's Pocket Guide to Lung Function Tests

Second edition. Bob Hancox, Ken Whyte. Published by McGraw-Hill Australia, 2006. ISBN 0074715968. Contains 195 pages. Price $39.95

The frontispiece of each Terry Pratchett novel ends with a comment about his books being the mostly commonly shoplifted in the world. A similar accolade could be applied to this Pocket Guide: left unattended on a desk it will disappear within minutes, borrowed by interested colleagues.

The diminutive volume expands on the well-received first edition, with new chapters on exhaled nitric oxide (eNO) testing and fitness to fly in chronic lung disease. The authors have kept true to their 'explanations without equations' premise and the new edition remains an accessible introduction to most aspects of pulmonary function testing.

Each chapter follows a similar format and ends with a bullet point summary and a series of carefully chosen clinical scenarios to reinforce the concepts introduced. Since the last edition a number of typographical errors have been amended and some additional points introduced, but the text of the chapters on basic spirometry, static lung volume testing and gas transfer remain largely unchanged.

The ATS/ERS joint statements on pulmonary function testing and interpretation are included in the bibliography, although not fully integrated in the text. Discussion of normal spirometric values in the introductory chapters highlights the difficulty in establishing 'normality', especially in different ethnic groups and children.

The eNO chapter appears rather nascent, and perhaps predated more recent advances in the use of this technology in monitoring airway inflammation. 40 pages are devoted to cardiopulmonary exercise testing, and the authors clearly discuss the hazards of over-interpretation of data; over half the chapter is devoted to clinical examples. Short chapters cover pre-operative assessment for thoracic surgery and fitness to fly, with reference to the BTS guidelines.

In summary, this is an excellent primer in pulmonary function testing, well written and with enough links to online and written resources to allow the subject to be explored further. Owners of the first edition, however, will probably not be able to justify an upgrade.

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Learning from Medical Errors: Legal Issues & Learning from Medical Errors: Clinical Problems

AVT Nguyen, DA Nguyen. Published by Radcliffe Publishing Ltd, 2005. ISBN 1857757688 (legal issues; 248 pages) and ISBN 185775767X (clinical problems; 240 pages). Each priced at GBP40.00

These two books are companion editions on the topic of medical errors. They aim to educate doctors about the causes and effects of medical errors, and the medicolegal environment in which they may find themselves as a result. The stated aim is to help doctors avoid terminal litigation fatigue. These books are well presented and hard covered. The font style and size easy to read.

While the medicolegal environment is somewhat different here in New Zealand than in the USA (where the authors practice), the clinical issues are not. The book, on legal issues, covers topics including history-taking, note taking, medical records, and letter writing, how to deal with the difficult patient, recognising one's limitations, getting one's foot out of one's month, and not giving into threats. The clinical problem edition is a series of case examples of issues raised in the first book.

There is one major flaw with the logic behind these books in that they link medical errors and medical legal complaints. While there is a common medical myth that they are linked, this is often not the case.[1,2] These are often different issues. Most cases were medical errors occur, there is no medical legal consequences.[2] In situations were medicolegal issues are important, it is often not precipitated by about medical error.

In theory these books sounds great, but in practice they are a flop. The writers appear to have limited clinical practice and write as if from a lay prospective. The legal issue edition is interesting and could be read over a wet weekend, however one may struggle to stay awake. I thought the clinical cases would be interesting, but if similar case studies were handed in by medical students they would likely get a failing mark.

The books are a disappointment. Perhaps by the next edition the authors may have more clinical experience and that in itself would help. While the concept is great, the execution is poor.

Frank Frizelle
Editor, NZMJ
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Cases in Medical Ethics and Law – An Interactive Tutorial

David Lloyd, Heather Widdows, Donna Dickenson. Published by Cambridge University Press, 2005. ISBN-13: 9780521537285 / ISBN-10: 0521537282. CD-ROM. Price GBP35.00

I thoroughly enjoyed exploring this program on CD-ROM in the process of reviewing it for the NZMJ. The program is generally easy to navigate with clear instructions. I can imagine it being utilised very successfully in both an individual and group learning environment.

Undoubtedly the most useful components are the six interactive cases. As standalone interactive case-based tutorials they provide an enjoyable and entertaining format for learning around some complex ethical and legal dilemmas. The video and audio clips add a sense of reality and credibility to the scenarios being discussed.

The cases are somewhat heavily weighted to issues around genetics and reproductive technologies, rather than more common scenarios encountered in everyday clinical practice, however that is a small criticism, and incorporated within them are some of the more common issues such as consent and confidentiality. They also demonstrate well the value of using less common, but more provocative and memorable cases to develop the generic skills and processes of ethical analysis.

In a similar fashion, even though the law is not directly applicable to the New Zealand environment, the relationships between law, medicine, and ethics are explored and demonstrated in ways that will be useful to students and clinicians here.

In addition to the interactive case-based tutorials, the CD-ROM offers further resources such as an introductory tutorial covering general questions surrounding ethics and law, a glossary of terms, an index to further references, and some useful web links.

This CD-ROM is an excellent example of the considerable merit in innovative and interactive learning tools. The approach is particularly well suited to the often complex issues in medical ethics and law.

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