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EDITORIALS

Letter from Australia Thank you New Zealand

G'day!

By this time you jokers are probably aware that some of your brightest students, junior doctors, and a heap of your senior academic and research bods, have joined countless kiwis sunning it on this side of the ditch. Good keen men and women are flocking (excuse the pun) to our golden shores in droves (sorry). Studious New Zealanders are showing our students what dedicated application is. So eager are the ex-pats that they are putting a big dent in our perception of our ANZAC cousins. Gone is the cliché of kiwis just being good footballers, gun shearers and dole bludgers.

As much as we'd like to take the credit for all this, successive New Zealand governments really deserve congratulations for their tireless dedication to our cause. New Australians, fresh from New Zealand, are filling the hallowed halls of our fine institutions. And who can blame them! The cost of learning to play doctor is generally lower over here, and for those who've racked up debt getting a basic degree already, we have more flexible criteria for medical school entry, including graduate courses.

It's a simple formula really. We pay more, our dollar is stronger, and we can say six (not sux? sucks!). Young, and not so young, medics and scientists at least feel we want them. We now see the sense of investing in medical research, and in medical researchers, so we attract an increasing number of your best research boffins. Of course many of you jokers will probably stay, and call Australia home. And why not? Some hard cases might even decide not to repay their student debt. You train em, and we use em. Fair dinkum.

Hey, so what if your ranking in OECD countries for per-capita funding of medical research matches your defence spending. Any diseases and invading foreign forces will come to you via us anyway, so your frontline is better placed over here.

You fellas need to encourage your politicians to take their time to make sure they're thinking about the possibility of considering that maybe sometime in the not too distant future, but quite soon nevertheless, that this important issue is brought up and taken thoughtfully through all the processes of consideration often exhibited by governments on both sides of the fence, gate, divide, partition, ditch, necessary to change the system to a set-up not too dissimilar to the one that presently exists. Nice one!

We welcome bright talented and gifted kiwis, and if they do well, they will join the galaxy of stars we claim as ours, such as the Finn brothers, Fred Hollows, Russell Crowe, Sam Neill, John Clark, Jane Campion, the Pavlova, and Phar Lap. Kiwis all of them, sent to Advance Australia Fare.

Good on ya, mate!!!!

Your ANZAC Cousins,

Shane and Kylie.

Prostate specific antigen and screening for early prostate cancer

Peter Davidson, Urologist, Christchurch Hospital, Christchurch.

The role of prostate specific antigen (PSA) in screening for prostate cancer is one of the most controversial current issues in preventative medicine. In the absence of data from well designed randomised control trials, the arguments for and against PSA screening in prostate cancer are built on the somewhat shaky foundations of single armed screening programmes, population data and computer modelling.

A fundamental prerequisite for any screening programme is that the disease being screened for is an important health problem. Recently published Ministry data show prostate cancer to be the most commonly diagnosed (non-skin) male cancer with 2481 cases reported.¹ With 554 deaths, it was the third most common cause of death from cancer in men. Thus, one in five men diagnosed with prostate cancer will die from the disease. The mortality rate has increased 23.5% from 1986 to 1995 and in the year from 1994 to 1995 by 6%. Of the OECD countries, New Zealand has the third highest age-adjusted mortality rate from prostate cancer. Further, Dr Ron Cohen has shown that the fastest rise in mortality is in fact, amongst younger men.² Prostate cancer is, without doubt, an important health problem.

Another prerequisite for screening is the existence of an effective screening test. The tests used in screening for prostate cancer include not only PSA, but also the digital rectal examination (DRE). DRE is an important adjunct to PSA testing as it has been estimated that up to a third of cancers in screening programmes are detected by rectal examination where the PSA was regarded as being normal. The generally accepted upper limit of normal for PSA is 4 ug/L. The positive predictive value of a PSA above four, lies somewhere between 30-35%, whilst that for DRE is even less. A number of other conditions can artificially elevate the PSA, including infections, instrumentation and benign prostatic hyperplasia. Consequently, a number of efforts have been made to try and refine the likelihood of finding a prostate cancer, while reducing the number of diagnostic biopsies needed in patients with an elevated PSA. To this end, the ratio of PSA to prostatic volume (PSA density), the rate of change of PSA over time (PSA velocity) and the use of age-adjusted reference ranges have been assessed. Unfortunately, none of these refinements has been conclusively and reproducibly validated, and they have not increased the positive predictive value of PSA. PSA exists in serum in both bound and free forms. Recently, the measurement of the ratio of free to total PSA has been promoted. Although some studies have found this ratio useful, others have not. There are difficulties with inter-assay variations, and in cut-off levels. Finally, there is some evidence that, in poorly differentiated tumours (which are probably the most important to find) the results may be misleading. Whilst an exciting advance, the free to total PSA ratio is not yet secure enough for routine usage.

With all screening programmes, the benefit must outweigh the downside. In prostate cancer, there are no randomised controlled trials to show a benefit from screening in terms of survival. However, a number of single arm studies have shown that screening diagnoses cancers at both an earlier stage and lower grade when compared to historical controls. Whereas one might be naturally optimistic that early diagnosis and intervention will lead to a decrease in mortality, this has not been convincingly established. To do so would require randomised controlled trials, and while these are currently underway in both the United States

and Europe, any results from these trials are still a long way off. These will exclude possible selection, lead time and length time biases that may exist in single arm screening programmes. Whilst at this time there are no data from such properly constructed randomised trials to document a benefit from screening, some recent indirect evidence may well suggest a screening effect. Data from the SEER programme³ and the Ormsted Country study⁴ show, for the first time in the United States, that the mortality rate is decreasing for this disease. Similarly, in the federal state of Tyrol, Austria, where screening has been freely available since 1993, the mortality from prostate cancer has fallen, whereas in the rest of Austria it remains unchanged.⁵ It is uncertain if these reductions in mortality are due to effective screening. In-depth analysis of the SEER data has suggested the reduction in mortality has occurred too early to be purely a screening effect.⁶

It is important to remember the down side to screening. Two-thirds of men undergoing an ultrasound and biopsy of the prostate will not have the disease. Not only do these men have the anxiety and discomfort of the procedure, but they also run a small but definite risk of serious sepsis. Furthermore, many with the disease end up having radical treatment (with its attendant morbidity), a number of whom almost certainly would not have succumbed to the cancer had it not been discovered.

What are the current recommendations around the globe? The American Urological Associations and the American Cancer Society do recommend screening for prostate cancer. Other American institutions, such as the American College of Physicians, the American College of Preventive Medicine and the US Preventive Services Task Force do not.⁷ No major Australasian or New Zealand institutions currently recommend prostate cancer screening. There is division of opinion among New Zealand urologists. In a survey performed in 1995, 38% of urologists felt that screening of asymptomatic men was justified with 62% opposed. There was unanimity that men with lower urinary tract symptoms should have malignancy excluded prior to treatment and that those with a family history of prostate cancer should also be checked for the disease.

Whether or not a screening programme is undertaken is a matter for ongoing informed public and scientific debate. With the limited health dollar, the question which must be answered is whether we are better to spend money on screening, to improve the lot of those with the disease at the present time, or to search for the cure?

Finally, in the absence of a screening programme, the decision to look for a prostate malignancy (case finding) should be made in consultation with the patient so that the pros and cons of so doing can be fully discussed, allowing an informed decision to be made.

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Follow-up after attempted curative surgery for colorectal cancer; postal survey of New Zealand surgeons' practice

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Abstract

Aims. The role of follow-up after attempted curative resection of colorectal cancer (CRC) is not clearly defined. We wished to establish the frequency, duration and type of follow-up practised by New Zealand surgeons.

Methods. A postal survey was performed of surgeons on the General Medical Register, asking about the follow-up of asymptomatic patients after potentially curative surgery.

Results. The response rate was 66% (107/163). There was wide variability in the frequency, duration and type of the indicated follow-up practice. 97% of surgeons followed their patients on average four monthly for the first year. At five years, 79% of surgeons followed up their patients. Routine blood tests were performed by 54%, while serum carcinoembryonic antigen (CEA)

levels were measured by 56% of surgeons for the first two years. 41% performed abdominal imaging in the first two years. 97% of surgeons screened the remaining colon (88% by colonoscopy). 90% performed colonic screening three to five yearly.

Conclusions. Follow-up after potentially curative surgery for CRC appears to be widely practised in New Zealand. There is, however, considerable variation between surgeons in the frequency, duration and type of follow-up. This may reflect the conflicting evidence in the literature on the value of follow-up. The outcome of current large prospective randomised trials may confirm whether or not such follow-up is worthwhile and what form it should take.

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New Zealand has one of the highest incidences of CRC in the world.¹ Substantial health resources are spent on following up asymptomatic patients who have been treated by attempted 'curative' surgery, in spite of the fact that this follow-up is variable in nature and of uncertain benefit.²

There are a number of potential advantages to such follow up. They include clinical audit, patient reassurance and preference for follow-up, early detection of potentially curable recurrences and of metachronous adenomas and primary cancers.³ All of these factors are important. Perhaps the strongest argument for following up these patients is, however, that a significant number of them will ultimately die from their disease.² It is therefore hoped that sound follow-up programmes will have an impact on this disease-associated mortality. There are also a number of potential disadvantages to follow-up in this group of patients. These include complications of the investigations (mainly colonoscopy-induced bleeding and perforation)⁴ and the enormous costs of follow-up programmes.^{5,6}

The aim of the current study was to assess the frequency and duration of follow-up, and extent of investigation of asymptomatic patients after attempted curative resection of CRC by New Zealand surgeons. Surveys have been done of follow-up practices overseas^{7,8} but none is available for this country.

Methods

A postal questionnaire was sent to all general surgeons in New Zealand listed on the General Medical Register for 1999. A follow-up letter was sent to non-responders after six weeks.

The questionnaire asked specifically about follow-up for asymptomatic patients who had undergone curative surgery for CRC. Questions were asked about the frequency, length of follow-up, what investigations were done, and what factors influenced these variables.

Results

There were 239 general surgeons on the 1999 General Medical Register. Those who were retired or did not practice colorectal surgery were excluded. This left 163 surgeons, 107 (66%) of whom responded to the

questionnaire. Not all surgeons answered every part of the questionnaire.

Clinical Follow-up. 79% (85/107) of the responding surgeons undertook outpatient follow-up of patients for five years (Table 1). The mean (range in months) frequency of follow-up during the first year was four-monthly (2-12), during the second year six-monthly (3-12), and during the fifth year ten monthly (6-12).

Table 1. Mean frequencies of investigations used by New Zealand surgeons to screen asymptomatic patients following potentially curable surgery for CRC.

Follow-up Investigation		Year of follow-up					
		1	2	3	4	5	>5
History/exam	Proportion of surgeons using investigations (%)	97	95	89	82	79	23
	Frequency of investigations (monthly)	4	6	9	10	10	11
Blood Tests	Proportions of surgeons using investigations (%)	53	54	45	42	41	13
	Frequency of investigations (monthly)	5	7	9	9	10	10
Carcinoembryonic antigen	Proportion of surgeons using investigation (%)	52	56	51	48	47	15
	Frequency of investigation (monthly)	5	6	9	9	10	11
Radiology	Proportion of surgeons using investigation (%)	34	35	27	21	21	3
	Frequency of investigation (monthly)	9	9	10	10	10	10
CT Scan	Proportion of surgeons using investigation (%)	7	8	4	5	5	2
	Frequency of investigation (monthly)	9	9	9	11	11	12
Chest X-Ray	Proportion of surgeons using investigation (%)	13	13	9	9	9	2
	Frequency of investigation (monthly)	9	9	8	10	10	9

14% (15/104) of surgeons followed-up patients for less than five years; 61% (63/104) discharged them from follow-up at five years; 25% (26/104) followed them for more than five years. 56% (60/107) respondents reported that they would discharge earlier, or follow-up less closely, elderly patients and those with significant co-morbidities.

Blood tests. For the first two years, full blood count (FBC) and liver function tests (LFTs) were performed by 54% (58/107); CEA levels were measured by 56% (60/107) of surgeons. The mean (range in months) frequency of tests was five-monthly (3-12) for the first year, seven monthly (3-12) for the second year for FBC and LFT's, and six-monthly (3-12) for CEA. In the fifth year, 47% (50/107) of surgeons still performed routine tests. After the fifth year, only 15% (16/107) of respondents indicated doing so.

Radiology. For the first year, 34% (36/107) of surgeons performed routine abdominal ultrasound scans and 7% (8/107) similar CT scans. In the first two years, routine chest x-ray (CXR) was undertaken by 13% (14/107). The frequency of these investigations diminished with the length of follow-up. In the fifth year, ultrasound, CT and CXR were performed by 21% (22/107), 5% (5/107), and 9% (10/107) of respondents respectively.

Colorectal Screening. 97% (104/107) of surgeons performed screening of the residual colorectum. Colonoscopy was the preferred method by 88% (92/104) of surgeons (Table 2). Several respondents, however, commented on restricted access to this investigation in the public health system. The first colorectal screening was performed after follow-up for a mean (range in years) of 1.9 years (1-5). Factors that influenced the timing of the first screening were: the adequacy of the pre-operative colorectal imaging, the demonstration of polyps by pre-operative investigation or in the resected specimen, and the age of the patient. 90% (94/104) of surgeons performed a colorectal screening every three to five years (Table 2). Factors that influenced the frequency of this investigation included, the age of the patient (young > elderly), stage of the disease and patient preference.

Table 2. Numbers of surgeons performing colorectal screening following potentially curative surgery for CRC.

Screening Modality	DCBE	Colonoscopy			Both
Number of surgeons performing screening	1	92			11
Timing of first screening (year)	1	2	3	4	5
Number of surgeons performing screening	49	19	31	1	6
Frequency of screening (yearly)	<1	1-2	3	3-5	5
Number of surgeons performing screening	1	9	44	49	1

DCBE = double contrast barium enema.

Discussion

As two-thirds of the surgeons with a colorectal practice responded to the survey, it is likely that the results are a reasonably accurate reflection of the current situation in New Zealand. It appears that follow-up after potentially curative surgery for CRC is extensively practiced in this country. There is wide variability, however, in the amount and type of follow-up. One of the reasons for this variability may be the conflicting evidence in the world literature on the efficacy of such follow-up.²

This literature includes meta-analyses,^{2,9} prospective randomised trials (PRTs),¹⁰⁻¹⁵ cohort studies¹⁶⁻¹⁸ and reviews.¹⁹⁻²⁴ Unfortunately, they express many conflicting data and opinions on such follow-up (Table 3). One reason for this is that most of the studies have been limited by a lack of statistical power. In Figure 1, the available data from the

PRTs^{10-12,14} have been amalgamated. This demonstrates that of 1017 trial patients who underwent potentially curative resection, 280 developed recurrent CRC. In 55 of the patients with recurrence disease, a second resection was attempted for possible cure and, of these, only 23 gained a long-term improvement in survival.

Table 3. Conclusions from major publications on follow-up after attempted curative resection for CRC.

Ref	No. of Patients	Type of publication	Conclusions
2	2005	Meta-analyses	Intensive follow-up results in an improvement in survival of recurrences and an increased five-year survival.
9	3283	Meta-analyses	Intensive follow-up with CEA can detect early recurrences which may improve five-year survival.
10	106	PRT	Earlier detection of recurrent CRC by intensified follow-up does not lead to increased resectability or five-year survival.
11	107	PRT	Intense follow-up did not prolong survival.
12	597	PRT	Major improvement in survival from intensive follow-up is unlikely.
13	597	PRT	Hb, FOBTs, DCBE, LFTs low sensitivity for detecting recurrence.
14	207	PRT	Supports intensive follow-up after primary resection at least for rectal cancer.
15	325	PRT	No improvement when intensive follow-up compared with simple screening review.
16	212	Cohort	Survival rate was higher in those patients who were compliant with follow-up compared to those who were non-compliant. Postoperative endoscopic surveillance leads to early tumour detection and is associated with improved survival.
18	199	Cohort	Systematic follow-up increases rate of second operation and rate of survival.
17		Review	Most recurrences symptomatic, screening first year unlikely to be useful compared to years two to four.
19		Review	Intensive follow-up did not achieve increased survival and only recommended simple follow-up.
20		Review	Suggested prospective evidence for cost benefit for follow-up required before continuous use of limited resources advocated.
21		Review	Post-operative screening of asymptomatic patients after potentially curative surgery doesn't fulfil criteria for screening.
22		Review	Supported use of serum CEA as part of algorithm for management of recurrent CRC.
23		Review	No benefit from intensive follow-up for CRC.
24		Review	Insufficient evidence to make recommendation on benefit of post-operative surveillance in CRC patients.

DCBE = double contrast barium enema; FOBTs = faecal occult blood tests; Hb = haemoglobin; PRT = prospective randomised trial; LFTs = liver function tests; CEA = carcinoembryonic antigen.

Follow-up programmes in previous studies have differed in the extent and frequency of investigations used to detect asymptomatic recurrences. As no single indicator is ideal for detecting all recurrences, combinations of investigations have been used.⁹ The current survey demonstrates that clinical history and examination are employed most frequently. They should be supplemented by rectal examination and sigmoidoscopy after anterior rectal resection, in order to detect early suture-line recurrence.³ Regular clinical review can achieve good levels of patient reassurance and satisfaction. Its value in the detection of asymptomatic recurrences is low, however, unless combined with other routine tests.¹³ 54% surgeons responding to the survey indicated they also performed regular blood tests. Unfortunately, these have also been shown to be of little value when taken in isolation.²⁰

Serum CEA was used as a routine follow-up test by 56% of the surgeons in the survey. Its role in the detection of CRC recurrences is controversial. One meta-analysis of

CRC follow-up studies showed an increased cumulative five-year survival associated with those programmes that included CEA.⁹ CEA levels may become elevated in patients with recurrent CRC, before they become symptomatic.^{25,26} Its ability to improve outcome is, however, uncertain.^{10,23,25} Other tumour markers have also been used such as CA50, CA195, CA242 and CA19-9 but, to date, no benefit has been demonstrated.

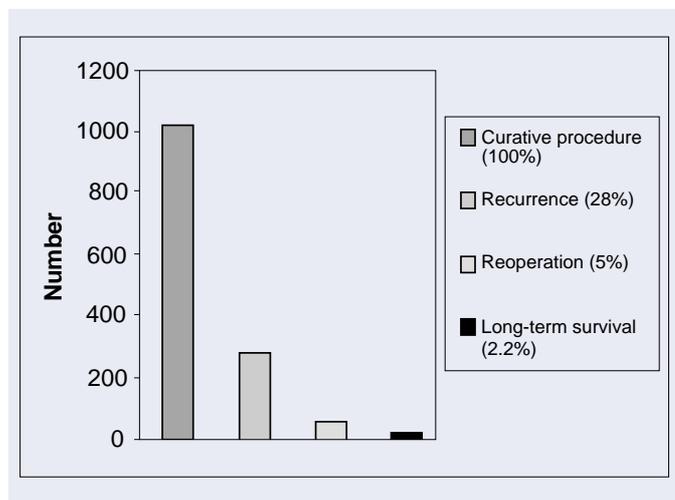


Figure 1. Amalgamated data from prospective randomised trials^{10-12,14} showing number and % of patients in whom cancer recurrence was detected by follow-up after resection of CRC with curative intent, % where potentially curative resection of cancer recurrence was performed, and % gaining a long-term survival benefit.

Routine abdominal imaging was performed in the first year of follow-up, by 41% of surgeons in this survey. As reported elsewhere,⁸ ultrasound was used more frequently than CT (Table 1). The purpose of such imaging has been to detect liver metastases at an early, treatable stage. In one study, however, ultrasound was found to be less sensitive in detecting such metastases than either CT or CEA.²⁷ Yearly CT scans have been shown to be effective in the detection of asymptomatic liver metastases but did not significantly improve the resection rate when compared with symptomatic cases.¹⁵ CXR have been similarly used to detect pulmonary metastases. Yearly CXR detected such lesions at an earlier stage, with a higher resectability rate, but the overall impact on survival was very small. It has therefore been suggested that CXR and CT be reserved for symptomatic patients or those with abnormal LFTs.¹⁵

Yearly faecal occult blood testing has been employed in some screening programmes to detect adenomas and second primary CRCs in this high-risk patient group.³ It is ineffective for detecting local recurrence, however, as the majority of these are extra-luminal.¹⁹

The majority of the surgeons in the survey clearly appreciated that colonoscopy is one of the investigations which is most likely to have a favourable impact on survival. If synchronous lesions have not been excluded prior to CRC surgery, then colonoscopy of the residual colorectum is usually performed a few months afterwards.²⁸ This was one of the reasons why some surveyed surgeons performed colonoscopy so soon after surgery. After clearance of the colorectum, it is known that new adenomas and metachronous CRCs develop slowly.^{29,30} The fact that 90% of the surgeons in the survey performed subsequent screening colonoscopies on a three to five-yearly basis is in line with current recommendations.¹⁵

After potentially curative resection of CRC, it is not currently possible to accurately predict which patients are most likely to have a treatable recurrence or a metachronous primary CRC. Follow-up is therefore usually offered to all patients without comorbidities that would proscribe consequential treatment.³ Future advances may make it possible to detect CRC recurrences at an earlier stage, and to define sub-groups of patients that are more likely to benefit from follow-up. More studies are needed to determine the role of follow-up in this situation and how extensive it should be.³ The results of large, current overseas PRTs are awaited with interest.

In spite of some variability, the follow-up practices of the majority of New Zealand surgeons are similar to those described in the literature by overseas specialist centres. It is hoped that the results of this national survey will not only be useful for practicing surgeons but also for health care planners and those constructing guidelines for follow-up. This may help with the resourcing and implementation of more effective follow-up programmes for the future.

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Hip fracture incidence in New Zealand, revisited

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Abstract

Aim. Earlier predictions of the incidence of hip fractures in the older adult population suggested that by 2011 the rate would rise to epidemic proportions. The purpose of this study was to compare the number of hip fractures occurring in New Zealand from 1988 to 1999 with the hip fracture rate predicted in 1990 by Rockwood, Horne and Cryer.

Methods. Data on the number of patients admitted to New Zealand hospitals with a diagnosis of fractured neck of femur were obtained, and compared with weighted regression and baseline predictions of Rockwood et al.

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Results. The numbers of hip fractures for females, from 1988 to 1993, were similar to the number predicted, yet have been significantly lower than stated predictions since 1995. For males, hip fracture numbers since 1995 were less than the weighted regressions predicted (NS).

Conclusions. Numbers of hip fractures since 1995 have been fewer than predicted. Possible reasons for maintaining the rates of hospitalisation due to fractured neck of femur at pre-1995 levels, are discussed.

Due to ageing populations and associated increases in life expectancy, the numbers of hip fractures throughout the world have been projected to increase from 1.7 million in 1990 to 6.3 million in 2050.¹ In 1990, it was predicted that in New Zealand there would be a significant rise in the number of age-specific hip fractures, creating increased financial demands on health services.^{2,3} Rockwood et al² predicted a disproportionate increase in the number of hip fractures compared with actual population growth for people aged over 64 years using weighted regression and baseline constant rates. The weighted regression rate was estimated from a linear regression, weighted by the inverse of the number of hip fractures, from 1968 to 1987. The baseline constant rate was derived from 1987 age specific rates of hip fractures. These rates were estimated by weighted linear regression for age groups in five-year bands, ie 65-69, to 85+.

They were then applied to population predictions for the same age groups. Rockwood et al² predicted that for women, there would be an increase in hip fractures from 2000 in 1987 to 4000 in 2011. They concluded that this would be due to an increase in population rather than rate of hip fracture. The greatest rise was predicted for women >85 years who were expected to account for 65% of the total number of hip fractures for females. For men, the weighted regression prediction pointed to a greater than 200% increase in the number of hip fractures from 594 in 1987 to over 1300 by 2011. The most significant rise expected was in the >80 year age group with those >85 years accounting for 40% of hip fractures in males.

The purpose of this study was to compare the number of hip fractures occurring in New Zealand from 1988 to 1999 with the hip fracture rate predicted in 1990 by Rockwood et al.²

Methods

The number of patients over 65 years of age admitted to hospitals with a diagnosis of fractured neck of femur (NOF), International Classification of Diseases (ICD) code 820, for the years 1988 to 1999, was obtained from the New Zealand Health Information Service at the Ministry of Health. Due to a change in the time period for publishing such data (from a full calendar year prior to 1996 to an annual period from 1 July to 30 June since 1 July 1996), the data for the first six months of 1996 have been converted into annual rates. Hip fracture figures for 1999 are provisional. Figures for patients admitted to private hospitals under ICD code 820 were available from 1988-1995 only. These figures remain small but are included. The total number of hip fractures was then compared to the weighted regression and baseline constant predictions of Rockwell et al for 1988-1999² (Figures 1 and 2).

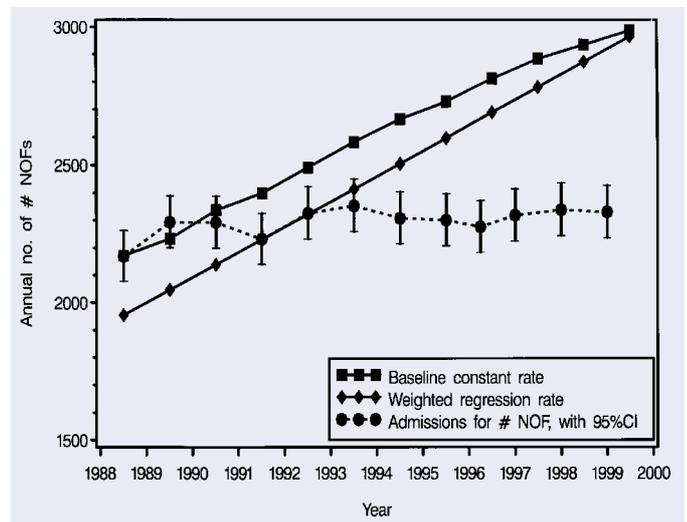


Figure 1. Comparison of hospitalisation rates for fractured neck of femur (#NOF) with prior predictions, females, 1988-1999.

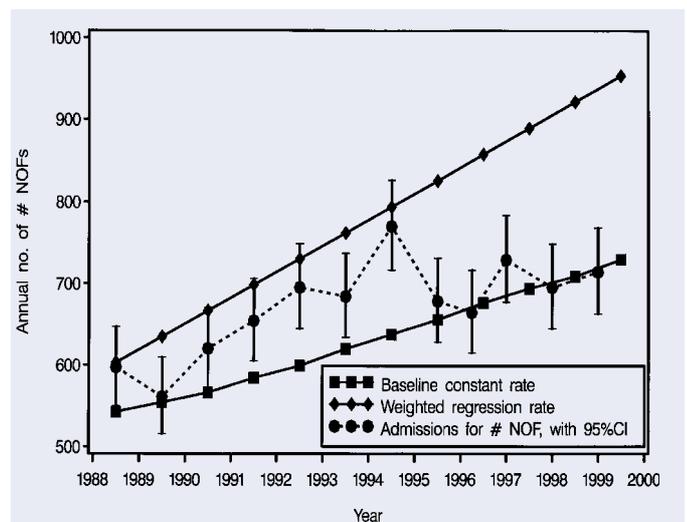


Figure 2. Comparison of hospitalisation rates for fractured neck of femur (#NOF) with prior predictions, males, 1988-1999.

Population data for residents 65 years and over from 1988 to 1998 were obtained from Statistics New Zealand. Figures were taken from the Estimated Age Distribution of Resident Population, tables for total populations.⁴

Age-specific rates of hip fractures for males and females from 1987 to 1999 were calculated in 5 year bands, ie 65-69 to 85+ years of age. For

each age group, Poisson regression was used to test for changes in hip fracture rates over time.

Results

The numbers of males and females with a fracture NOF did not meet predictions. Figure 1 shows that for females, the number of hip fractures was close to baseline constant predictions from 1988-1990. During 1991-1993, however, numbers of hip fractures for females aged 65 years and over remained constant. Since 1995, the number of fractured NOF has been less than predicted by the weighted regression rate. For example, in 1999 the numbers were 20% less than predicted. Age specific rates of hip fractures further reflect this finding (Figure 3). Between 1989 and 1998, the hip fracture rate dropped significantly for females in all age bands tested ($p < 0.002$ and in the 85+ group, $p < 0.0001$).

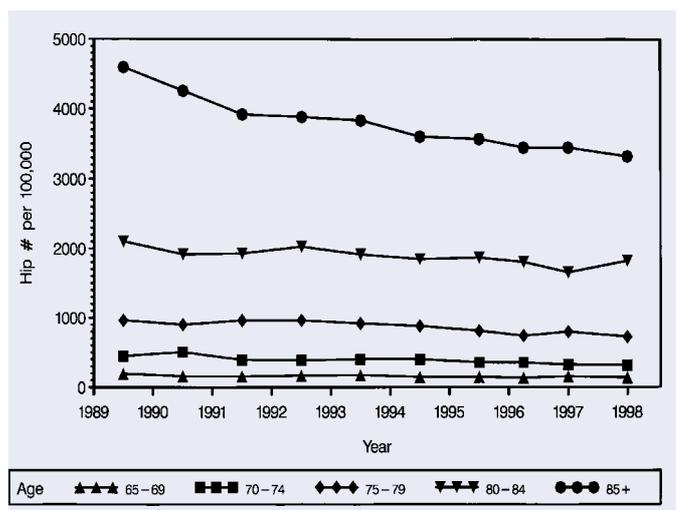


Figure 3. Age specific hip fracture (#) rates, females, 1989-1998.

Similarly for males, the number of hospitalisations for fractured NOF was in between the baseline constant rate and the weighted regression rate up until 1993 (Figure 2). Since 1995, the numbers closely resembled baseline constant predictions and were lower than the weighted regression predictions. The age specific rates of hip fractures for males remained much the same between 1989 and 1999 (Figure 4). Although the age specific rates of hip fracture for males were also decreasing, these trends were not statistically significant.

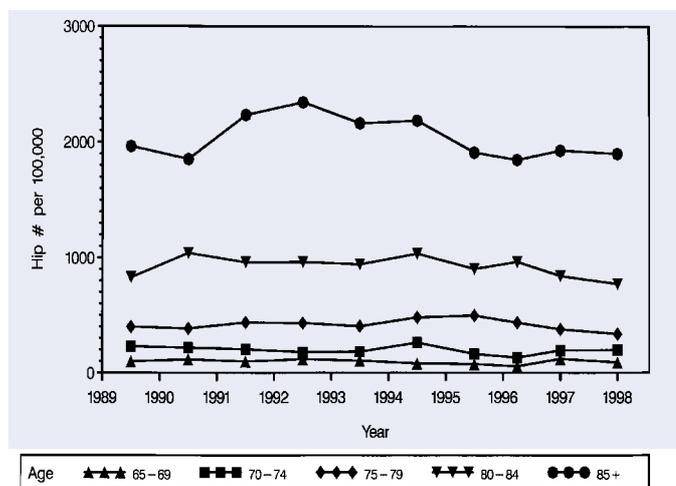


Figure 4. Age specific hip fracture (#) rates, males, 1989-1998.

Figures 1 and 2 do not include data for 1988 or 1999, as age specific rates had not been published at the time of analysis.

Discussion

While it is not immediately evident why the rates of hospitalisation due to fractured NOF for females, and males to a lesser extent, over 64 years of age, are so much lower since 1994 than predicted,² we speculate on possible reasons. First, it is well documented that fractures of the vertebrate, distal forearm and proximal femur among those aged 65 years and older are most frequently due to osteoporosis.⁵⁻⁸ Hip fractures have the most significant outcomes in terms of mortality, morbidity and health care costs in tertiary institutions. Since 1991, when a working party was set up to investigate osteoporosis prevention,⁷ the National Health Committee commissioned a review of the evidence aimed at osteoporosis prevention.⁹ As a result, multi-level prevention strategies were recommended to control or modify known risk factors, target high-risk individuals, reduce the incidence of fractures associated with osteoporosis and reduce the morbidity associated with osteoporotic fracture.⁹ Specific prevention strategies which included diets rich in calcium and vitamin D, and increased weight bearing exercise may have reduced the incidence of hip fractures over the past decade.^{10,11} While this explanation seems feasible in younger populations, it does not account for reductions in hip fracture rates since 1990 in those over 80 years of age. Members of this age group were children during the early 1900s, and are likely to have had poorer nutrition and higher rates of diseases known to interfere with calcium absorption.⁹ Such disorders, during bone formation and skeletal maturation are known to have a profound effect on bone mineral density.⁷⁻¹⁰ Even during the late 1930's when milk was introduced into schools to improve the nutritional status of children after the great depression,^{12,13} primary school aged children then would be 60-70 years of age in 1990. However, the rates of hip fracture in this age-group have remained static and considerably lower than in older age-groups (Figures 1 and 2). It is acknowledged that people aged 80+ years during the 1990s may have had more exercise as children, which is protective against osteoporosis.^{6,11,14}

Second, strategies aimed at preventing falls and fractures in older populations may have contributed to the reduced rate of hip fracture. Included here are targeted risk assessments of older adults and their home environments and preventing falls through creating safe living environments (installation of hand rails, lighting on stairs, adequate warmth and use of arm rests on chairs in private dwellings and retirement homes).^{11,14} Personal strategies have focused on maintaining adequate foot care, wearing appropriate shoes and glasses⁷ and the practice of moderate weight bearing exercise 3-5 days/week.^{6,11,14}

A third explanation may relate to the expanded use of hormone replacement therapy (HRT). While it is difficult to gauge the usage of HRT in post-menopausal women in New Zealand, the protective effect of oestrogen or oestrogen-progestin replacement is well documented.^{11,15-18} Older studies found that long-term treatment with oestrogen reduces the fracture risk by 70%.^{19,20} For women who have contraindications to or do not wish to take HRT, bisphosphonates (eg alendronate) or selective oestrogen receptor agonists (eg raloxifene) have a similar protective effect.¹¹ Col et al²¹ compared these preparations to HRT and found that all three protected similarly against hip fractures (estimated relative risks 0.57, 0.58 and 0.54 respectively). More recent research, however, suggests that HRT in combination with other pharmacological treatment modalities (eg alendronate, raloxifene, etidronate or calcitonin) or personal health practices (eg environmental safeguards, nutritional factors, moderate weight bearing exercise, smoking cessation, use of soft hip protector pads) may be more successful.^{11,16} Other factors shown to reduce hip fracture in postmenopausal women include smoking cessation, avoidance of excessive alcohol intake,¹¹ and minimising the use of selective serotonin reuptake inhibitors and 2^o amine tricyclic antidepressants.^{22,23}

Whereas individual clinicians may recommend some of these strategies, the absence of a nationally agreed strategy or intervention studies aimed at evaluating such strategies in New Zealand, means it is not possible to make definitive conclusions about the effectiveness of available strategies. Osteoporosis New Zealand was launched in 1999 with the aim of “increasing public and government awareness of osteoporosis” (personal communication, Gloria Whitson, 27/9/00). Other organisations such as the Arthritis Foundation, the Osteoporosis Society, the Dairy Industry, Age Concern and the Hillary Commission, all have a role in promoting awareness, prevention and management of osteoporosis. Studies to evaluate the efficacy of prevention strategies run by such organisations would be valuable.

A final explanation may be that actual population increases have not met increases projected in 1987. A sample comparison of population predictions made in 1987 for the latest census year 1996 (assuming high fertility, high short term migration and long-term annual net migration of 5000²⁴) with the actual population for the same year, revealed that the increase in resident population figures was 2.4% higher than those projected for the 65+ age groups.²⁵ Yet in the 85+ age group where hip fracture rates are highest, the population is 4.6% lower than predicted.^{24,26} While this is likely to have contributed to the reduced incidence of hip fractures in this age group, it does not account for the size of the difference between predicted² and actual hip fractures (20% for females in 1999).

Acknowledgements. We thank the editors of *J Orthop Trauma* for permission to reproduce weighted regression and baseline constant rates in Figures 1 and 2.

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'Sunset clause' on the Y chromosome?

It has been hypothesised that the Y chromosome evolved from the X chromosome by progressive alteration or additions, an important inversion of the biblical view of Eve's creation. During meiosis it is only the tips of the short arms of the X and Y chromosome that pair to exchange euchromatic DNA, severely limiting the ability of the Y chromosome to repair the deletions that are appearing. The inescapable hypothesis that follows is the Y chromosome has a limited evolutionary lifetime that means the male is facing eventual extinction. If there is a 'sunset clause' that has been inserted into the genomic blueprint of evolution, an alternative may need to be found for sexual reproduction. Perhaps the recent observation of inheritance of Y chromosome deletions by sons born of severely infertile men after the IVF technique known as intracytoplasmic sperm injection will prolong the inevitable demise of the Y chromosome. Indeed, some interest groups will applaud the good sense of evolution in preprogramming the decay of the Y chromosome. Conservative sectors of the community, on the other hand, will be very disappointed and may call for scientists to immediately address germ cell genetic engineering to halt increasing Y chromosome deletions as a serious research project.

Alan O Trounson. *Med J Aust* 1999; 171: 661.

The Swiss-based pharmaceutical company Roche announced this week that it is to close its prestigious Basel Institute for Immunology (BII), which has been home to three Nobel Prizewinners. The institute will be transformed into a medical genomics centre under the interim directorship of Klaus Lindpaintner, head of Roche's genetics activities in Europe.

The move brings to an end the 30-year experiment of a research institute being supported in its entirety by a pharmaceutical company, and given complete academic freedom to pursue any line of research in immunology.

The BII's 160 employees are in shock. Although Roche had indicated three years ago its waning interest in supporting the institute, discussions had never been sufficiently intense to suggest that such a radical move was on the near horizon, says Fritz Melchers, BII's director for the past 20 years.

Roche has enjoyed significant reflected glory from the BII, which cost SFr40 million (US \$24 million) per year to run. But it has not enjoyed any profit, and has not picked up a single lead from the institute's research. "The model Roche invented was never taken up by other companies", points out Jonathan Knowles, head of Roche's global research organization.

Alison Abbott. *Nature* 2000; 405: 605.

The epidemiology of emergency department attendances in Christchurch

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Abstract

Aim. To describe the characteristics of patients who attended Christchurch Hospital's emergency department (ED) in 1998.

Methods. Non-identifiable data about all the attendances to the ED during 1998 were obtained from Christchurch Hospital's management information services database. Demographic data, time and date of arrival, source of referral, diagnosis, triage category, and discharge destination were analysed.

Results. In 1998 there were 65 024 attendances, on average 178 people per day (95% confidence interval 145-211). Children and the elderly were the most frequent attenders except in weekends when visits by young people were more common. The elderly had the highest age

specific rates of attendance. Most attendances were between 8am and midnight, and Mondays and July were the day and month with most attendances respectively. 43% of people referred themselves and 38% were referred by their general practitioner (GP). GP referrals were significantly more common during the day, the working week and in the winter. The elderly frequently presented with medical problems, their attendances were classified as more urgent and 75% of their visits resulted in hospital admission.

Conclusions. These findings are generally consistent with the few previously published descriptions of ED attendance in New Zealand and most overseas studies. ED attendance data have important implications for funders and providers of ED services and a national dataset should be established.

NZ Med J 2001; 114: 157-9

Emergency departments (EDs) are important in New Zealand's health services, but there is a remarkable lack of published information describing the characteristics of ED users. Recent publications from New Zealand include a brief description of one month's attendance at Auckland Hospital,¹ a review of paediatric attendance at Waikato Hospital's ED between 1980-1986,² and a survey of the characteristics of attendances at Waikato Hospital's ED during 1979.³ Instead of presenting a general profile of patient characteristics, studies over the last ten years have focused upon users with a specific complaint (usually injury or poisoning)⁴⁻⁶ or medical condition (most commonly asthma).⁷ By contrast, the general profile of patients attending ED facilities has recently been extensively reviewed in the United Kingdom^{8,9} the United States¹⁰ and Australia.^{11,12}

Christchurch Hospital's ED is an ideal venue to examine attendance patterns. It is located in a major teaching and tertiary hospital, and is the only hospital-based facility servicing a city of over 300 000 residents. Annual patient attendance numbers (over 65 000 per year) are among the highest in Australasia and information has been stored on a computerised database since 1995.

Methods

Data were obtained regarding all attendances at Christchurch Hospital's ED in 1998 from the computerised database managed by management information services (MIS) at Canterbury Health Limited. This database records information about each attender's demographic details, arrival time and date, source of referral, diagnostic group, discharge destination, and triage categorisation. Categories for referral source included self, GP, ambulance, or other (eg private specialists or government and voluntary agencies). Attendances were categorised into five diagnostic groups (medical, surgical, injury, psychiatric and insufficient information/other) based on discharge diagnosis. Discharge categories were: admission to hospital (inpatient), discharged with instructions to attend their GP for further care (GP), other follow up (usually transfer to a specialist outpatient facility, most commonly orthopaedic outpatients, for further management), no formal instructions for any follow up (no follow up) or the patient left before arrangements could be made (left). Triage categories used five codings that described the urgency of the presenting problem. They do not define importance of the condition nor appropriateness of attendance at the ED. Category one indicated that medical attention was needed within minutes whilst category five attenders were judged less urgent and able to wait for medical treatment

for two hours. The fields have been consistently defined since 1995 and staff are experienced with the maintenance of this database. Raw numbers of attenders have been presented as well as (age specific) rates with reference to the total population present in the Christchurch urban area at the 1996 census. The fields were cross tabulated to examine relationships between the variables.

Results

In 1998, Christchurch Hospital's ED had 65 024 attendances, or approximately 20 visits per 100 people in the Christchurch population. On average, 178 people attended per day and for 95% of the year between 145 and 211 people attended daily.

Demographics and the time of arrival. Children (<14 years) and the elderly (>65 years) each contributed approximately 21% of attendances (Figure 1). The age specific attendance rate for the elderly (310 visits per 1000 people) was higher than any other age group (Figure 1). Attendance was highest on Mondays and lowest on Wednesdays. July was the busiest month and April had the least attendances. There was a marked difference in attendance patterns between the working week (Monday to Friday) and the weekend. Most visits during the week were made by patients 0-14 and over 65 years of age. In the weekends there was a 47% increase in presentations by people aged 14-25 years and this age group became the most frequent attenders. Peak attendance during the 24 hour period was in the afternoon and evening, with the maximum hourly attendance rate from 6-8pm and the minimum between 4-6am.

Referral source. 43% of attendances were self-referred, and 38% were referred by their GP. The elderly (>65) and the very young (<14 years) were more likely to be referred by their GP than other age groups. The pattern of GP referrals varied during the day, with most referrals occurring between 8am and midnight with a peak at about midday. By contrast, the number of patients who were referred by ambulance staff was relatively constant throughout the 24 hour period. GP referrals were generally constant and consistently more common than self referrals throughout the working week,

but this was reversed in the weekend when self referrals were twice as common. Self-referrals peaked in the summer months while GP referrals were more common in the winter (especially July). Ambulance referrals slowly increased throughout the year, however they were consistently less common than either self-referrals or GP referrals.

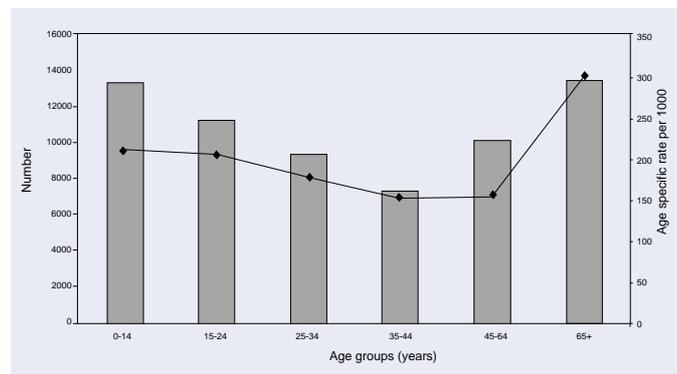


Figure 1. Number (bars) and age specific attendance rates (points) for age groups at Christchurch Hospital's ED 1998.

Diagnostic groups. 36% of attendances were due to injury and 36% were due to medical causes. Surgical (18%) and psychiatric (5%) diagnoses were less frequent. Attendances by people aged 15-34 years were most commonly because of injury while medical causes predominated among older people and children. GP and ambulance referred attendances were mainly for medical problems but self referred attendances were commonly for injury. The majority (60%) of medical attendances were admitted to hospital and attendances related to injury were more frequently discharged without follow-up (42%).

Discharge arrangements. Over 45% of all attendances resulted in admission to hospital and 75% of attendances by the elderly led to inpatient care. By contrast, only 24% of attenders aged between 15-24 were directly admitted to hospital from the ED. Transfer to a specialist out-patient facility was the most common discharge destination for 15-24 year olds, with this group accounting for over half of the transfers to orthopaedic outpatients. This group was also the most common group to leave the department before discharge arrangements could be made. Referral to the GP for follow up varied from 12% for patients aged >65 years to 26% for patients aged between 15-45 years. A small number (41) of mainly elderly people died in the ED.

50% of patients who were admitted had been referred to the ED by a GP. Over 60% of GP referrals were admitted, 23% were transferred to an outpatient facility and only a small proportion (16%) were discharged. 62% of ambulance referrals were admitted, 19% were referred for further care to a GP and only 8% were discharged without any follow up arrangements. By contrast, only 24% of patients who had self-referred were admitted, 29% were referred to their GP for subsequent care and 12% were provided with no follow up arrangements. Self-referred patients were the most likely to leave the ED before any follow up had been organised (80% of those who left had self referred).

Triage. The most common triage categories were three (45%) and four (39%) followed by two (8%), five (4%), one (1%), and 3% were not allocated a triage category. The elderly were the most common age group in category one (34%) and two (38%) attendances whereas young people comprised the highest percentage of category five attendances (over 50% were aged between 15-34 years). 72% of category one attendances were referred by ambulance services while category three and four triage groups were usually self or GP referred, and 80% of

category five attendances were self-referrals. Most triage category one (92%) and two (78%) patients were admitted, however a small proportion (4%) of triage five attendances were also hospitalised. Triage one attendances were more common during the afternoon, on Fridays and Saturdays, and between 6am and 8am. Triage five attendances were more common in the morning and on Sundays and Mondays. 51% were discharged to receive further care at an outpatient facility. Specifically, most were referred to orthopaedic outpatients for x-ray imaging and subsequent management. Of the 41 patients who died in the ED, 26 were triage category one, ten were triage category two and five were triage category three.

Discussion

This review profiles attendance at a major New Zealand ED during 1998. Attendances peaked during the day and early evening, and Monday was the busiest day and winter the busiest season. The elderly had the highest age specific rate of attendance followed by children, and both of these groups were more often referred by their GP. By contrast, weekend attendance had a predominance of young adults who were mostly self referred. Overall admission rates were high, especially for the elderly and the more urgent triage categories. Most attendances were triaged as category three or four. Category one triage patients were mostly elderly people with medical problems who were referred by ambulance services. Category five attendances were mostly young people with injuries who had referred themselves and this group were commonly transferred for further outpatient care.

These findings are in keeping with the results of the small number of previous New Zealand-based studies and the more extensive overseas research. Several studies have consistently documented that the majority (over 85%) of ED attendances occur during the day.^{3,10-15} Higher attendance numbers at the Christchurch ED at weekends and on Mondays were consistent with an audit of 25 707 visits to the Waikato ED in 1979² and an earlier survey of 2811 attendances at the same venue.³ Overseas research conducted within the last decade using large databases describing a minimum of 48 000 attendances have consistently documented that ED attendance numbers were significantly higher in the weekend and on Mondays.^{10-12,16} The finding of a winter peak in attendance is consistent with some overseas studies that have reported a seasonal effect on attendances for certain conditions such as asthma¹⁷ or coronary disease.¹⁸ However, general assessments of the periodicity associated with all types of visits to the ED have found a variety of patterns.^{19,20}

There is some inconsistency in previous research regarding age group utilisation of ED services. While this review and a systematic random sample of 22 209 attendances at 392 EDs in the United States¹⁰ both found that the elderly had the highest rates of ED attendance, five previous New Zealand-based studies^{3,14,15,21,22} and several overseas studies^{11,12} have reported that young adults (aged 15-29 years) are the most common users of EDs. Studies that have provided age specific attendance rates for the local population consistently exhibit a 'u' shaped distribution with high attendance rates among the young and the elderly and lower attendance rates for people aged 35-65 years.²³ The occurrence of a peak in attendance by either younger or older people may depend, therefore, on the underlying age structure of the local population.

Attendance data have important resource implications for the providers and funders of ED services. Elderly patients often have more complex clinical presentations and usually require a greater resource to assess and manage.^{24,25} The high admission rate for the elderly in this study has also been documented by others.^{24,26} The elderly appear to present with more severe disease and usually comprise the largest percentage of category one triage attendances.²⁴ Their high rate of hospitalisation may also reflect a

more complex clinical picture and precarious social situation.²⁶ Staffing levels at the ED need to reflect not only the average number of attendances but also the clinical complexity of the patients. Another important measure of resource needs is the urgency of visits. Recent Australian reports have found that the use of a triage scale was a reliable measure of urgency that was influenced neither by inter-rater variability²⁷ nor changes in the activity level of the department.²⁸ In 1998, Christchurch ED attendances requiring the most urgent attention were evenly spread across the week but were mainly associated with the busiest parts of the day. Additional resources should therefore be allocated to times when a high proportion of elderly or triage category one patients are likely to attend.

Referral patterns are conspicuously under-investigated. This review suggests that the GP has an important gatekeeping role for children and the elderly in determining their use of ED (and other secondary care) services. However, other age groups largely modulate their own ED attendance. Previous studies of ED attendance have included higher proportions of young adults and have consequently reported relatively low rates of GP referral to the ED (16-20%).^{13,14,22} Richards and White¹⁵ found that most (98%) GP referrals to the ED were for x-ray investigation. Lewis²² noted that the ED was perceived by young adults to be the most appropriate place to receive investigation (especially radiological) and treatment for accidents, even though only around 40% of this group considered that they needed urgent treatment.

Richards¹⁵ also found that many attenders considered the ED to be more appropriate for their general after-hours needs and a significant percentage reported ED usage because of difficulties in accessing a GP. Significantly in this study, although there was an increase in self referrals by young people in the weekend and during the summer holiday period, self-referral rates for other age groups were generally unchanged outside normal working hours. This may reflect good access provided by purpose-built after hours GP facilities in the city.

This review found that the same proportion of attendances 36% each were due to injury and medical causes in contrast to previous surveys where injury-related visits accounted for over 60% of all attendances.^{3,15,21} Changes in the age structure of Christchurch suggest that there are relatively fewer young people in the population and the provision of radiological services at other venues may decrease the number of injury related attendances at the ED.

This study found higher rates of hospital admission (45% overall) than reported by McRae and Topping (13%)³ and Wilson (17%).¹ The higher proportion of elderly patients, and patients with medical problems rather than injuries may account for this. In addition, the two studies cited excluded various types of admissions, specifically those hospitalised after a GP referral.

A common concern in the literature is that many ED attendances are inappropriate,^{29,30} and should be managed by GPs. This study suggests that Christchurch ED has a high proportion of patients referred by GPs, a high admission rate, a higher proportion of medical illness and a lower proportion of injury-related attendances than other studies.^{29,30} Although attempts to assess appropriateness of attendance have been made in the United States²⁹ and the United Kingdom³⁰ no such attempts have been conducted in New Zealand. Our study suggests that Christchurch ED is different to EDs described overseas, and claims relating to the appropriateness of attendance based on overseas data may not be valid in New Zealand. This area demands local research.

Triage categorisation is not intended to define appropriateness but instead to describe priority for medical attention. A small proportion of triage category five (the least urgent category) were admitted, and just over one half were referred to a hospital

outpatient facility (usually orthopaedic outpatients). This suggests that although triage five is considered less urgent it does not necessarily mean less appropriate.

Comparisons between ED attendance surveys are difficult. They may have been undertaken in different countries or at different times. They use a variety of methods, some relying upon self reported attendance data obtained from samples of the general population²² or detailed inventories of the characteristics of samples of ED attenders.¹⁵ More recent surveys have summarised the information available on computerised databases commonly found in modern EDs.² While the use of these databases reduces the possibility of recall or sampling biases associated with the preceding methods, the technique is substantially hampered by the absence of a standardised dataset. Recently, large surveys in the US and Australia have used their own standardised electronic patient record form which enables data to be collected prospectively and across a variety of providers.¹⁰

Despite the high rates of attendance at New Zealand EDs and the important role that these departments have in this country's health services, no common classification system exists to facilitate collection of robust epidemiological data about who uses their services, why they use the ED, what treatments they receive and what outcomes are derived. The development of a standardised dataset akin to the National Minimum Dataset applied to outpatient activity should be a high priority for both provider and funder organisations in order to assist their service delivery, facilitate quality assurance activities and promote research.

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Frequent attenders at Christchurch Hospital's emergency department

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Abstract

Aim. To describe the characteristics of adult frequent attenders presenting to a major urban emergency department during a twelve month period.

Methods. A retrospective study was performed of all frequent attenders (presenting ten or more times during twelve months) to the Emergency Department (ED) at Christchurch Hospital.

Results. The proportion of visits to the ED by frequent attenders increased from 1.38% to 2.08% of all visits between 1996 to 2000. A computer search identified 86 frequent attenders between 1 November 1998 and 31

October 1999: 1395 visits were made by these patients. The median age was 35 years, both sexes were equally represented and most frequent attenders were single. The most common presenting problem was medical (40%) or psychological (36%), and 86% had secondary problems related to each attendance.

Conclusion. This study's findings are generally consistent with those from two previous descriptions of frequent attenders. Evidence from overseas trials suggests that case management may provide the best outcomes for these patients, but further research is needed.

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Frequent attenders at emergency departments (EDs) are an important but under researched population. They provide a challenge to clinicians, and disproportionately utilise hospital and community health and welfare resources. Relatively little research has examined the characteristics of this group and the reasons for their repeated visits. The few studies describing the epidemiology of frequent ED attenders have been in Northern hemisphere hospitals using various definitions of frequent attenders ranging from 2-10 or more visits over a twelve month period.¹⁻⁵ Several of these studies did not include all ED presentations in a region.

Christchurch Hospital provides the sole ED servicing 330 000 patients in the Christchurch urban area covering approximately 452km². The nearest alternative ED is over two hours away by road. Christchurch Hospital's ED receives approximately 65 000 patient visits annually or 20 visits per 100 local population, and provides all the major specialties on one site with the exception of obstetrics and gynaecology. The aim of the study was to describe frequent attenders at Christchurch Hospital's ED over a twelve month period.

Methods

Data were obtained by a retrospective audit of ED charts and inpatient notes. ED and hospital notes are stored separately but both records are filed under each patient's unique national health identification (NHI) number. Christchurch Hospital has an electronic surveillance system to identify patients attending the ED ten or more times in any year. These frequent attenders are offered intensive social work input, a case management plan or other appropriate assistance.

The annual number of frequent ED attenders over the last four years was ascertained, along with an estimate of their proportion of all ED attendances. The demographics of a series of patients presenting ten or more times between 1 November 1998 and 31 October 1999 were studied in detail from patient records. Three patients aged three years and who had experienced ongoing medical problems since birth were excluded from this analysis. One of the authors (PEH) assigned a single primary and one or more secondary reasons for each visit from three broad diagnostic groups: medical (eg asthma, abdominal pain, seizures, etc) psychiatric (including all attempts of deliberate self harm and hysterical or conversion reactions such as pseudoseizures), and drug and alcohol intoxication/dependence and its immediate complications. Entries in more than one diagnostic group were made when the secondary reason for the visit was considered to be due to a significant combination of psychiatric, medical or drug dependence problems.

Results

The annual number of frequent attenders increased from 69 patients in 1996 to 85 in 1999. The number of visits attributed to frequent attenders also increased in this period from 896 to 1340, and from 1.38% to 2.08% of all visits to the ED. By contrast, the number of visits made by infrequent attenders was relatively stable during this period (Table 1).

Table 1. Number of frequent attenders, number of visits by frequent attenders and the percentage of total Christchurch ED visits by frequent attenders.

Year	Number of patients making 10 or more visits per year	Number of visits by frequent attenders	Total number of all visits to ED	Percentage of visits to ED by frequent attenders
1996	69	986	64818	1.38
1997	80	1170	65007	1.80
1998	72	1142	65014	1.76
1999	85	1340	64500	2.08

Table 2 presents the frequency of visits to Christchurch ED during the study period along with data obtained from the only study which has published similar information.⁵ 86 patients (0.18%) made ten or more visits to the Christchurch ED between 1 November 1998 and 31 October 1999 and 76 patients (0.2%) had ten or more attendances at the ED in Dublin during 1995. Most patients (72% in Christchurch and 80% in Murphy's study⁵ made only one visit to the ED during either twelve month period.

In Christchurch, there were 26 frequent ED attenders per 100 000 residents. Murphy⁵ and Kne² recorded similar rates of frequent attenders in Dublin (34 per 100 000 population) and Rochester, New York (32 per 100 000 population). The median number of visits by frequent ED attenders in Christchurch was thirteen and the range was 11-81 visits. The median age of the patients was 35 years and the range was 15-86 years. These findings were similar to the results of Murphy⁵ and Kne² (Table 3). Males and females were equally represented in Christchurch and Rochester² but not in Dublin⁵ (Table 3). There were significantly more single adults among our sample of frequent attenders than in the

general adult population in Christchurch City based on the 1996 population census ($p < 0.0001$).

Table 2. Frequency distribution of ED visits by frequent attenders to Christchurch hospital in 1998-1999 compared with Dublin, Ireland.⁵

Number of visits by a patient in 12 month period	Christchurch NZ (1 November 1998-31 October 1999)	Dublin, Ireland (1 January 1995-31 December 1995) after Murphy ⁵
1	37324	27943
2	7012	4758
3	1949	1252
4	663	458
5	300	187
6	137	105
7	64	65
8	43	39
9	38	27
10	22	20
11-15	32	32
16-20	16	12
>20	16	10
Patient Total	47617	34908

Table 3. Christchurch results with comparative data from Rochester, New York.²

	Christchurch, NZ 86 patients	Rochester, USA ² 76 patients	Dublin Ireland ⁵ 74 patients
Male:female distribution	43:43	37:39	52:22
Median age (years)	35	33	35
Age range (years)	15-86	19-88	23-53*
Marital status -percentage single adults	70%	---	81%
Total ED attendance rate per 100 population	20	25	21
Frequent attenders per 100 000 local residents	26	32	34

*Interquartile range only.

Most visits were primarily due to a medical problem (51%) with relatively fewer attributed to psychiatric (33%) or drug dependence and related conditions (16%; Table 4). A high proportion of visits (86%) had at least one other diagnostic category listed as a secondary problem, and eleven visits were associated with problems from all three categories. Table 4 also presents a comparison of the primary diagnostic categories from this study and the only other published study with similar data.

Table 4. Diagnostic groups assigned to visits made by frequent ED attenders.

	Primary problem	Secondary problem(s)*	Primary problems for visits by frequent attenders in Rochester, New York ²
Medical	44 (51%)	32 (37%)	55%
Psychiatric	28 (33%)	21 (24%)	22%
Drugs/alcohol	14 (16%)	21 (24%)	22%
Total	86 (100%)	74 (86%)	

*11 visits had secondary problems in two categories.

Discussion

The main finding from this study is that a small number of patients made a relatively large number of ED visits during a twelve month period, mainly due to medical problems and most visits were also associated with a secondary problem. In keeping with previous research, adult frequent attenders were usually about 35 years old, although there was a wide age range with elderly frequent attenders usually presenting with chronic serious medical problems.¹⁻³ We found there was equal representation between the sexes and this was consistent with results obtained by Kne² but differed from the male over-representation of two previous studies.^{4,5} Unmarried adults predominated in the Christchurch series and in Dublin.⁵

The results from this study confirm the observations of several other authors who have noted that frequent attenders usually present to the ED with significant medical illnesses complicated by major psychiatric or substance abuse problems.^{1,4,6} This study is, however, notable as the first to quantify the frequency of these co-morbid conditions among a series of frequent attenders who have made more than nine visits to the ED during a twelve month period. Almost all these patients were found to have a complicated mixture of serious chronic medical and psychiatric conditions that are prone to frequent exacerbations. Providing care for these patients is challenging for clinical staff. The complicated clinical history and multiple symptoms can provide significant diagnostic challenges to ED staff and may explain their high admission rates^{3,4} and the potential for serious medical and psychiatric illnesses among frequent attenders also explains their high rate of premature mortality.⁸

Results from two small trials suggest that a case management approach, where consistent and individualised care is provided by a small number of practitioners, may provide the best outcomes for frequent ED visitors although their frequency of attendance may not necessarily be reduced.^{9,10}

This review is the first published indication that both the number of frequent attenders and their proportion of the total ED visits may be increasing. A potential rise in the number of frequent attenders underlines the need for more extensive research to describe the psycho-social context of frequent ED attenders, their utilisation of health services and the effectiveness of interventions to improve their health outcomes.

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Medical care at the Sweetwaters Music Festival

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Abstract

Aims. To describe medical cover and medical presentations at the four-day 1999 Sweetwaters Music Festival, and make comparisons with other festivals.

Methods. All medical contacts were counted, and patients presenting to the medical tent were included in the study. Case records were studied to determine demographic data, nature of complaint, treatment and disposition. A Medline literature search was performed to obtain information on other festivals.

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Results. There were 2231 medical contacts overall (8.9% of estimated attendees) and 217 presentations to the medical tent (0.9% of estimated attendees). 53% of patients presenting to the medical tent were men and the mean patient age was 25 years. Lacerations (16%), intoxication (13%), local infections (12%) and soft tissue injuries (9%) were the most common problems. There were no deaths or cardiac arrests.

Conclusion. Problems encountered were similar to other music festivals, with minor injuries predominant.

Sweetwaters '99 was a four-day outdoor music festival held in January 1999 at Puhinui Reserve in Manukau, South Auckland. The festival included a wide spectrum of music and performances: rock bands, jazz, blues, folk, cultural groups, dance troupes, children's entertainers, and dance DJs. There was also a gypsy fair, many exhibits, food and beverage tents, plus stalls, so as well as performers and paying patrons, there were numerous volunteers, contractors and their helpers present. Alcoholic drinks were available with proof-of-age identification and "Herbal Ecstasy" was sold at stalls. Both the Police and the on-site security teams had a relaxed approach, and were aided by volunteers identified by their "Big Friendly Daddies" T-shirts, so security-related tension was minimal. There was on-site camping but many people commuted daily to the site from greater Auckland. Medical services were provided on a fixed-contract basis by EMT Ambulance, who had requested input from specialists at the Middlemore Hospital Emergency Department (ED), the closest hospital facility. Initial projections were for 40 000 attendees. Final estimates suggest that the number of paying patrons at the festival may have been as low as 15 000, however 10 000 free tickets were distributed,¹ so attendance of 25 000 seems more likely.

Medical services were provided at the central medical tent and cabin placed near a site exit, at several small first-aid stations around the site, and by roaming first aid foot patrols. First aid stations and foot patrols used walkie-talkies to communicate with a central co-ordinator based at the medical cabin. Cell phones were also used for communication around the site. Patients were transported around the site, or taken to clinics and hospital, by ambulance. The medical tent with stretchers was the assessment and short-stay area, where the doctors and many of the nurses were based, and where intoxicated patients could be observed, and if necessary, rehydrated with intravenous fluids. The cabin housed the radio-communication centre, and a resuscitation area with one monitor/defibrillator, and equipment, fluids and drugs associated with advanced life support. Most staff were volunteers, who worked one or more twelve hour shifts in return for a free pass to the festival. Volunteers included around 40 first aid personnel (10-20 per shift), 22 ambulance officers (8 per shift), 4 paramedics (1 per shift), 40 nurses (5-7 per shift) and 5 doctors (0-1 per shift).

Methods

All patients presenting to the medical tent were included in the study of medical presentations. A case record was completed for each patient, and information collected included demographic data, the nature of the complaint, vital signs, treatment given and disposition. Descriptive statistics were used to analyse the data. A Medline literature search was performed to obtain data and information on other music festivals for comparison. Medical presentation rates are patients per hundred attendees, based on attendance of 25 000.

Results

There were 217 presentations to the medical tent, and 2014 people were treated at first aid stations or by foot patrols. The latter were deemed to require no further assistance so were not included in the study of medical presentations. The medical tent presentation rate was therefore 0.9 patients per hundred attendees, and the overall medical contact rate was 8.9 patients per hundred attendees. 53% of patients presenting to the medical tent were male, 45% were female, and gender was not recorded in 2%. The mean patient age was 25 years, although patients in the 15 to 19 year old age group were most numerous. As seen in Table 1, the most common diagnoses were lacerations, intoxication, local infections and soft tissue injuries. Minor surgical problems such as lacerations, soft tissue injuries, sprains, burns and musculoskeletal injuries made up 38% of medical tent presentations. There were no cardiac arrests, no major trauma and no deaths. Of the 28 people presenting with intoxication, causes of intoxication, elicited by history, included alcohol (16 patients), alcohol and other drugs (6), and other drugs (6). Where drugs other than alcohol contributed to intoxication, substances included cannabis (5), "Herbal Ecstasy" (3), LSD (2), and unknown drugs (3). Although 28 patients presented with intoxication, only eight were transported to hospital, with the remainder observed and treated at the medical tent under the supervision of a doctor. Of the 217 people presenting to the medical tent, 157 (72%) were treated and discharged, with general practitioner follow-up recommended for 28 patients and no follow-up for 129. 37 patients, (17%) were transferred to Middlemore Hospital, and 15 (7%) were transferred to medical clinics. Amongst the patients transferred to Middlemore Hospital, the most common diagnoses were intoxication (8 patients), possible fracture (7), abdominal pain (3) and local infection (3). Five patients seen at Middlemore ED were admitted to hospital, with diagnoses including an amputated finger, cellulitis, transient ischaemic attack, miscarriage, and chest pain associated with intoxication. Two intoxicated patients were kept overnight in the observation ward and discharged the next morning. There were no deaths.

Table 1. Principal diagnosis of patients presenting to the medical tent.

Diagnosis	Number of patients (% total)
Lacerations	35 (16.1)
Intoxication	28 (12.9)
Local infections	25 (11.5)
Soft tissue injuries	20 (9.2)
Possible fracture	15 (6.9)
Eye irritation	14 (6.5)
Sprain	12 (5.5)
Localised allergy	11 (5.1)
Burn	9 (4.1)
Abdominal pain	8 (3.7)
Headache	7 (3.2)
Musculoskeletal injury	6 (2.8)
Sunburn	6 (2.8)
Asthma	3
Insect bites	3
Chest pain	2
Pregnancy-related problems	2
Sleep deprivation	2
Gastroenteritis	1
Miscellaneous	8

Discussion

Providing medical care at a music festival presents a number of challenges. Projected attendance figures are often used to predict patient load, but these figures can be notoriously inaccurate.¹ As seen in Table 2, reports from past music festivals show medical presentation rates varying between 0.3 and 10 patients/100 attendees, although methods of collecting caseload data differed.²⁻¹⁰ An analysis of 405 single day concerts found that patient load varied significantly by music category but not with overall attendance, ambient temperature or indoor versus outdoor location.¹¹ In this review, the median medical presentations per concert was comparatively low, 0.021 patients/100 attendees. However, attendees at rock concerts were 2.5 times more likely to go to a first aid station than attendees of non-rock concerts, although all cardiac arrests occurred at classical concerts, probably because the average age of classical concert attendees was higher.¹¹ The medical tent presentation rate at Sweetwaters '99 was 0.9 patients/100 attendees, which is similar to the rates at festivals seen in Table 2, where first aid

contacts were excluded from caseload data. When compared to festivals in Table 2 that included all presentations in their caseload data, the overall medical contact rate at Sweetwaters '99 (8.9 patients/100 attendees) was higher than rates at all festivals except the 1972 Ngaruawahia Festival, the only other New Zealand festival reported in the literature.¹⁰ Sweetwaters '99 was longer than many other festivals, which could explain the higher rate. Nevertheless, even when average attendance per day is calculated, at 2.4 patients/100 attendees per day, the overall medical contact rate remains high. As well as treating minor injuries, first aid stations gave out sunscreen, condoms and feminine hygiene products, and the popularity of these items may have contributed to the high overall contact rate. Also, easy access may have been a factor, as first aid foot patrols were frequent, and staff were highly visible.

Minor surgical problems were the most common diagnosis at four of the festivals in Table 2, and the experience at Sweetwaters '99 was similar, with lacerations most common, and minor surgical problems comprising 38% of all presentations. Insect bites are a common problem in summer, and contributed to the large number of local infections seen. Although Sweetwaters '99 was a summer festival, sunburn and heat-related illness, which have been common at other festivals, were not a significant problem, probably because of mild weather. Clean water was freely available on-site and the portable toilets were regularly serviced, which may explain the rarity of gastroenteritis. Concerts are thought to have higher medical presentation rates than sporting events because of the increased use of alcohol and drugs.¹² At 12.9%, the proportion of patients presenting with intoxication at Sweetwaters '99 appears slightly higher than at other festivals in Table 2, but lower than the 27% of patients with alcohol and drug toxicity noted by Erickson et al in their review of five rock concerts.¹² Underestimation of alcohol or drug-related toxicity could contribute to lower incidence at other festivals, as the diagnosis often depends on historical data volunteered by patients or friends, or on clinical suspicion, as drug testing is rarely performed at festivals.¹² Availability may, of course, affect the incidence of alcohol and drug-related toxicity. Strict security measures at the 1982 US Festival were thought to have contributed to the lower than

Table 2. Attendance, medical presentation rates, and diagnoses at past music festivals.

Festival	Attendees	Patients per 100 attendees	Most common diagnoses	Alcohol and drug-related
T in the Park '96 (2 day) ⁶	70 000	0.5 to tent‡ (1.1 overall†)	Soft tissue injury (96 patients = 12.2%)	9 patients (1.1%)
Feile '95 (3 day) ⁹	70 000	2.3*	Heat-related (407=25%)	180 (11%)
Monsters of Rock '92 (1 day) ⁵	62 000	1.7†	Headache (242=23%)	38 (3.6%)
US Festival '82 (3 day) ⁸	410 000	0.6‡	Minor surgical (1174=44%)	83 (3.2%)
Heat Wave '80 (2 day) ⁴	30 000	1.7‡	Headache (228=45%)	22 (4.4%)
Diamond Head '74 (1 day) ³	40 000	0.3*	Minor surgical (40=29%)	15 (11%)
Ngaruawahia '73 (3 day) ¹⁰	20 000	10.0†	Sunburn (592=30%)	17 (0.9%)
Holland, Vermont '73 (2 day) ⁷	35 000	0.7†	Minor surgical (161=66%)	24 (10%)
Glastonbury '71 (free 5 day) ²	15 000+ (estimate)	2.3 to doctor‡ (7.8 overall†)	Minor surgical (429=37%)	11 (0.9%)

*Method of collecting caseload data unclear. † All presentations included in caseload data. ‡ First aid contacts excluded from caseload data.

expected incidence of drug-related problems, as attendees were hand searched prior to entering the concert areas, and all drugs and alcohol confiscated.⁸ The long queues to buy alcohol were thought to contribute to the low incidence of alcohol-related presentations at the 1996 "T in the Park" festival.⁶ Security at Sweetwaters '99 was very relaxed so patrons could easily have brought along recreational substances, and because attendance was lower than expected, queues for alcohol were relatively short. It is possible that both these availability factors may have contributed to the higher proportion of patients with intoxication, predominantly alcohol-related, seen at Sweetwaters '99.

There were concerns that Sweetwaters '99 would result in a markedly increased patient load at Middlemore ED. If all those presenting to the medical tent had been transferred to the ED, the extra 217 patients over the four days of the festival would certainly have put pressure on an already busy department. However, the presence of a doctor in the medical tent at Sweetwaters '99 meant that 157 patients were assessed and discharged, and a further fifteen triaged to medical clinics, significantly reducing transfers to Middlemore ED. In particular, only eight of the 28 intoxicated patients were transferred to the ED, as the presence of a doctor and nursing staff meant that selected intoxicated patients could be observed, rehydrated with intravenous fluids where required, then discharged.

In summary, medical care at Sweetwaters '99 relied heavily on volunteer staff. The presence of doctors and nursing staff in the medical tent allowed the assessment and discharge of

the majority of patients, minimising the impact on the local ED. When compared to other festivals, the overall medical contact rate was high, but the medical tent presentation rate was similar to rates seen at festivals where first aid contacts were excluded from caseload data. Problems encountered were similar to those seen at other festivals, although the proportion of patients presenting with intoxication was slightly higher.

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Morbidity associated with gastrostomy placement in children demands an ongoing integrated approach to care

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Abstract

Aims. To evaluate the short and long term morbidity of gastrostomy insertion, and to identify ongoing management requirements.

Methods. A retrospective review was undertaken of the hospital casenotes of children aged up to fifteen years who had a gastrostomy placed in Christchurch over a six year period to March 1998.

Results. 42 children had a gastrostomy fashioned, 35 in the last three years of the period reviewed. The most common underlying diagnosis was neurological disease (48%), and the most common indication for tube placement was failure to feed orally. Complications were frequent but minor. Morbidity was related to local erythema and infection around the stoma (85 episodes in 23 children), persistent and major gastric fluid leakage (three episodes), and mechanical failure of the tube (21 episodes). Gastro-oesophageal reflux

was seen in fourteen children, nine of whom had primary neurological disease. Complications were seen more after open gastrostomy than after percutaneous endoscopic placement (6.6:4.7). There was no mortality related directly to the gastrostomy tube or tube placement.

Conclusions. An increase in the frequency of gastrostomy placements has been seen over this period. As the number of children with a gastrostomy increases, so too have the demands on medical and nursing staff to care for and manage the devices. The frequency of minor ongoing problems necessitates ongoing support of the child and care of the gastrostomy. A close working relationship between outreach nursing staff, stoma therapists and medical staff is required if morbidity is to be minimised. Education, audit and review remain important additional aspects of care.

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The importance of optimisation of nutritional status in children in a wide variety of chronic diseases is well recognised and accepted.^{1,2} Since the initial description of percutaneous endoscopic gastrostomy (PEG) placement by Gauderer³ further refinements, and safer techniques, of gastrostomy tube placement have followed.⁴⁻⁷ Clearer

definition of the role of the gastrostomy has led to increasing acceptance and utilisation of this method of enteral feeding, in selected children.

The use of a gastrostomy device is not without complications,⁸⁻¹² although the majority are minor. Moreover, most children who have a gastrostomy require

ongoing and constant care for many years. This has obvious and important implications for service provision and workforce planning. This review of gastrostomy use in children over a five-year period documents the range of indications and complications of the procedure, and identifies the requirements for ongoing management of these children.

Methods

The hospital casenotes of children, aged up to fifteen years, who had a gastrostomy placed at Christchurch Hospital between January 1992 and March 1998 were reviewed. Children were identified from the hospital medical record coding system and from the records of the outpatient nursing service. The underlying diagnoses, indication for gastrostomy placement, type of gastrostomy tube and technique of insertion, postoperative complications and ongoing problems with the devices were recorded. Major complications were defined as: death, gastro-oesophageal reflux (GOR) requiring surgical therapy, severe infection leading to septicaemia, inability to place the gastrostomy tube, and bowel perforation. Minor complications included: mechanical problems such as broken or dislodged tubes, minor bleeding or discharge from the gastrostomy site, local infection requiring treatment, granulation tissue formation and symptomatic GOR not requiring surgery. Minor infection was defined as an episode of erythema around the gastrostomy site or discharge from the site which was interpreted as infection and which resulted in intervention in the form of investigation (eg local bacterial swabs), and/or antibacterial treatment. It is acknowledged that the retrospective nature of the study meant that these episodes could not be clearly distinguished from acid excoriation of the surrounding skin from minor leakage, such that the apparent minor infection rate is likely to be higher than the true rate. Severe infection was defined as that related to the gastrostomy site with associated septicaemia requiring intravenous antibiotics. Granulation tissue was defined as excessive granulation tissue around the gastrostomy site necessitating intervention. Mechanical problems included: tube dislodgment, tube migration, erosion of site by the tube, leakage of gastric fluid or exudate around the gastrostomy site, and blockage of the tube. Inability to place a gastrostomy was considered a complication when placement by a planned route (e.g. percutaneous endoscopic) was attempted but could not be achieved. Death was included as a complication of gastrostomy only when it resulted from the procedure of gastrostomy insertion or was related indirectly to the gastrostomy for any other reason.

Results

There were 52 children (28 male, 24 female) identified, for whom a total of 98 surgical procedures were performed. The average age at gastrostomy was 47 months (range one day to fourteen years) and the period of follow-up after gastrostomy placement averaged twelve months (two to 65 months). The majority of gastrostomies (37) were placed in the final three years of the period under review and incorporated the period when PEGs became more widely used (Figure 1). On one occasion, the PEG device was unable to be placed, requiring open gastrostomy placement. Eight were placed by a gastroenterologist and 44 placed by one of five surgeons. All tube placements took place under general anaesthesia and prophylactic antibiotics at the time of placement of the gastrostomy were used routinely during the final 36 months of the study period.

Children with a significant neurological impairment, leading to dysphagia or impaired swallowing, comprised the largest group (Table 1). All children had improvement in nutritional intake and weight gains following gastrostomy placement.

Local infection, excessive granulation tissue and mechanical tube problems caused most morbidity (Table 2). There were 85 episodes of local infection in 23 children. This equated to 17.2 episodes of infection per 1000 days of usage (0.52 episodes / month). *Staphylococcus aureus* was the most common pathogen detected on bacterial swabs (72 episodes, 85%). There was one episode of Staphylococcal toxic shock that required admission to the Intensive Care Unit. Other organisms detected were Coagulase negative *staphylococcus* (5), *Candida* (4) and *Pseudomonas* (3). Each of

these episodes was treated with topical or oral antibiotics. Admission was required for intravenous antibiotics in two children including the one with toxic shock.

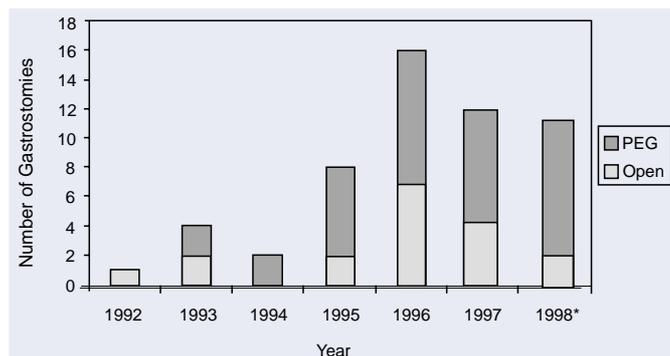


Figure 1. Year of initial gastrostomy placement. Total numbers for 1998 included in this figure to facilitate assessment of trends, but only patients until March 1998 form the basis of the study. PEG = percutaneous endoscopic gastrostomy. Open = open gastrostomy.

Table 1. Primary Medical Diagnosis.

	Number of Children	Percentage
Neurological Disorder	20	48
Nutritional Support	13	31
Renal Failure	1	
Metabolic Disease	5	
Short Bowel Syndrome	1	
Cystic Fibrosis	9	
Musculoskeletal Disease	1	
Unable/Inappropriate to Swallow	9	17
Oesophageal Atresia	3	
Oesophageal Trauma/Stricture	2	
Severe GOR*	4	
	52	

* Gastro-Oesophageal Reflux

Table 2. Complications in 42 children.

	Number of Children	Number of episodes
Minor		
bleeding	5	6
mechanical	16	23
GOR*	14 (3 new)	14
local infection	23	85
Major		
death	-	-
perforation	-	-
GOR needing operation	2	2
unable to place	1	1
septicaemia	3	3

* Gastro-Oesophageal Reflux

Excessive granulation tissue was recorded in most children, but was not always treated. Treatment included application of topical silver nitrate or topical steroids. Improvement was noted with both treatments, but was often transient. Surgical debridement of excess granulation tissue was not required. Gastric bleeding (haematemesis or bleeding around gastrostomy), sufficiently severe for the patients to seek medical attention, occurred in five children on six occasions. None led to significant anaemia or required blood transfusion. Histamine antagonists were used twice, but most episodes settled spontaneously with no therapy. Upper gastrointestinal endoscopy was undertaken on two occasions following bleeding, but no specific pathology was found. Discharge of gastric fluid was most common in the days immediately following tube insertion. Three children had ongoing difficulties with major leakage of gastric fluid

beyond the initial 30 days, leading to extensive skin irritation and excoriation. One child required revision of the gastrostomy.

Mechanical problems included concern about tube position (eg migration of the tube beyond the pylorus) on eight occasions, accidental removal in seven and blockage in four. Tube replacement for mechanical reasons was performed on 21 occasions. Deliberate replacement with a button device was undertaken in nineteen children to facilitate ease of handling, for cosmetic considerations and by parental choice. Change to a button device occurred at an average of 6.5 months following tube insertion (from 2 - 24 months) and required intravenous sedation or general anaesthesia. Twelve of these button devices were replaced subsequently.

Gastro-oesophageal reflux (GOR) was detected prior to gastrostomy in seventeen (40%) children. Symptoms of GOR were noted in fourteen children after gastrostomy insertion, with three of these children developing symptoms only after placement of the gastrostomy. Anti-reflux surgery (Nissen fundoplication) for GOR was undertaken in thirteen children: two prior to gastrostomy insertion; nine at the same time; and two following gastrostomy placement, because of severe GOR not controllable medically - both these children had symptoms prior to PEG insertion with subsequent worsening of symptoms after their gastrostomy was placed.

Complications were more frequent in those with primary neurological disease (5.3 episodes of complication per child) compared with four episodes per child in the remaining children. Children aged less than twelve months at the time of gastrostomy placement tended to have more complications (mean 11.6) than those aged over twelve months (mean 3.6; Table 3). In addition, complications were more common after open gastrostomy (6.6 episodes) compared to PEG (4.7 episodes). Other recognised complications such as gastrocolic fistulae, gastric separation from the abdominal wall or perforation did not occur in this series. Mortality was related to underlying disease in all seven deaths and was not directly related to the gastrostomy. One death, five months following gastrostomy, was from respiratory failure secondary to cystic fibrosis. The remaining six involved children with severe neurological impairment and occurred at between six weeks and eleven months following gastrostomy insertion as a result of aspiration (non-refluxing) or progression of underlying neurological disease.

Table 3. Relationship of age at insertion to mean number of episodes of complications at various lengths of follow-up.

Age of insertion	Number of episodes of complications			Total
	Length of Follow-up (years)			
	< 1	1-2	> 2	
< 12 months	4.8	6	24	11.6
> 12 Months	2.8	2.75	5.3	3.6

Discussion

Home enteral feeding via gastrostomy has become increasingly common for children suffering a variety of chronic debilitating diseases that impair nutritional intake, or prevent normal swallowing. Development of safer and easier techniques of gastrostomy insertion and increased recognition of the importance of adequate nutrition in these chronically unwell children has contributed to this trend.

Use of a gastrostomy is not without complications, but as is evident from our series, most problems are minor. Other reviews have described infection as the most common complication following gastrostomy.^{6,9,11-14} In our series,

minor episodes of local infection were frequent (17.2 per 1000 days of usage) whereas infections requiring intravenous antibiotics were rare. It is likely that the incidence of local infection has been overestimated in this review: many children had wound discharge only, antibiotics were often used early and cultures were not always taken and not always positive. A factor, which is difficult to quantify retrospectively, is the ability of the community caregivers of these children to accurately distinguish cellulitis from stomal discharge and acid excoriation around the stoma. Erythema around the gastrostomy may be exacerbated by pressure from the gastrostomy tube flange, and erosion of the gastric wall. Routine prophylactic antibiotics given at the time of tube placement may reduce local infection rates.⁶ Gastrostomy site wound infections are often polymicrobial and may involve both aerobic and anaerobic flora.¹⁵

GOR symptoms are common in children being considered for gastrostomy, particularly in those with severe neurological impairment. There is a poor correlation between preoperative GOR and subsequent reflux symptoms; gastrostomy may lead to symptomatic GOR in previously asymptomatic patients with neurological impairment.¹⁶⁻¹⁸ Some children develop reflux symptoms many months after gastrostomy.¹⁷ Suggested possible mechanisms include altered gastric motility¹⁹ (which may be transient), or decreased lower oesophageal pressures.²⁰ Evidence that the incidence of GOR after PEG is as high as it is after open gastrostomy is contradictory.^{18,20,21} The role of preoperative 24-hour pH studies to screen for GOR prior to gastrostomy are yet to be determined.¹⁶ In our series, there was no consistent approach to the pre-operative assessment of possible GOR in asymptomatic children. However, symptoms of GOR were documented and managed as appropriate. Improvement in the nutritional state of the child itself may lead to reduction in GOR symptoms.²² However, in some children anti-reflux surgery may still be required. Where a PEG has been performed, there are few adhesions such that fundoplication can be performed laparoscopically with ease.

The gastrostomy tube was replaced by a button device in sixteen of our patients. In some children the button devices have a number of advantages over a conventional gastrostomy tube: older children attending school and pursuing active sporting activities find them cosmetically preferable, and they may allow an improvement in self-image. Reduction in skin irritation and the elimination of accidental tube dislodgment have also been documented.^{23,24} Recent changes in button design have allowed primary placement of button devices in some children²³ and have been used in our institution since the completion of this series. A button device, however, confers no obvious advantage in infancy.

Mortality rates directly related to the gastrostomy procedure in this group are in accordance with other published series.^{7,9} Late death following aspiration has been noted, especially in the group of patients with neurological impairment.¹¹ Complications were more common early in the period of study, and when a gastrostomy is placed in infancy (Table 3).

The increase in the use of gastrostomy devices in recent years in Christchurch is likely to continue as the technique of insertion is further simplified and indications are expanded to conditions such as cystic fibrosis,⁶ Crohn's Disease,²⁵ and children with cancer.²⁶ Coinciding with the increased use of gastrostomy devices has been the requirement for nursing staff and medical staff to develop the skills to manage these devices on a day to day, and ongoing, basis both in hospital and at home. The paediatric-trained stoma therapist is of particular

importance, and often serves as the main link between hospital staff and outreach services. Protocols for inpatient care of the gastrostomy (especially immediately after insertion), development of guidelines and pathways of care for ongoing management of the gastrostomy upon discharge have been key initiatives. The community care of the child with a gastrostomy has primarily involved the local outreach outpatient nursing service that provides home-based care and support, in conjunction with paediatric medical and nursing support and backup. Ongoing audit is essential to identify preventable problems. Parental education on how to use and care for the gastrostomy devices can minimise minor morbidity, and will be increasingly important as this method of feeding children becomes more common and as the patients increase both in number and complexity. It is our belief that refinement of the guidelines for management of the gastrostomy outside the hospital and clear mechanisms to enable training of staff and parents are vital aspects of provision of this service.

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SPECIAL ARTICLE

The competence and performance of medical practitioners

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The competence and performance of medical practitioners

Importance

Ensuring the ongoing competence of medical practitioners is vitally important to the health of New Zealanders and the trust in which the medical profession is held. The public is making more complaints than ever before and they clearly expect a new level of accountability. The media love medical stories and with newspapers soliciting for stories of medical misadventure, it is vital that some objectivity is brought into a debate regarding how the profession can ensure its members stay competent and how to identify those who, for various reasons, have not maintained their competence.

Another group with an important stake in medical competence are the funders of health services. They are also requiring a higher degree of accountability and value for money based on the application of quality assurance principles derived from industry and business. This has resulted in an increasing emphasis on measuring performance and outcomes, but not always with the wisdom that comes from having experienced the coal-face of the ward or clinic.

The rate of change in the knowledge base required to practice any defined area of medicine is enormous, making staying up-to-date a formidable challenge even for those working in a narrow area of medicine. For generalists, and this must include all general practitioners (GPs) and many hospital doctors, the struggle to keep up with all the changes in the practice of medicine is truly titanic. The struggle is made worse by geographical isolation, less than perfect health and any constraint to participation in the appropriate recertification programmes. A proposed amendment to the Medical Practitioners Act proposes to make it easier and more acceptable for doctors to report concerns about the competence of their medical colleagues. There also appears to be a growing trend for doctors to criticise their colleagues to patients.

The net result of all these changes will inevitably be for an increasing number of doctors having their clinical competence challenged. The response to this must be the development of valid and reliable methods for maintaining and measuring clinical competence.

Competence, performance and medical error

Competence is defined as 'What the doctor is capable of doing' but performance is 'what the doctor does in

practice'.¹⁻³ Clearly medical schools and vocational education programmes should measure competence: are students competent to be undifferentiated medical practitioners? Is this registrar competent to be a vocationally registered specialist in the chosen discipline? Once training is complete, however, it is performance in practice that is important, the actual appropriate management of patients.

For practising doctors, competence and performance do not easily equate.²⁻⁸ The study of Rethans et al³ showed little correlation between the performance of GPs in managing simulated patients in the course of their every day work, and their competence when faced with the same patients in an examination. They concluded "performance and competence should be considered as distinct constructs". Competence is an important determinant of performance, but many other motivational and situational factors are involved. The doctor's personality, mental and physical health, professional ethics, the standard of premises, equipment and support staff in which he or she works, and the work load and time of day are just some of the factors that influence performance.

Just as competence may differ from performance, so medical error may be related to neither. All doctors are human and make clinical mistakes.⁹⁻¹² Competent doctors who usually perform at a high standard do make medical errors. The only quality that has been shown to distinguish those doctors who have been the subject of complaints is poor communication skills.¹³⁻¹⁵ No matter how good the screening or promotion of competence and performance, errors will still occur. What is important in addressing medical error is an attitude in the profession that promotes open discussion so lessons can be learned.¹⁶⁻¹⁸ It is also important that the role of systems error be recognised when assessing patient complaints. The best doctor is unlikely to function well with a flawed system.

Doctors' work is complex and its quality is difficult for patients to assess. Doctors therefore have a professional responsibility to remain competent and perform to a high standard. In the past, this has depended on their own awareness of their level of skills and their areas of need, but the accuracy of this self perception has been questioned.^{19,20} It is thus important for assessment tools to be available for doctors to make a more objective assessment.

How can performance be measured?

Focusing on performance is a relatively new area of educational assessment.^{21,22} In Britain, the General Medical Council (GMC) assesses performance in its reviews; the Medical Council of New Zealand (MCNZ) does so in its competence procedures; and to some extent the Canadians do so in reviews that are a mixture of competence and performance, with performance predominating.²³ The assessment modality chosen depends on the aspect of performance to be assessed.

Communication skills are commonly assessed by direct observation²⁴ or video recording of the doctor consulting,^{25,26} patient satisfaction surveys²⁷ and interview or questionnaire to the doctor about their communication and attitudes to patients.²⁸

Clinical management has been assessed by videos of consultations,^{7,25} simulated patients^{3,29} and chart audits.³⁰⁻³² Increasingly used is the 'case based oral' or 'chart stimulated recall' where a selection of patient records is reviewed by assessors who then interview the doctor on any areas of concern.^{33,34} This takes into account that the doctor only records a percentage of what he or she knows or does.³⁵

Record taking skills are usually assessed by random chart audits.^{34,36,37} Procedural skills affecting complication rates and mortality rates are usually assessed by audit which may

be facilitated by the use of computerised data collection forms. Results can be collated nationally to obtain reference ranges as is done by the Royal Australasian College of Surgeons Section of Breast Surgery, Otago University Department of Surgery and the Royal Australasian college of radiologists for interventional radiology. The accuracy of diagnostic skills can be assessed by dual reporting a proportion of investigations, eg histopathological specimens,³⁸ x-rays³⁹ and by self or peer assessment using standardised material for a group working in the same field eg cytopathology. Practice systems such as equipment, record systems, access, and availability are usually assessed by an assessor visiting the practice with a checklist of items.^{40,41} Peer assessment questionnaires have been shown to be useful for assessing clinical skills and humanistic qualities.^{42,43} However, if used as part of a performance assessment by a registration body, rather than an educational one, ratings may be more positive and hence less discriminatory.

The growth in information technology has made data easier to collect and comparisons to be made between hospitals or individuals, resulting in the production of league tables. Thus comparisons can be made between surgeons' operative mortality rates or GP referrals, prescribing or laboratory testing rates, but the data are often difficult to interpret and can be misused.⁴⁴⁻⁴⁶ At best, league tables can indicate the possibility of problems which can then be explored further to determine whether the variation results from poor doctor performance⁴⁷ or to other factors such as underfunding and faulty systems.

Overseas systems for ensuring satisfactory performance

Now that performance assessment tools are being developed, various countries are using these for both checking doctors who may not be performing well and screening all doctors.

The GMC has developed 'performance procedures' which are applied "*where it appears that a medical practitioner's general pattern of professional performance is seriously deficient.....Seriously deficient performance is defined by the GMC as a departure from good professional practice sufficiently serious to call into question the medical practitioner's registration*".⁴⁸ Anyone referring a doctor for a performance review must provide evidence of a pattern of poor performance. The assessments take account of the nature of the doctors work, focus on the areas of alleged deficiency and assess the doctors level of performance in the recent past, rather than their ability to reach some standard under test conditions.⁴⁹ The GMC is now developing revalidation procedures for all doctors at a local level.⁵⁰⁻⁵² These will act as a screening process and doctors will be referred for the competence procedures when indicated.

New South Wales has developed plans for competence reviews but these have not yet been implemented.⁵³ The State Medical Board anticipates the "*main source of notifications will be the Health Care Complaints Commission, hospitals, Colleges and other health institutions, colleagues and the public. The Medical Board may also investigate cases brought to its attention through the media and other public sources*". Queensland has carried out some competence reviews on GPs using the British tools. Currently, participation in a recertification programme is not required for obtaining an annual practising certificate but there are plans to change that.

The Canadian licensing body is developing a three tiered system called Monitoring and Enhancement of Physician Performance.^{54,55} At the first level, all doctors will be screened by monitoring of prescribing, practice profile data, by peer assessment questionnaires and patient satisfaction

questionnaires. The second step will include an audit and structured interview with the doctor, such as that already carried out in Ontario in the Peer Assessment Programme. This programme has been used to assess more than 4500 doctors.⁴¹ It comprises a) a review of the physical facilities of the practice, b) a record keeping review and c) a 30-60 minute discussion of patient management based on the records reviewed to assess the quality of patient care provided. Those who perform poorly in this programme will go on to a detailed needs assessment which will include written tests of knowledge, OSCEs for assessment of clinical skills, oral examination and detailed interviews. Currently, in some states there are programmes such as the Peer Assessment Programme referred to above and the Physician Review Program (PREP) which can be used to assess doctors if there are concerns about their competence.^{41,56-58} The equivalent to our specialist colleges have educational programmes similar to our recertification programmes but participation is not linked to obtaining an annual practising certificate.⁵⁴

In the USA, all the American Boards, the equivalent to our Colleges, have time recertification programmes and most have time limited initial certificates. They traditionally depend on examinations but are moving towards incorporating measures such as chart audits in an attempt to come closer to assessing patient outcomes.⁵⁹

New Zealand processes

The principle purpose of the Medical Practitioners Act 1995 (Section 3) is to “*protect the health and safety of members of the public by prescribing or providing for mechanisms to ensure that medical practitioners are competent to practise medicine*”. It is the task of the Medical Council to implement such mechanisms, namely:

- competence reviews and competence programmes,
- general oversight,
- recertification.

Competence reviews. Sections 60-65 of the Act set up a new provision that allows for competence reviews and competence programmes for doctors. The Act specifies that the MCNZ may carry out a competence review on any doctor at any time. However, the experience of other countries suggests that carrying out competence reviews randomly is not an effective way of identifying poorly performing doctors. The MCNZ currently has a policy of reviewing only doctors whose standard of competence has raised concern.

Wherever possible, the review process uses standard tools developed for the purpose and focusing on assessment of performance rather than competence. These tools have been designed for use across most specialties, with specialty specific modifications as necessary. Over time the development of reference ranges for some of these tools will be possible. Meanwhile, the assessment tools do ensure that the reviewers take a standardised, consistent approach to the information they collect and the manner in which they collect it. The final decision as to whether the doctor meets the standard is a judgement based on the information collected and the experience and wisdom of the reviewers.

The standard required is that each “*practitioner has the skill and knowledge required to practise medicine in accordance with his or her registration*” and that “*the practitioner’s practice of medicine meets the standard reasonably to be expected of a medical practitioner who holds registration of the type held by the practitioner*”.⁶⁰

If a competence review finds that a doctor does not meet the standard required, then that doctor can be required to undertake a competence programme consisting of remedial

educational activities and further assessment. In addition, the Council may order that conditions be placed on the doctor’s practising certificate or registration. Although poor interpersonal boundaries and unethical or even criminal behaviour may affect clinical competence, these cannot be measured using the competence or performance procedures and are managed using other mechanisms.

Recertification. All medical practitioners who hold vocational registration must participate in a recertification programme. The Medical Practitioners Act (1995) states in Section 63(l):

“For the purpose of ensuring that medical practitioners who hold vocational registration are competent to practise the branch or sub-branch of medicine in respect of which they are registered, the Council may from time to time set or recognise recertification programmes in respect of such practitioners.”

The MCNZ does not intend to develop its own recertification programme, but approves programmes meeting specific criteria recognised as having an effect on the maintenance of competence and performance. These approved programmes will be those provided by the Medical Colleges, Societies and other bodies for this purpose. To be approved, recertification programmes must require a mixture of educational, quality improvement and audit activities totalling at least 50 hours a year and have a system in place for monitoring a doctor’s involvement in these activities. Recertification programmes are expected to include activities that will identify doctors who are not practising to the standard expected and will help them improve.

General oversight. The provisions of the Medical Practitioners Act, 1995 require that from 1 July 2001 all doctors on the general register, as distinct from those holding vocational registration in a branch of medicine, became subject to general oversight. This legislation and the concept of general oversight are unique to New Zealand. The purpose of general oversight is to help the Medical Council determine that the general registrant is practising competently. This requires another doctor to provide oversight, assisting the general registrant in:

- a) selecting appropriate educational activities for continuous self improvement,
- b) selecting appropriate audit activities to review performance and identify areas of weakness which require improvement,
- c) providing collegial support and, where necessary, supervision.

Junior resident medical officers who are not in a formal training programme are expected to receive oversight from the consultant to whom they answer in the workplace. Where a general registrant is in a formal vocational education programme, the requirements of that programme are taken as sufficient for the purposes of general oversight. For other general registrants, oversight is ideally provided in the workplace by a doctor vocationally registered in the same branch. Where there is no such doctor at the site, arrangements may be made for oversight from a distance. General registrants doing medical work for which there is no recognised vocational branch should select an overseer from the branch that most closely relates to their work. Those working in more than one branch require an overseer from each branch unless the two branches are similar. Similarly vocationally registered doctors working in a different branch to the one in which they are vocationally registered require general oversight for that aspect of their work unless the two branches are similar.

Summary

Assessment of the performance of doctors is important in helping ensure high standards of medical care and thus to allay public anxiety about standards of health care. Although measurement of performance is still difficult and often inexact, the MCNZ is putting in place important processes to maintain the health and safety of New Zealanders that are similar to the processes being developed elsewhere in the world. Although doctors required to undergo competence assessment will inevitably find the process stressful, the aim is either to confirm their competence or to identify measures to restore it.

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VIEWPOINT

Obesity, oral contraceptives, and fatal pulmonary embolism

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From time to time, case reports have appeared of massive fatal pulmonary embolism (PE) in apparently healthy persons.^{1,2} However, more systematic studies suggest that fatal PE occurs in approximately five per million of those under 50 years of age, many of whom have serious comorbidity, such as advanced cancer.³⁻⁵

The problem of fatal PE has been thrust into the spotlight in New Zealand following media publicity concerning sudden death in women using oral contraceptives. At least nine such cases, diagnosed by post mortem examination, were reported in New Zealand from 1990 to 1999. With the

focus on oral contraceptives, the potential role of obesity may have been underemphasized. The body mass index (BMI) was available in six of these nine cases. According to the current definition of BMI > 30 kg/m², five were obese, (BMI 32.1- 38.4), and the sixth case was borderline obese with BMI 29.8.⁶ Four of these six women had been using contraceptives for five or more years prior to death. In addition to obesity and oral contraceptive use, most had other risk factors, confirming the commonly held view that at least two risk factors are generally required to cause thrombosis in young adults.⁷

Minor risk factors for venous thromboembolism (VTE) such as obesity, oral contraceptives, heterozygous Factor V Leiden mutation, and recent travel, are each associated with risk ratios of between three and eight. However, when any two of these are combined, the risk ratio may be increased to the order of 50 or more.⁸ Major factors, such as hemiplegia and major surgery, are associated with an incidence of VTE as high as 50%.⁹

As early as 1927, obesity was implicated as a potential additional risk factor for fatal PE in patients who had undergone recent major surgery.¹⁰ Subsequent studies suggested that obese patients had approximately twice the usual risk of developing postoperative deep vein thrombosis (DVT).¹¹ The postmortem incidence of PE, including nonfatal cases, was 21.9% among a group who were 20% or more over their standard weight (as defined by insurance tables), compared with 14.4% in the remaining necropsy population, and the combination of morbid obesity and major burns resulted in fatal PE in three of seven patients treated over a 20 year period.^{12,13} By contrast, in a series of 168 consecutive patients undergoing gastric bypass surgery for morbid obesity without the use of thromboprophylaxis, the incidence of postoperative DVT detected by systematic impedance plethysmography was only 1.8%, and fatal PE occurred in only one patient.¹⁴ However, with an average age of 34 years, these patients were probably younger than those in many other surgical series. In younger persons, PE generally is much less common and has a more favourable prognosis, and youth may well counterbalance other risk factors.¹⁵ As in other situations, postsurgical VTE is a multifactorial process, and it is difficult to isolate the effect of individual factors.

Recognition of the potential role of obesity in nonsurgical situations has been slower, as is evidenced by the *a priori* decision of investigators in a major study as recent as 1995 not to take obesity into account because it was "at best a weak risk".⁸ However, in the same year, another study found obesity to be a risk factor for VTE in women using oral contraceptives.¹⁶ In the Framingham study, women who had a fatal PE were observed to be heavier than those who died of other causes.¹⁷ The best current evidence on this topic is provided by a study of 112 822 female nurses published in 1997, which showed that obesity, defined as a BMI of ≥ 29 was associated with a threefold increase in the incidence of PE.¹⁸ Another, more recent study, confirmed that a BMI of >35 carries a fourfold risk of VTE, and a BMI of between 30 and 35 doubles the risk in females.¹⁹ While these previous findings relate to females, in a cohort of 792 Swedish men followed for 30 years, those in the highest decile for waist circumference (≥ 100 cm) had approximately a fourfold increase in subsequent VTE.²⁰ This was the first demonstration of such a relationship in a presumably healthy male population, but may not be true in other countries, because of the unusually high prevalence of factor V Leiden in Scandinavia.²¹ Surprisingly, in another recent study, both BMI ≥ 30 and hormone therapy were independent predictors of increased long-term survival following an episode of VTE.²² One study which did not find an association between obesity and VTE was Heit et al.²³ However, unlike other studies involving surgical patients, women using contraceptives or older persons, this was a case control study of 625 unselected cases of both sexes, and may have lacked the power to identify a difference.

In addition to influencing the incidence of PE, different risk factors may have varying effects on the relative severity of those events which do occur. For example, factor V Leiden mutation appears to be a risk factor for DVT but not for PE, presumably because the DVT's which occur, for some reason, are less likely to embolise.²⁴

Similarly, it is possible that VTE in the obese might be qualitatively different from that occurring in other situations. Higher fibrinogen levels, polycythaemia, and other haematological changes in the morbidly obese may affect the physical properties of the thrombi which are formed, as judged by thromboelastography, possibly making them more resistant to fibrinolysis.^{25,26} These thromboelastographic abnormalities may be reduced by a hypocaloric diet.²⁷ Hyperlipidaemia has also been postulated as a risk factor for DVT,^{28,29} and wartime conditions, notably food rationing, in Vienna during both World Wars resulted in a reduction in autopsy proven fatal PE to less than 1%, compared with an incidence of up to 8% during both postwar periods.³⁰

I conclude that obesity is a risk factor for VTE, particularly in women, and may also be a risk factor for fatal PE in some situations. Additional factors such as oral contraceptives, probably multiply this risk. This interaction is common to all oestrogen containing oral contraceptives. Whether it is further enhanced by specific progestagens is unclear. Non thrombogenic alternatives such as Mirena, and the minipill may be safer alternatives in obese women with risk factors for VTE.

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