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Abstract page – this must not exceed 200 words and should describe the core of the paper's message, including essential numerical data. Use four headings: Aims, Methods, Results, Conclusions.

Body of the paper – there should be a brief introduction (no heading) followed by sections for Methods, Results, Discussion, Acknowledgements and Correspondence.

References – in the text use superscript numbers for each reference. Titles of journals are abbreviated according to the style used by Index Medicus for articles in journals the format is: Marks P. Hypertension. In: Baker J, editor. Cardiovascular disease. 3rd ed. Oxford: Oxford University Press, 1998. p567-95. Note all authors where there are four or less; for five or more authors note only the first three followed by ‘et al’. Personal communications and unpublished data should also be cited as such in the text.

Tables should be on separate sheets with self-explanatory captions. Footnote symbols must be used in a set sequence (1, 11, 11i et al). Figures must be glossy prints or high quality computer printouts. Since these are likely to be reduced in size when printed, use large type and approximately twice column size for the figure.

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And now the failure of cervical screening

Everyone wants an excellent health service that is accessible and affordable. Theories on how to achieve this vary from universal insurance to payment by individuals in a free market. Traditionally, New Zealand lay in the middle of the spectrum with elements of both public and private provision and public and private funding. Over the last 10-15 years ideological swings by government have altered systems of funding and governance but on each occasion central control and the power of management has increased. Failures have been attributed, by proponents of the changes, to incomplete implementation or insufficient time. In the absence of careful, prospective collection of data, such contentions are not open to proof. We know that our current health rating by the World Health Organisation is disturbing. Our performance is rated 80th in the world on level of health and 41st on overall health system performance. Three recent ‘studies’, all retrospective, have provided some evidence about why this may have happened. These are the reports by the Health and Disability Commissioner into Christchurch Hospital and Gisborne Hospital, and that of the Committee of Inquiry into Cervical Screening at Gisborne. Some general principles and underlying factors can be identified from them.

In Christchurch, the Commissioner found that “the Ministry of Health did not adequately meet its responsibilities ... it did not develop standards for effective monitoring” that Treasury and CCMAU set a business plan in which the “financial risks were high and the targets almost impossible.” This was known by the Ministers of Health and Crown Health Enterprises. Canterbury Health “focused predominantly on issues of efficiency, funding and financial performance. It is not evident ... that the issue of the adequacy of patient care was appropriately considered.”

“The lack of clinical involvement in high level policy planning and decision making was a major cause of the breakdown.”

In Gisborne “the key driver for the change was the financial imperative for Taraiwhti Health Care to live within its budget.” Consensus processes ... did not extend into the organisation.” “There was a level of consultation, but ... probably not a lot of cognisance was taken of concerns, because of the key driver to break even.” The Nursing staff in both Gisborne and Christchurch lost effective communication with management because of the loss of their independent professional organisations.

The saga of the Cervical Screening scandal is long and tortured. Cervical screening received impetus from the inquiry at National Women’s Hospital. That inquiry increased awareness of cervical cancer as a public health problem and it was decided in 1988 to set up a National Cervical Screening Programme. This was a high priority for then Minister of Health, Helen Clark. The National Advisory Committee on Cancer Treatment Services advised the Minister that given the current state of cytopathology and colposcopy facilities, implementation should be deferred. The Minister wished to proceed and meetings of the National Advisory Committee lapsed. Now, some 13 years later, the Gisborne committee of inquiry has found that: “There appears to have been a consistent failure to follow the advice of experts.”

“The Programme’s design appears to have been influenced by lay persons, who seem not to have recognised that a screening programme has certain essential requirements.”

“The expert advice at the time the Programme was being established was that all parts of a screening programme needed to be in place from the outset. This advice was not followed.” On 25 August 1989, Helen Clark, Minister of Health sent a memorandum to the Director General of Health which stated: “There is widespread concern that there has been too much emphasis placed on the development of the national register and the computing system necessary to operate a register and recall system, at the expense of action on developing smear-taking programmes. I share this concern. My objective is to use the money available by Government to raise the awareness of the necessity of smears ... The importance of the register and ensuring all women are enrolled should probably be secondary to that ... I am not committed to launching a national register by the end of this year. I am committed to ensuring that the proportion of women having smears increases over the year.”

“This imposed time pressures on officials which resulted in unrealistic deadlines and caused a shift in focus away from a balanced screening programme.”

The report goes on to say: “The Programme ... was originally shaped to fit and later forced to accommodate the prevailing ideologies on health delivery. This has created systemic problems in the Programme and has been at the expense of its effectiveness.” The “failure to design and deliver a soundly based cervical screening programme” compounded by “no internal or external quality control at Gisborne Laboratories: ... permitted Dr Bottrill to practise as he did.”

The ethical issues involved are discussed in a Viewpoint article in this issue of the Journal. Today we hear calls for the setting up of an independent cancer management authority. Clearly, national co-ordination and planning is required. It is a pity that the advice of the National Advisory Committee on Cancer Treatment Services was not heeded. It would have avoided a great deal of anguish.

The common factors uncovered by the inquiries into Gisborne and Christchurch Hospitals and cervical screening include breakdown in relationships between management and staff, authoritarian management, exclusion of qualified staff and their ideas from proper consideration in planning, and interference from the financial bureaucracy and politicians into detailed planning. Deaths occurred as a result of these factors. Although the hospital service is underfunded and an increased budget would be helpful, the issues of management, its relationships with staff, and planning are more important.
Who should be accountable? The Minister of Health who imposed a system of general management and insisted on setting up a cervical screening programme against health professional advice? Succeeding Ministers Simon Upton, Paul East, Bill Birch, Jenny Shipley and Bill English who accepted unrealistic budgets imposed on Health Boards and insisted on the acquiescence of Boards and health professionals? Medical advisors to these successive Health Ministers? The Director General of Health and her advisors who were willing to accept the strictures placed on them by Treasury and CCMAU? The Boards and Management of Crown Health Enterprises who restructured to meet unrealistic financial targets and were prepared to have their health professionals work with inadequate support? Those doctors who supported autocratic management in their positions on Health Boards or as medical advisors or clinical directors? The health professionals who provided inadequate services through the lack of adequate support or their own lack of knowledge? To be fair, many are at fault. Yet we have witnessed a desire to put the blame on one or two health professionals providing the service. In the cervical cancer inquiry, it seems that no one, other than the pathologist, really accepted responsibility.

The problems in the Health Service in New Zealand are endemic and serious. The relationships between Boards, Management and health professional staff are unsatisfactory in many hospitals. In a small country facing competitive economic pressures, we must make the best and most effective use of the resources at our disposal. To achieve this, we need strong collegiality within health professional groups, between health professionals and management, and effective co-ordination of activities at a national level. This has not been the case for so long now that our Health Service puts people at unnecessary risk.

Many health professionals perceive that advice to government on matters of health has been ceded to those who support political initiatives—whatever they might be. There is little confidence in medical advice to Health Ministers or in the Ministry of Health who have become apologists for changing political theories. Planning has been dominated by short-term financial considerations. Instead of beginning with an assessment of health needs, followed by a plan to meet these within financial limitations, financial decisions came first. This has had serious consequences for the provision of effective services, for the morale of health professional staff and often also for the costs involved in the longer term. Removed from any ability to assist planning effectively, most medical staff became demoralised and retreated to concentrate on their individual clinical activities. This has had a profoundly damaging effect on the hospital as a community. Continued authoritarian administration, proliferation of protocols and insistence on petty documentation will not solve the issue.

We believe that clinical services will only be effectively planned when health professionals again participate. Sweeping central changes are high risk activities because medicine is complex and the needs of individuals vary so much. The direct interference by Treasury and CCMAU in health planning and delivery has been associated with many of the serious problems documented in the recent reports. The Ministry of Health has been found to have failed by each of the three investigations. Government should now consider where it might best seek advice in health matters. In hospitals, line management should be balanced by input from democratic health professional groups of doctors, nurses and allied health professionals. We urgently need to return to the professionalism that existed in health and education before the ‘reforms’ of the last 10-15 years and to remove Health from detailed control by Treasury and CCMAU, and domination by general management.

The Editors


Hazard associated with the boat building industry in New Zealand

Bill Glass, Occupational Medical Specialist, Christchurch.

New Zealand’s successes in America’s Cup competitions and Round the World races have led to an upsurge in boat building, in particular boats made from composite based on glass reinforced plastics (GRP). The report in this issue of the Journal of a random audit of 120 boat building firms and 151 workers by the Occupational Safety and Health Service (OSH) of the Department of Labour, raises a number of issues concerning the impact of work in this industry on the health of the workers. The audit used an interview based questionnaire and the results indicated both skin and respiratory (asthma) consequences of such work, but no evidence of chronic neurotoxic effects.

The authors recognised the limitation of the study design and as such would have been wise not to draw conclusions such as “it is reassuring that in this study no workers reported symptoms associated with possible long term neurological effects” particularly when a recent review of chronic solvent neurotoxicity in New Zealand concluded that boat building was the third highest industry for notified cases of chronic solvent neurotoxicity. There can in fact be little reassurance about such a situation given the poor recovery rate from this condition and the consequential damaging effects of such illnesses on the family and on the individual’s own work future. Nevertheless in spite of short comings in the design, the authors deserve our appreciation for highlighting an industry where there are significant health consequences from work.

Boat building is an ancient industry and health hazards in the construction of boats were recorded by Pliny (AD 23-79). Hunter’s classic text, “The Diseases of Occupation” recorded that Pliny states “the ancients painted their ships with native ceruse” (lead carbonate), and “that lead poisoning was known in his day and that the workers in lead products tied up their faces in loose bags lest they should inhale the pernicious dust”. Lead remains to this day a hazard in the boat building industry where the older wooden boats are sanded down and repainted.

GRP now dominate the boat construction industry with the use of mainly unsaturated polyester resins and, to a lesser extent, epoxy resins in which glass fibres are the
principal reinforcing agents. The manufacturing process
involves an open mould method using either a hand lay-up
and rolling technique or a spray technique. Where
unsaturated polyester is the resin, styrene is the volatile
component of concern and the hardeners or catalysts are
organic peroxides such as methyl ethyl ketone peroxide,
and methyl methacrylate as an occasional alternative.
When the resin used is an epoxy, the curing agent is
usually an amine but may also be a peroxide, amide or
organic acid anhydride. In addition to the resin and
hardeners additives can include fillers, pigments,
accelerators, inhibitors and mould release agents. Solvents
used in cleaning and painting include acetone, methyl ethyl
ketone and toluene. All in all it is a witches brew!

Many studies have been reported on health effects to
workers in this industry with particular concern
regarding exposure to styrene where unsaturated
polymers are used. Nicola Cherry and others reported
mood changes, fatigue and a slowing of reaction time in
a group of men building glass fibre boats and correlated
blood styrene levels with mood changes. A decade later
in 1990 Letz and others reported significant correlations
between a post shift digit symbol test and both acute
styrene exposure (air levels) and mandelic acid levels in
urine (a metabolite of styrene). Recently, Challenger and
Wright demonstrated a weak association between
styrene exposure and aggression/hostility among workers
in the boat building industry and reported that the
health effects of styrene had been “extensively studied
and documented since the 1970’s”. It is, therefore, not
surprising that the OSH audit confirmed ongoing health
problems to workers in the manufacture of GRP boats.
The audit also looked at surfboard manufacture in
which polyurethane foams are used. These are based on
highly reactive chemicals, the isocyanates, used in a
closed mould system. The two most common isocyanates
are toluene diisocyanate (TDI) and 4,4’
diphenylmethane diisocyanate (MDI). The former has a
vapour pressure which, at normal temperatures, results
in a concentration in air which will exceed the workplace
exposure standard (WES) whereas, although MDI has a
lower vapour pressure, it too will exceed the WES when
used in a spray application.

Isocyanates are also used in paints and lacquers in the
boat building industry. Health consequences of their use
were first identified in New Zealand in 1964 and in a
recent paper on diagnostic methods for diisocyanate-
induced occupational asthma the point is made that
diisocyanates are among the most frequent causes of
occupational asthma in industrialized countries. Clearly,
therefore, the modern boat building industry can be
hazardous.

The final point I should like to make in commenting on
this OSH audit is to refer to the OSH Notifiable
Occupational Disease System or NODS. This is a voluntary
system whereby doctors, nurses and other health professionals
and even patients can notify the OSH branch of a suspected
work related illness. An annual report is published
and although, like all notification systems, coverage is far from
complete, the system nevertheless operates as a “hazard alert”
bringing to the attention of OSH, occupational health issues
which may then lead to a national audit. Other recent
eamples of such audits include Isocyanate Use in Spray
Painting and Health and Safety Issues in New Zealand
Mortuaries.

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1. Dryson EW, Ogden JA. Solvent induced chronic toxic encephalopathy: extent of recovery
3. Cherry N, Waldron HA, Wells GG et al. An investigation of the acute behavioural effects of
4. Letz R, Mahoney FC, Hershman DL et al. Neurobehavioural effects of acute styrene
5. Challenger J, Wright D. Aggression in boat builders: a search for altered mood states in boat
6. Glass W, Thom NG. Respiratory hazards associated with toluene diisocyanate in
7. Bernstein DI, Jolly A. Current diagnostic methods of diisocyanate induced occupational

Taking risks: primary prevention of cardiovascular events

Patrick Vallance, Professor of Clinical Pharmacology and Therapeutics, University College London, UK.

As presentation with severe or malignant hypertension
becomes less common, raised blood pressure is seen more as
a risk factor than as a disease. It is clear that the higher the
pressure, the greater the risk of heart attack or stroke.1
However, it is equally clear that the slope of the relationship
between pressure and risk is not constant; it is influenced by
other risk factors. Thus for the smoking diabetic with
hypercholesterolaemia and left ventricular hypertrophy each
increment in blood pressure is associated with a sharp
increase in risk. In contrast, for the non-smoking otherwise
healthy individual with no other risk factors, the slope of the
relationship between pressure and risk is relatively shallow.
These concepts are of more than academic interest since it
follows that potential benefit to be gained by lowering blood
pressure is greater in the first case than the second. Similar
arguments have been widely rehearsed in relation to lipid
lowering therapy and different therapeutic options have
been proposed.2 In the UK, for example, it has been
suggested that lipid lowering therapy should only be
prescribed for individuals whose absolute risk of a

cardiovascular event exceeds 30% in ten years. Depending
on which drugs are used, the cost of treating hypertension is
often as high, or higher than the cost of lowering lipids. Can
this same strategy be applied to antihypertensives, and what
are the consequences of doing so?

Age is a major risk factor

The factors that influence the risk associated with any given
level of blood pressure are the conventional risk factors for
cardiovascular disorders – lipid profile, smoking status, the
presence or absence of diabetes etc. Some are fixed and some
are reversible. In terms of treatment options it makes sense to
try to understand what is modifiable and what is not, and to
quantify the relative importance of different risks. When this
is done, it becomes apparent that the major non-modifiable risk
factor is age. Even with appalling risk factors, 20 year olds have
a relatively low absolute risk of a cardiac event within the next
ten years, whereas a 70 year old with the same constellation of
risk factors may be at very high absolute risk. Therefore, it is
important to appreciate that any treatment policy that is based

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upon absolute risk over a period of five or ten years will tend to dictate that older individuals are treated while younger individuals are left untreated. This may be reasonable and help prevent undue premature exposure to drugs or being labelled with a disease at a young age. However, these younger individuals will become eligible for treatment as they age and therefore the real question for cardiovascular disease prevention is not only who to treat but also when to treat.

Events are delayed, not avoided
When considering ten year blocks, treatment of lipids or hypertension avoids events occurring within that ten year period, and pushes them into the next ten year block.1 In other words, treatment of risk factors does not truly avoid events in the population, it simply makes them occur at an older age. Because there are competing causes of death, some individuals will succumb to other diseases and therefore there will be some small reduction in total event rate in a population, but the major effect is to increase the age at which events occur. Again, whilst this benefit would be expected to occur throughout the age range of treated individuals it will be most obvious in the elderly in whom the event rate is highest.

Speed and extent of reversibility
One of the key determinants of deciding when to initiate treatment is the speed and extent of reversibility of risk in response to drug treatment. For lipid lowering the data are reasonably clear. Lipid lowering reduces risk quickly (within two years) and nearly completely4 – following treatment individuals appear to adopt a level of risk similar to that defined by their new lipid profile. This is perhaps surprising since it had always been assumed that part of the beneficial effects of lipid lowering would be to regress atheroma. However, the speed with which benefits accrue suggest that lipid lowering stabilises plaques and reduces the risks associated with any given level of atheroma. For blood pressure lowering the results of intervention trials are less conclusive. Certainly risk is reduced and for stroke the risk reduction appears nearly complete within a couple of years. In contrast, for prevention of heart attacks the risk reduction may be only a proportion of that expected from the new level of pressure.5 It is unclear whether the failure fully to reverse risk is because irreversible damage has occurred, because blood pressure has to be lowered for many years before the full benefits are seen, or because blood pressure is simply a marker for some other vascular disease process that continues even if pressure is reduced. The implications of these observations are that for those individuals who reach the requisite level of absolute risk to cross the ‘threshold for treatment’, lipid lowering will reap most of the achievable benefit and they may have avoided years of unnecessary treatment. However, some individuals will have had an event whilst waiting to reach the age at which they cross the absolute risk threshold and for them the treatment delay will have had a very significant impact. For blood pressure lowering, a policy of waiting until a threshold level of absolute risk has been crossed may be acceptable for stroke prevention, is of uncertain validity for prevention of ischaemic heart disease, and there are few data to indicate the likely effect of such a policy on renal function or development of peripheral vascular disease.

Facing a patient
Deciding whether to treat risk factors for secondary prevention is easy – abnormal values of lipids and blood pressure will usually require treatment. Similarly, individuals at high absolute risk over the next ten years require treatment to reduce their risk. It is worth noting that for some people who are being treated for primary prevention, their absolute risk is as high as it is for other individuals being treated for secondary prevention, accordingly, the potential gain is also greater. The real problem occurs when faced with someone at an absolute risk below the absolute risk treatment threshold but who nonetheless is at high relative risk. For example, a 36 year old man with a blood pressure of 154/95 and a total cholesterol of 6.7, HDL cholesterol of 0.9 and LVH on his ECG has a risk seven times higher than the average 36 year old, yet would still be at a level that would not justify treatment on a ten year absolute risk model. Should he be treated, reassured, or simply told to return when he is 45 at which time his risk will be 30% over ten years? These are the realities of everyday practice and the decision made may have profound impact upon the health prospects of the individual. From a pure health economics angle, a policy based on ten year absolute risk makes some sense. For the doctor treating the patient, it sits uncomfortably with the knowledge that this man is at very high relative risk. For the individual patient he has a chance of about 1 in 5 of having a cardiovascular event whilst waiting to reach his 45th birthday. In other words, adopting a 30% ten year threshold for treatment will expose some individuals to avoidable events at a young age. Of course, the setting of a 30% threshold, whilst explicit and transparent as a health policy, is arbitrary and is intrinsically no more valid that a 15% threshold or a 40% threshold.

Proposed solutions
Informed decision making on behalf of both patient and doctor is essential to therapeutic success. The notion of ten year absolute risk has been very valuable to focus minds on where intervention should be targeted and to encourage treatment in the elderly. However, its extension to younger age groups is fraught with problems, particularly as it applies to hypertension. For the sake of a simple health economics solution, events will be delayed in the elderly but young individuals will be put at risk and stand to lose a significant number of healthy event-free years. Furthermore, these healthy years will be lost at a time of maximum work productivity and family responsibilities. One solution is to extrapolate beyond ten years, calculate lifetime risk for an individual and determine the effects of intervention at different ages.3 This then allows both doctor and patient to understand the consequences of delaying treatment to different ages. Surprisingly, for many younger individuals it will still allow recommendation of a watch and wait policy, but it will do so in the firm knowledge that the risk of doing so has been quantified and a clear treatment start age has been identified. This information needs to be shared with the patient, who must take part in the decision making process. Although such calculations are not possible with existing charts or computer programmes, they would be easy enough to generate if this is accepted as a useful way to guide treatments. Finally, even with this approach, doctors should be aware that for hypertension treatment we are still working only on partial knowledge. It remains possible that delaying treatment of hypertension permits accrual of risk that becomes irreversible and that only early and efficient intervention will prevent this. The available data do not give a clear answer to this predicament.

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Hazards associated with the boat building industry in New Zealand: an OSH audit

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Abstract

Aim. To randomly audit the boat building industry in New Zealand to assess the occupational health status and level of knowledge of employees.

Methods. A survey was conducted using a nurse and inspector administered questionnaire. 151 workers from 120 randomly selected firms participated in the survey.

Results. 31.5% respondents thought they had had some sort of work related health problem since working in that job. 22% reported wheezing during the last twelve months. 14-16% met criteria for occupational causation, and 4% met a measure of severe wheezing related to work. 25.6% of workers had dermatitis. Only a quarter of these met criteria for occupational causation. No respondents reported symptoms suggestive of chronic solvent neurotoxicity. Solvents and epoxy resins comprised the majority of chemicals with which there was contact. Observation suggested little use of Material Safety Data Sheets as a source of knowledge about toxicity of the chemicals used. Although 94.3% reported wearing gloves, this did not correlate with numbers reporting dermatitis suggesting non-compliance or glove failure.

Conclusion. New Zealand boat builders and their employees remain at risk for occupational health problems by virtue of their employment.

Concerns with the boat building industry in New Zealand were highlighted in North and South magazine in 1997. This suggested that many boatbuilders had become sick by virtue of their occupation.

Traditional fibreglass boat construction has used polyester resins. The solvents used such as styrene and acetone, represent hazards in respect of the skin and neurological system. More recent ‘high tech’ epoxy resins are a hazard to the respiratory system as are the isocyanate paints used as surface coatings.

The New Zealand Occupational Health Service of the Department of Labour (OSH) carried out a random audit of boat building industries in 1998 and 1999 to assess health status and knowledge of occupational health hazards amongst those employed there. The majority of boat building in New Zealand today incorporates fibreglass construction and the audit concentrated on this, metal and wood manufactured boats being excluded. This paper summarises findings of that audit.

Methods

Data were collected by means of an occupational health nurse or inspector administered questionnaire to 151 people from 120 boat building firms. 120 firms were randomly selected from the Occupational Safety and Health national database and asked to complete an audit form. In addition, one employee (or two from the larger firms), were selected from each firm, to represent average length of employment and asked to complete a health surveillance questionnaire. The audit questionnaires incorporated the following data:

1) The number of employees per firm
2) Demographic data (age, gender, years of employment)
3) Details of chemicals used at each site.

The surveillance questionnaire incorporated questions covering: respiratory, dermatological and neurological symptoms. Wheezing related to work was defined as wheezing in the last twelve months, temporally related to work. A measure of severity was worsening as the week progressed. Occupational dermatitis was defined by subjects self reporting dermatitis which was temporally related to work, and the handling of chemicals on a specified list.

Results

No firms refused to participate. The number of employees was unobtainable for eight firms. Listings of substances used was unavailable for 26 firms. No selected employees refused to participate. Data on health surveillance was unavailable on sixteen questionnaires. Health data was obtained on three questionnaires with no supporting demographic data. The number of years of employment in the boat building industry ranged from a few months to 49 years (average 8.5 years). Almost 1/3 of respondents (31.5%) thought they had had some sort of health problem related to their job since working in that job.

22% of respondents reported that they had had wheezing during the last 12 months. 14% reported that wheezing occurred during or straight after work; 15.9% reported that it improved outside of work; and 4% reported that it got worse as the working week progressed.

25.6% of respondents had dermatitis, the commonest site being the hands followed by the face (20%). Of all cases, only 26.9% thought that work had contributed to their dermatitis and 24% thought that their dermatitis improved when away from work.

No respondents reported chronic neurotoxic symptoms on the questionnaire.

Chemicals listed in the workplace included solvents (98% of respondents), epoxy resins (90%), glues (75.5%), isocyanates (64.8%), detergents (46.9%) and oils or lubricants (46.4%).

Discussion

Workers in the boat building industry are known to be at increased risk of occupational disease by virtue of their environment. Exposure to epoxies and isocyanates may cause new asthma, while solvents in irritant concentrations may exacerbate pre-existing asthma. 22% of workers in this audit indicated the presence of wheeze. Using the same measure of wheezing in the previous twelve months, D’Souza reported a prevalence rate of 28.5% for New Zealand adults in the Hawkes Bay, Wellington and Christchurch areas, and Lewis et al found a prevalence rate of 15.2% in New Zealand adults aged 20-44 years. These studies do not, however, differentiate between occupational and non occupational wheezing. By these criteria it would appear that the number of people reporting wheezing in the boat building industry does not differ significantly from that.
of the general population. However, when our criteria for wheezing related to work are used, ie, exacerbation while at work, and improvement after work, it is notable that a third of the employees with wheezing fitted these, suggesting that their wheezing was in fact due to their occupation. Using our measure of severity, ie worsening wheeze as the week progressed, we noted with concern that 4% of the study population reported this, suggesting an unrecognised and uncontrolled occupational cause for their wheeze. It is likely in our view, that these wheezing episodes are in fact related to asthma and specifically, occupational asthma.

Irritant contact dermatitis has been documented as a result of skin contact with solvents, fibre glass and uncured polyester resins. Epoxy resins have been associated with allergic contact dermatitis. There are no New Zealand data on the prevalence of occupational dermatitis. Overseas data suggest an incidence rate of 0.5-1.9 cases per 1000 full time workers per year, but rates will vary considerably from industry to industry. Tarvainen et al found six out of 86 (7%) glass fibre reinforced plastics workers (ie comparable work tasks to the present study) had allergic and 12 (14%) had irritant contact dermatis, or a total of 21%, similar to the total rate in the present study. Sertoli et al found 29% of all contact dermatitis cases in their study were occupational in origin. This is similar to the 26.9% in the present study who considered occupation a factor, and the 24% who improved away from work. The remainder are likely to be either atopic or be in contact with non occupational allergens or irritants. Atopic dermatitis has a prevalence of 10-15% in the general community.

It is noteworthy that 94.3% of workers stated that they wore protective gloves, in spite of 25.6% reporting dermatitis of the hands. Possible explanations for this apparent contradiction include pre-existing dermatitis, perhaps exacerbated by the irritant effect of retained sweat, poor compliance, faulty glove selection, glove failure from tearing during mechanical abrading activities, and the possibility of skin irritants and allergens either penetrating, or running inside the glove.

In spite of the fact that boating has been identified as the third highest industry in New Zealand for notified cases of chronic solvent neurotoxicity, it is reassuring that in this study no workers reported symptoms associated with possible long term neurological effects.

It is of concern that occupational health nurse observations, made during the course of the survey, found little evidence for the use of Material Safety Data Sheets (MSDS) or adherence to recommended health guidelines as laid down in the Health and Safety in Employment Act of 1992.

Potential biases in this study relate to the use of a questionnaire to elicit respiratory and dermatological symptoms. Although self administered questionnaires have good sensitivity in population based studies, they have previously been found to be poorly predictive of occupational asthma in individuals. The diagnosis of wheeze related to work requires, ideally, the use of peak flow measurements and often serial spirometry, not done here. Similarly, our individual respondents were not clinically examined. Questionnaires were administered by occupational health nurses and inspectors and the potential for variation in administrative technique exists. The use of questionnaires is also well recognised in the medical literature as carrying an inherent risk of recall bias.

Studies that have used a questionnaire method for determining the presence of dermatitis correlate well with clinical findings. The questions asked in the dermatology portion of the questionnaire used in our study, had not previously been validated. The questionnaires also did not investigate the prior or concurrent use of topical medications. No allowance was made for atopy in individuals, and this may also have influenced our results.

New Zealand boat builders and their employees remain at risk for occupational health problems by virtue of their employment. Further attention needs to be paid in terms of health surveillance and obligations of employers under the Health and Safety in Employment Act 1992. This is especially important in view of the potential increase in work in this industry as a result of the recent America’s Cup racing.

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Poisoning the profession - the Piñata syndrome

Disillusion, despair and discontent pervade our profession. Doctors’ dissatisfaction with the circumstances in which they practise leads many to depression, while others ditch medicine altogether. These distraught doctors may become detractors of medicine: many would not recommend medicine as a career.

Thomas Marr, a United States physician and healthcare consultant, calls this professional melancholy the piñata syndrome, to reflect the feelings of a physician who, frustrated with managed care, exclaimed: “I feel like a piñata. Everyone is taking a whack at me” (piñatas are a Mexican tradition – hollow figures filled with sweets which are beaten open with sticks to release their contents at festivities). Marr observes that the syndrome is characterised by “grumbling and griping; sniping at medical and administrative leadership; resistance to examining best practice” and “grousing physicians who no longer enjoy the practice of medicine”.

The piñata syndrome also affects patient care, as “unhappy, underproductive doctors who do not enjoy caring for patients” deliver second-rate care. If not reversed with powerful antidotes, such as restoration of patient and doctor control of healthcare, the piñata syndrome will continue to reap professional deaths and will eventually see medicine become a second-class profession.

Factors determining non-attendance at a cardiac rehabilitation programme following myocardial infarction

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Abstract

Aim. To identify factors contributing to patient non-attendance at an outpatient cardiac rehabilitation programme following hospital admission for a first myocardial infarction.

Methods. Consecutive patients admitted over a two year period to the Auckland or Green Lane Hospital Coronary Care Units for a first myocardial infarction were identified. All patients had been invited to attend the cardiac rehabilitation programme during their admission. A questionnaire was mailed to all identified patients.

Results. Overall 324 patients were identified with a mean age of 61 years, of whom 212 (65%) subsequently attended the cardiac rehabilitation programme. 220 of the 324 patients (68%) responded to the questionnaire. Univariate analysis revealed that non-attenders were less well educated (p <0.05), more often from a lower socioeconomic status (p<0.05) and lived alone (p<0.05). Non-attendance and withdrawal from the programme were most frequently related to transport and inconvenient scheduling.

Conclusions. Patients with less education, lower socioeconomic status and patients living alone were less likely to attend a cardiac rehabilitation programme. Provision of a transport service and more flexible scheduling of the programme may improve attendance.

There is evidence from randomised controlled trials that multifactorial cardiac rehabilitation programmes improve psychological well being,1,2 exercise tolerance3-5 and may improve survival.6,7 Rehabilitation after myocardial infarction usually involves the implementation of physical activity and educational programmes. Ideally, rehabilitation commences during hospitalisation (phase I) and then proceeds to a supervised outpatient programme (phase II), lasting between six weeks and six months. This is followed by a long-term maintenance programme (phase III). The Auckland-Greenlane cardiac rehabilitation programme is a phase II educational programme of six weeks' duration which provides instruction on the aetiology of coronary artery disease, risk factor modification, dietary change, stress reduction and physical activity.

Attendance at phase II cardiac rehabilitation programmes which include a structured exercise component is generally much greater in younger patients and varies from 20 to 60%.8,9 Various factors have been shown to be associated with non-attendance. These include social isolation,10 lower socioeconomic status,10,11 and lower educational attainment.12 After initially commencing a cardiac rehabilitation programme patients may later withdraw. The rate of withdrawal from phase II programmes is high, commonly around 50%.8,11,13 Reasons for this include post infarction angina, continued smoking and uncontrolled hypertension.5,11 Non-medical reasons include lack of interest or motivation14 and logistical reasons or work commitments.13,14

In the present study a descriptive profile, including demographic, social, ethnic and clinical factors, of non-attenders at the Auckland-Greenlane cardiac rehabilitation programme was obtained. Identification of factors which may potentially limit attendance should facilitate efforts to improve programmes and patient outcomes.

Methods

Ethical approval was obtained from the University of Auckland and North Health Ethics Committees. Management approval for the use of the hospital computer systems was obtained. Patients were requested to fill in a structured postal questionnaire. A pilot questionnaire was initially utilized to ensure that the postal questionnaires were comprehensible and could be interrogated statistically.

Baseline population characteristics. The baseline population consisted of 324 consecutive first myocardial infarction patients who had been admitted in 1994 or 1995 to either the Auckland or Greenlane Coronary Care Units and referred to the Auckland-Greenlane cardiac rehabilitation programme during their admission. Eligible were patients who had no previous history of cardiac disease documented on hospital files and a definite first myocardial infarction according to standard diagnostic criteria.

Rehabilitation attendance. Information regarding the frequency of attendance at the cardiac rehabilitation programme was collected from programme records. Patients who attended no classes were referred to as 'non-attenders' whereas those who attended one to five classes were referred to as 'withdrawals'. Patients who attended all six classes were referred to as 'full-attenders'.

The completed questionnaire provided self-ascribed data on ten demographic variables. These included age, sex, ethnic origin, language, marital status (four categories), number of household members, caring responsibility, highest level of education (four categories), years of schooling and occupation of patient (and spouse where applicable). In addition, coronary heart disease risk factors including smoking status at admission, history of dyslipidaemia, hypertension, diabetes or family history of coronary heart disease were noted from patient records. The International Socioeconomic Index15 was used for the translation of occupations into socioeconomic status. The socioeconomic status of married women of the older age group (who may not have worked since marriage) was determined from their husband's level of employment.

Six categories were used for classification of ethnic origin: Maori, European, Pacific Island People (which includes people of Polynesian, Samoan, Tongan, Tokelauan, Cook Islands, Nuiean and Tuvaluan origin), Indian, Asian and other. Where a person was of mixed Pacific Island/Maori or European/Maori ancestry they were classified as Maori. Patients chose from a 19-options list (which included a non-specified (other) category) their individual three most important reasons for not attending or discontinuing the cardiac rehabilitation programme.

Statistical methods. Data were analysed using Statistical Analysis Systems (SAS) software. Univariate analysis was performed using the chi-squared test for categorical variables and by analysis of variance (ANOVA) for continuous variables. All tests were two-tailed and a 5% significance level was maintained.

Results

Patient characteristics. The study group was 324 patients with a mean age of 61 years (range, 35 to 85 years), of whom 74% were male. The ethnic composition of the group was (%): Maori (3.5), Pacific Island (3.1), European (87), Asian (0.7), Indian (4.8) and other (0.7). 112 of these patients (35%) attended no classes and 212 (65%) attended one to six classes. Of those attending, 75% attended fully (six classes). Of the 25% who attended one to five classes, more than half discontinued after only one class. The response rate to the mailed questionnaire was 220 out of 324 eligible patients (68%) with thirteen patients having died during the follow-up period. The response rate was 72% for full-attendees, 64% for withdrawals and 56% for non-attendees.
**Attendance at the cardiac rehabilitation programme among respondents.** The most commonly stated reasons for non-attendance at the cardiac rehabilitation programme were (Figure 1): transport problems (33%), ‘people were sicker than me’ (19%) and scheduling inconvenience (12%). Frequently stated reasons for withdrawal from the programme were similar and included transport problems (31%), scheduling inconvenience (13%) and ‘people were sicker than me’ (9%). In addition, the recommencement of employment (16%) was a frequently provided reason for withdrawal.

![Figure 1. Reasons for non-attendance and withdrawal from outpatient cardiac rehabilitation.](image)

In accord with previous work,9,10,19 social isolation was associated with non-attendance at this programme. Other studies have shown that people with a low level of social integration have more than twice the relative risk of death than those who are highly socially integrated.20 Moreover, social isolation has been suggested to impose a high negative impact on recovery from myocardial infarction.21,22 While ethnicity did not appear to influence attendance at rehabilitation, only a small number of Maori (3.5%) and Pacific Island (3.1%) patients were included in this study and thus the overall results cannot reasonably be extrapolated to these groups. There is evidence that cultural differences between ethnic groups are likely to influence the use and acceptance of medical facilities and services.23 None of the Maori and Pacific Island patients included in this study reported that the programme was ‘not culturally specific’ and ‘language’ was only twice identified as a problem in attending the programme.

Smoking status and history of hypertension or dyslipidaemia were shown to exert no influence on rehabilitation attendance in contrast to previously reported high early withdrawal rates for smokers in a one-year cardiac rehabilitation programme.11 The influence of gender on cardiac rehabilitation attendance is unclear. Women, particularly older women, have been reported to attend cardiac rehabilitation programmes less often than men.1,17 Furthermore, women are less likely to own and drive a car thereby rendering access to a rehabilitation programme more difficult.1 In the present study, gender, however, did not influence attendance.

Patients most often stated transport problems and inconvenient scheduling of the programme as reasons for withdrawal or non attendance at the cardiac rehabilitation programme. Although patients living in the central Auckland area only were eligible, the results showed that transport to and from the programme was still a major concern. A transport service and an alternative evening session, especially for the significant fraction of patients who resume fulltime employment,24 may improve attendance.

In conclusion, lesser education, lower socioeconomic status and social isolation were factors contributing to non-attendance at a phase II cardiac rehabilitation programme. Attendance could be improved by provision of both a transport service and alternative programme times. Providers of such programmes should consider these factors to optimise attendance and patient outcomes.

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Sun protection practices, knowledge and attitudes to tans among New Zealand adolescents, 1991-1997

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Abstract

Aims. To examine change in the self-reported sun protection, knowledge and attitudes to tans amongst fourth form students from 1991 to 1997.

Methods. Questionnaires were mailed to 20 New Zealand secondary schools, where 20 students were randomly selected to participate in each school.

Results. The proportions of adolescents who reported getting sunburnt over summer, and sunbathing for the purpose of tanning increased significantly from 1991 to 1997, while there were decreases in the proportions who reported getting a suntan, wearing clothing for sun protection and having heard of melanoma. There was also some evidence of a decrease in the attribution of positive qualities to a tan.

Conclusions. Some positive changes in attitudes to tanning among New Zealand adolescents were present over the 1991-1997 period. Although these changes are promising there was little change in utilisation of sun protection measures, in fact, there was evidence that this had worsened.

New Zealand has one of the highest melanoma mortality and incidence rates in the world. Yet melanoma is potentially one of the most preventable cancers through its strong link to excessive sun exposure. With recent research indicating an increase of about 12% in sunburn-related ultraviolet radiation in the past decade the need is greater than ever for reductions in the amount of sun exposure experienced by New Zealanders.

Evidence suggests that sun exposure during childhood and adolescence is a particularly important risk factor for development of melanoma. As individuals move from childhood to adolescence they are increasingly expected to undertake responsibility for their own personal health behaviour, including their protection from the sun. In New Zealand, parental protection from the sun is strongly related to sun protection among young children. Adolescents, however, appear less influenced by their parents with respect to sun protection.

Studies have established that a tan is considered a very desirable attribute, particularly for adolescents, and seeking a tan may lead to harmful sun exposure. Furthermore, in New Zealand there is considerable emphasis on the desirability of outdoor activities as part of health promotion messages to ‘be active’. While not directly conflicting with sun protection messages, a strong outdoor culture also requires that sun protection is ‘built in’ to daily activities, such as shade provision at venues, appropriate clothing requirements, and timing of events. Often these environmental considerations are overlooked.

Alteration of sun exposure behaviour is the primary aim of programmes designed to reduce the incidence of melanoma. In New Zealand, a wide range of material has been produced for such a purpose, including pamphlets, posters, and television advertisements. The Cancer Society’s ‘SunSmart’ campaign, run during summer of 1990-1991 was one campaign targeted at adolescents whose effectiveness has been formally evaluated. It focused on encouraging the use of sun protection and increasing awareness of melanoma. The assessment involved surveys of fourth form students, four months apart in November and February to evaluate pre- and post-campaign levels of knowledge, attitudes and behaviour. It was found that post-campaign, melanoma awareness and use of sun protection increased, attitudes to tanning became less positive and there was a reduction in the amount of sunbathing among adolescents. Thereafter, however, messages aimed at adolescent sun protection have been scarce, with health promotion campaigns focussing much more upon sun protection among younger children. It is unclear how sun behaviours and attitudes have changed among adolescents during this period.

The present study was designed to assess changes in sun behaviour and attitudes, by comparing results from the February 1991 sample with a similar survey carried out in 1997, and examining for long-term changes in adolescent self reported behaviour and attitudes.

Methods

Participants were fourth form students enrolled at one of 20 selected New Zealand secondary schools originally selected in 1991 to represent a
socio-economic cross section of the population. Each school was asked to randomly select 20 students: in 1991 these were selected on an alphabetical basis; in 1997 it was done on proximity of birth-dates to the survey time. The 1997 survey included 404 participants (208 females and 196 males), whereas the 1991 survey included 345 individuals (177 females and 168 males). There was a comparable number of students identifying themselves as Maori in the 1991 and 1997 surveys (14% and 12% respectively) and as Pacific Islanders (10% and 14% respectively). The remaining students were primarily from a European background. There were no significant differences in skin type between 1991 and 1997, as indicated by participants’ own estimation of their skin sensitivity to 30 minutes of sun exposure at the beginning of summer, with predictions of sunburn being 63% and 69% respectively. There was a significant difference in skin type between Maori/Pacific students and the remaining students, with 57% and 69% respectively reporting sunburn after 30 minutes exposure. The surveys were carried out during different times of the year, the first in February and the second in May.

The surveys asked questions about sunbathing, sun protection, tan related attitudes and knowledge of melanoma. The 1997 questionnaire contained more items than the 1991 one, and there were some differences in question format. Consequently the fifteen comparable questions were included for analysis in the present study.

**Results**

**Sun behaviours.** Frequencies for measures of sunbathing and use of sun protection in 1991 and 1997 are presented in Table 1. In both samples, while most male and female adolescents reported getting a tan over summer, significantly higher proportions of females than males reported that they sunbathed to get a tan; this was also true for the use of oils or lotions to tan. Males in both samples were significantly more likely to wear hats; however, females were significantly more likely to report sunscreen use in the 1997 sample only.

Female students from the 1997 survey were also significantly more likely than males to report having been sunburnt over the previous summer.

**Attitudes to tanning.** Attitudes towards suntans are more likely than males to report having been sunburnt over winter. Female students from the 1997 survey were also significantly more likely than males to report sunscreen use in the 1997 sample only.

**Discussion**

The change in sun protection amongst adolescents in this sample over the 1991-1997 period was relatively disappointing for efforts to reduce the incidence of melanoma. Despite ongoing encouragement of sun protection in New Zealand there have been no significant increases in either the use of sunscreen or hats. In fact there was a significant decrease in the proportion reporting the use of clothing for sun protection. This may be related to a campaign focus on children’s sun protection, with little

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**Table 1. Reports of sunbathing and use of sun protection amongst adolescents, 1991 & 1997.**

<table>
<thead>
<tr>
<th>Question</th>
<th>1991 Male</th>
<th>1991 Female</th>
<th>1997 Male</th>
<th>1997 Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last summer did you:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Get a tan</td>
<td>81 76</td>
<td>78 62</td>
<td>73 68</td>
<td></td>
</tr>
<tr>
<td>Sunbathe regularly</td>
<td>9 23</td>
<td>16*</td>
<td>15 38</td>
<td>27*</td>
</tr>
<tr>
<td>Seek deepest tan</td>
<td>10 18</td>
<td>14</td>
<td>8 15</td>
<td>12</td>
</tr>
<tr>
<td>Use oils/lotions to tan</td>
<td>15 35</td>
<td>25*</td>
<td>14 34</td>
<td>25*</td>
</tr>
<tr>
<td>Get sunburnt (red skin)</td>
<td>56 54</td>
<td>55</td>
<td>67 78</td>
<td>73*</td>
</tr>
<tr>
<td>Get sunburnt (red and sore)</td>
<td>36 31</td>
<td>33</td>
<td>27 33</td>
<td>30</td>
</tr>
<tr>
<td>Often or always:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use sunscreen</td>
<td>49 59</td>
<td>54</td>
<td>37 58</td>
<td>48*</td>
</tr>
<tr>
<td>Wear a hat</td>
<td>43 20</td>
<td>31</td>
<td>42 23</td>
<td>32*</td>
</tr>
<tr>
<td>Protect self with clothing</td>
<td>58 46</td>
<td>52</td>
<td>36 39</td>
<td>38</td>
</tr>
<tr>
<td>Have you:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heard of melanoma</td>
<td>97 97</td>
<td>97</td>
<td>87 90</td>
<td>89</td>
</tr>
</tbody>
</table>

* Chi squared value for sex difference significant at p<0.01, otherwise nonsignificant. **Only those who reported that they got a tan last summer were asked these questions, however, figures shown represent proportion of whole sample.

---

**Table 2. Percentage agreeing with reasons for a suntan among adolescents, 1991 & 1997.**

<table>
<thead>
<tr>
<th>Reason</th>
<th>1991 Male (n=168)</th>
<th>1991 Female (n=177)</th>
<th>1997 Male (n=196)</th>
<th>1997 Female (n=208)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunbathe regularly</td>
<td>11 18</td>
<td>14</td>
<td>7 10</td>
<td>8</td>
</tr>
<tr>
<td>Get a tan</td>
<td>34 31</td>
<td>32</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>Tans are attractive</td>
<td>9 21</td>
<td>15*</td>
<td>7 13</td>
<td>11*</td>
</tr>
<tr>
<td>Tan hides defects</td>
<td>52 54</td>
<td>53</td>
<td>28 38</td>
<td>33</td>
</tr>
<tr>
<td>Feel better with tan</td>
<td>33 35</td>
<td>34</td>
<td>16 21</td>
<td>19</td>
</tr>
</tbody>
</table>

* Chi squared value for sex difference significant at p<0.01, otherwise nonsignificant.

**Changes 1991-1997.** Changes in the fifteen variables shown in Tables 1 and 2 were then examined using logistic regression procedures. For each variable the predictor variable ‘Year’ was included in the model first; for those variables where this added significantly to the model the predictor variable ‘Sex’ was also included. If the variable ‘Sex’ also added significantly to the model a ‘Year x Sex’ interaction term was then included. Table 3 shows those logistic regression results that were statistically significant at the p<0.01 level.

**Table 3. Logistic Regression for 1991 and 1997 data.**

<table>
<thead>
<tr>
<th>Last summer did you:</th>
<th>B value</th>
<th>Standard Error</th>
<th>Year Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get a tan</td>
<td>-0.35</td>
<td>0.17</td>
<td>0.58</td>
<td>0.42-0.80</td>
</tr>
<tr>
<td>Sunbathe regularly</td>
<td>0.65</td>
<td>0.19</td>
<td>1.90</td>
<td>1.32-2.78</td>
</tr>
<tr>
<td>Get sunburnt</td>
<td>0.75</td>
<td>0.16</td>
<td>2.12</td>
<td>1.56-2.87</td>
</tr>
<tr>
<td>Often or always:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protect self with clothing</td>
<td>-0.38</td>
<td>0.15</td>
<td>0.56</td>
<td>0.37-0.75</td>
</tr>
<tr>
<td>Have you:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heard of melanoma</td>
<td>-1.46</td>
<td>0.36</td>
<td>0.23</td>
<td>0.12-0.47</td>
</tr>
<tr>
<td>Reason for liking a tan:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel better with tan</td>
<td>-0.84</td>
<td>0.15</td>
<td>0.43</td>
<td>0.32-0.58</td>
</tr>
<tr>
<td>Feel healthier with tan</td>
<td>-0.80</td>
<td>0.17</td>
<td>0.45</td>
<td>0.32-0.63</td>
</tr>
</tbody>
</table>

As is shown in Table 3, there were significant differences across years for seven of the fifteen comparable variables. While there was an overall decrease in the proportion who reported getting a suntan, there were increases in the proportions who reported getting sunburned, and sunbathing for the purpose of tanning. There were decreases in the proportions who reported wearing clothing for sun protection and reporting that they had heard of melanoma. Finally, there was some indication of attitude shift with fewer reporting that a tan makes them feel better about themselves and reporting that a tan makes them feel healthier. There were no significant interactions between year and sex, suggesting these changes were occurring among both girls and boys.
promotion expressly targeting adolescents. The significant drop in awareness of melanoma may also be a product of a change in promotion focus to what should be done (ie increase protection) rather than why it should be done (ie avoid melanoma), as was the case in early campaigns.

As shown in Table 1, experience of any sunburn over summer increased significantly from 1991 to 1997, with female students, in particular, being a concern. Nevertheless, the proportion of students who had more severe sunburn stayed relatively constant at around a third of the sample. An indication of the site or amount of area sunburnt on each occasion would be valuable information in future studies as it may suggest sun protection strategies which could be of particular benefit to this population.

The increase in reported sunburn is in contrast with findings from Australia reporting a trend of a decrease in sunburn in addition to increases in use of hats and other clothing for sun protection. However, the reductions in sunburn levels among Australian adolescents may have been smaller than those for older people, which is consistent with our findings.

Fewer adolescents reported getting a tan during the summer of 1997 than during 1991. Those who were ‘tanners’ were then asked more specific questions about their tanning behaviour. The proportion who had achieved their tan through deliberate exposure to the sun was significantly higher in 1997 than in 1991. This apparent contradiction may be explained by a decrease in those who tanned as a consequence of outdoor activity such as sport or part-time work, while proportions of those who practiced deliberate sun exposure for the purpose of tanning remained high. In each sample there were only a small proportion seeking the deepest tan possible; however, a quarter of adolescents in each sample there were only a small proportion seeking the deepest tan possible; however, a quarter of adolescents reported using oils or lotions to help them tan. Due to the wording of the questionnaire, it was not possible to establish if these products acted to accelerate sun-induced tanning or if they were fake/self-tanning lotions, which do not require sun exposure to create a tanned appearance. Areas of the body which were most likely to be subject to deliberate exposure were not assessed, however, this is information which could usefully be collected in future studies.

There were shifts in attribution of positive qualities to a ‘tan’ with those agreeing with two of the reasons for liking a tan decreasing significantly. It is possible that there may be some confusion as to what constitutes a ‘tan’. The distinction between a ‘tan’ as a result of ethnicity and a ‘tan’ as a result of sun exposure is an important one, especially for children and adolescents in New Zealand as the population becomes more ethnically diverse.

Differences in attitudes to tans between Maori/Pacific and non-Maori/Pacific students highlight this distinction, though the findings should be treated with some caution, due to relatively small numbers. Confusion is likely when messages are given that ‘no tan is a good tan’ but that ‘natural tans’ are good as they protect against getting sunburnt.

There are a number of limitations to the generalisability of these results. The samples only included those in the fourth form, and as there is evidence that attitudes change over adolescence, these results may not generalise to all adolescents. The two surveys were also carried out at slightly different times of the year, one during summer, one during autumn, the latter requiring recall of more distant events. As mentioned earlier, there were also some differences in question order and format in the two questionnaires. While only those questions with answers which were directly comparable were included in the present study, these issues may have influenced responding.

Sun protection involves the organisation, on a daily basis, of shade, clothing, and sunscreen, according to individual skin type and proposed activity. It may be unfair to expect adolescents to be solely responsible for coordination of their personal sun protection. Some responsibility needs to be taken by schools, sports clubs, city councils and other organisations to have sun protection ‘built in’ to activities for adolescents. Examples of this are shade provision, uniform requirements, and appropriate timing of events.

In conclusion, while there has been some positive change in the self-reported attitudes of New Zealand adolescents over the period 1991-1997, there was little change in the use of sun protection measures, with some evidence that protection may have even decreased. The responsibilities of organisations working with adolescents in regard to sun protection need to be recognised, and the changing socio-cultural context surrounding adolescents taken into consideration in any future attempts to change attitudes and behaviour.

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References
Trauma and co-morbidity – a pilot study

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Abstract

Aims. To study the adult trauma patient population at the Auckland Hospital in order to determine the age distribution of trauma, the prevalence and importance of co-morbid conditions and any effect of the latter on the length of stay in the hospital.

Methods. Data were collected on 78 consecutive patients admitted to the Auckland Hospital under the Trauma team between December 1999 and January 2000. Data were collected by interviewing the patient, as well as reviewing patient’s medical notes and the Trauma Registry.

Results. The prevalence of co-morbidities was 14.7%. No co-morbidity was found below the age of 40 years, but the prevalence of co-morbidity increased with age. The average length of stay for patients with no co-morbidities and an Injury Severity Score (ISS) >15 was 19 days while for those with co-morbidities was 24.5 days – an increase of 29%.

Conclusion. This pilot study has found that a significant number of trauma patients being admitted to Auckland Hospital have a pre-existing co-morbid condition that may alter their length of stay. It is an important issue that warrants further investigation, in order to devise a more accurate prognostic scoring system.

A person of any age can suffer trauma of varying severity. Many factors influence the outcome of such a heterogeneous ‘disorder’ that must first be considered when predicting the outcome. These include severity of the injury, age of the patient, time to definitive care and the quality of care.1

Various methods have been devised to evaluate trauma and predict outcome. Among the most popular are the Injury Severity Score (ISS) and TRISS. The ISS tries to correlate the severity of the injury with outcome while the TRISS correlates age, physiological parameters and injury severity with outcome.2 Those with an ISS of >15 are classified as major trauma patients.3 ISS does not take into account pre-existing health status or age of the patient. TRISS does take into account the age (co-morbid conditions increase with age) of the patient but not the pre-existing health conditions that may alter outcome. Thus it is no surprise that trauma scores and ISS that predict a 10% mortality for blunt trauma in patients under 55 years of age are associated with a mortality of approximately 40% in patients aged 55 years or older.1

A review of the literature1,5-7 reveals that the following are important in altering the prognosis of patients with major trauma: renal failure, cirrhosis, coagulopathy, ischaemic heart disease (IHD), chronic obstructive respiratory disease (COPD) and diabetes. Very little is known about the prevalence of these co-morbid conditions and their effect on outcome in trauma patients admitted to Auckland Hospital. The primary aim of this paper was to study the adult trauma patient population at Auckland Hospital in order to determine the effects of age and co-morbid conditions on the length of stay in the hospital.

Method

Data were collected on 78 consecutive patients admitted to Auckland Hospital as a result of trauma starting December 1999. Inclusion criteria were the same as those used to enter patients into the Trauma Registry.4 The Trauma Team reviewed every patient admitted to Auckland Hospital as a result of trauma, irrespective of the primary admitting service. Patients presenting as a result of a previous injury or trauma secondary to a primary medical cause were not accepted by the Trauma Team onto the Registry and were thus not included in this study. Data were collected from three sources: patient interviews, patient’s medical notes and the Trauma Registry. The co-morbid conditions considered were: renal failure, cirrhosis, coagulopathy, IHD, COPD, and diabetes.

Results

Two of the 78 patients were excluded because their injuries were subsequently judged to be secondary to a medical condition. Another patient was excluded because he did not speak English and there was no information available about his co-morbidities.

Age distribution. The age distribution of the population is illustrated in Figure 1. 80% of trauma occurred in patients aged less than 60 years of age. 61.3% were less than 50 years of age. Of patients aged 50 years and older, almost half were in the 50 to 59 year age bracket.

Co-morbid conditions and age. The prevalence of co-morbidities was 14.7%. No co-morbidity was found in patients younger than 40 years, and as the patients got older, the prevalence increased (Figure 2). 90% of co-morbidities occurred in patients aged 50 years and over. 34.5% of patients aged 50 and over had co-morbidity and this figure was 53.3% for those aged 60 years and over.
ISS and age. The younger patients tended to injure themselves more severely. Those with an ISS of >15 were classified as major trauma patients. 4 21.7% of the patients aged less than 50 years of age had an ISS >15 compared with only 13.8% aged 50 years and over.

ISS and length of stay (LOS). As expected, the more severely injured patients (high ISS) had a longer stay in the hospital. The average LOS for patients with no co-morbidities and an ISS>15 was 19 days while for those with co-morbidities it was 24.5 days – an increase of 29%. This result is even more significant when we take into account the fact that none of the patients with an ISS>25 had a co-morbid condition. None of the patients had an ISS of 40 to 49. The number of patients was too small for statistical analysis in this small, pilot study.

Discussion
In this pilot study, the prevalence of co-morbidities was 14.7%. In other studies the prevalence ranged from 8.8-19%. Morris et al1 reported a figure of 8.8% for the prevalence of co-morbidities as defined by them – a list that closely resembles our definition (cirrhosis, coagulopathy, COPD, IHD and diabetes). Possible reasons for discrepancies in the incidence of co-morbidities include differences in the patient population of Auckland and California, the use of patient discharge notes as the data source by Morris et al1 (mentioned in their paper as a possible limitation due to the under-reporting of co-morbid conditions) compared with a direct interview in this study, and the smaller number of patients in the present study.

The trend of increasing co-morbidities with age was apparent also in other studies.1,3,5,6 A study by Mackenzie et al6 reported that 36% of their patients aged over 55 years had a pre-existing condition. Morris et al1 noted that nearly 25% of their patients aged 65 years or over had one of their five pre-existing conditions. Our study found no co-morbidity in patients under 40 years which confirms data from Milzman et al1 which showed 71.9% of their patients with no co-morbidities were younger than 35 years.

Mackenzie et al1 analysed the effect of co-morbidity, age and ISS on LOS (one marker of outcome). They found that the higher the ISS, the greater the effect of a co-morbidity on the LOS and that the length of stay increased with increasing ISS score. Our findings also show that the higher the ISS, the longer the stay and the greater the effect of a co-morbid condition. For an ISS >15, we found a 29% increase in the LOS if co-morbid conditions were present. Mackenzie et al6 reported that patients aged 55 and older who had one or more co-morbid condition stayed on average 30% longer than those without such conditions.

A larger study is required to analyse further the effects of co-morbidities in trauma patients presenting to Auckland Hospital. Such a study may allow calculation of a coefficient to modify the ISS that might better predict the LOS and outcome.

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Pilot study comparing the accuracy of lymphoscintigraphy sentinel lymph node localisation with axillary node dissection in women with operable breast cancer

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Abstract
Aim. To evaluate the use of lymphoscintigraphy sentinel lymph node mapping with scintillation gamma probe detection and blue dye assisted sentinel lymph node biopsy in patients with invasive breast cancer. To compare the lymph nodes detected lymphoscintigraphically and at surgery for invasive breast cancer and the accuracy of sentinel node prediction of axillary status.

Methods. A prospective pilot study was performed on 36 women diagnosed with invasive breast cancer requiring axillary node dissection. Lymphoscintigraphy involving peritumoral injection of 99mTechnetium antimony sulphide or rhenium sulphur colloid was performed prior to surgery. Sentinel lymph node biopsy was then performed using gamma probe and blue dye localisation.

Results. Sentinel lymph nodes were identified on lymphoscintigrams in 100% of cases, and sentinel nodes located surgically in 34/36 (94.4%) of patients. All women with positive axillary lymph nodes on axillary dissection were correctly identified on sentinel node biopsy. Eight patients demonstrated internal mammary (IM) node radiocolloid uptake, one returning positive IM histology in the presence of positive axillary sentinel node metastasis.

Conclusion. A high proportion of sentinel nodes were demonstrated by lymphoscintigraphy and were subsequently removed surgically. When internal mammary nodes are identified surgical removal should be considered. In this small series sentinel lymph node status correctly predicted axillary node status in 100% of patients for whom sentinel nodes were retrieved supporting the concept of sentinel node biopsy only for women with normal sentinel lymph nodes. Evidence from randomised trials that sentinel node based management does not compromise regional control of breast cancer or survival, is awaited.

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Current standard surgical treatment for invasive breast cancer is to perform an axillary node dissection (AND) in addition to mastectomy or wide local excision. Histological assessment of excised lymph nodes may influence further adjuvant treatment and remains the single most important prognostic indicator. The morbidity of axillary dissection may include haematoma, infection, vascular injury, arm lymphoedema, numbness, neuralgia and restricted shoulder movement, as well as prolonged hospital stay. The incidence of lymphoedema is related to the extent of dissection. Axillary node dissection may account for a higher rate of morbidity than surgical treatment of the primary breast tumour.

When regional nodes are pathologically involved, AND is indicated to minimise local recurrence, and some evidence supports a survival advantage. Surgical axillary lymph node clearance may be unnecessary in women for whom subsequent lymph node histology proves negative.

Sentinel node biopsy (SNB) entails visualisation and identification of the first (sentinel) lymph node or nodes on a direct lymphatic drainage pathway from the primary tumour. The sentinel node is the node thought to be at greatest risk of harbouring metastatic disease and its status can assist in determining the status of the regional lymphatic basin. Sentinel lymph nodes (SLN) may be identified by lymphoscintigraphy and gamma probe, blue dye method or both. A number of studies have demonstrated improved detection accuracy using lymphoscintigraphy compared with blue dye mapping alone. Use of both techniques has been advocated as the method of choice and early studies indicate that sentinel node biopsy accurately predicts axillary status in most cases. The techniques used vary from centre to centre with numerous factors such as the tracer properties, injection method, injection volume, surgeon experience, tumour location within the breast, and tumour size remaining to be fully investigated. In addition, although numerous studies have compared the pathological results of SNB with AND, randomised trials comparing outcomes for women with SNB based treatment versus AND are just commencing.

This study compared the lymph nodes detected lymphoscintigraphically and at surgery with combined blue dye SLN mapping and an intra-operative gamma probe in patients with invasive breast cancer, and compared the accuracy of sentinel lymph node status prediction of axillary node status.

Methods

Women with cytological or histological confirmation of operable invasive breast cancer in whom axillary node staging or dissection was required as part of their standard breast cancer treatment, and where it was logistically feasible to perform preoperative lymphoscintigraphy between August 1998 and March 2000, were invited to participate. Women with previous carcinoma in the ipsilateral breast, previous axillary surgery or radiotherapy, or those with previous major breast surgery or breast radiotherapy, were excluded. Women over 70 years of age with no palpable axillary nodes were not invited because of a conflicting study protocol. Thirty-six women met the inclusion criteria and consented to the study. With Waikato Ethical Committee approval all patients gave written informed consent.

Lymphoscintigraphy. Two tracers with an activity of 20-55 MBq were utilised, 99mTc antimony sulphide (Radiopharmacy Unit, Royal Adelaide Hospital, South Australia) or reduced heating preparation (unfiltered rhenium sulphur colloid, Nanocis CIS bio international France). Four samples of antimony sulphide each of 0.4 mL were injected concentrically around the lesion, and at tumour depth, as described by Uren et al. A similar injection method was adopted for the sulphur colloid consisting of 4, 0.8 mL injection volumes as reported by Cox et al. Patients with non-palpable lesions were either injected under ultrasound guidance or at the time of breast hookwire (1). Patients performed gentle injection site massage for ten minutes post-injection to promote lymphatic dispersion. Imaging was commenced immediately post-injection to 800K counts, generally completed within three hours post injection.

Patients were scanned in the supine position with a 25° tilt toward the contra lateral breast to move the breast away from the ipsilateral axilla and with the arm extended to simulate the operative position. Two anterior and anterior oblique images (Figure 1a) were acquired, one using a Cobalt-57 transmission source to provide a body outline, and another without the transmission source to ensure no low activity lymph nodes were obscured by the transmission source activity. A direct lateral view (Figure 1b) with the patient’s arm above their head was then performed to determine nodal depth and identify any nodes not demonstrated on the other views. The sentinel lymph node(s), once located were marked on the patient’s skin in both the anterior and lateral planes using a dermatological pen to assist the surgeon.

Operative method. Surgery was performed 4-22 hours post injection in theatre under general anaesthesia. All 36 patients underwent peritumoural injection with 2.0 mL of Patent Blue Dye (Rhone Poulenc Rorer) diluted to 4.0 mL with normal saline followed by injection site massaging for 5-8 minutes prior to skin incision. For non-palpable lesions blue dye was injected adjacent to the hookwire or skin marker. The surgeon explored the axillary basin visually and with a hand held gamma probe, [the Navigator (United States Surgical Corporation, Norwalk Connecticut, USA) or Gammasonics probe (Gammasonics Ltd, Five Dock, Sydney Australia)] identifying blue and/or ‘hot’ lymphatic channels and lymph nodes. Once the sentinel node was removed the node and background counts were recorded, the axilla was re-examined visually and with the gamma probe for residual radioactivity. All patients proceeded to formal axillary dissection.

Pathology. All nodes less than 5 mm in diameter were embedded whole in paraffin. Nodes ≥5 mm diameter were sectioned into 3-4 mm slices and embedded. The blocks were sectioned in 3 micron slices and stained with haematoxylin and eosin (H&E). If these sections were positive for metastatic breast carcinoma, nothing further was done. If the initial H&E section was negative a further two levels were examined, and broad-spectrum cytokeratin stain (AE1/AE3 – DAKO, 1:50 dilution) undertaken. This stain was performed using an enzyme technique to expose the epitope.

Results

Ages of the 36 patients ranged from 30 to 82 years. Axillary sentinel lymph nodes were identified on all patient lymphoscintigrams (100%), with between 1 and 4 axillary sentinel lymph nodes (median=2) identified lymphoscintigraphically. Tumours ranged in diameter from < 5 mm to > 50 mm (mean 23, SD 13.6 mm). The surgical lymph node retrieval rate for lymphoscintigraphy was 91.7% (33/36). Combined lymphoscintigraphy and blue dye mapping resulted in 34 patients (94.4%) with surgically located sentinel nodes (Figure 2). In two patients, sentinel lymph nodes could not be located with either the gamma probe or patent blue dye rendering sentinel lymph node dissection unsuccessful. Both these patients were investigated early in the learning phase of the study, after a delay of 18 and 22 hours between injection and surgery, and with injection sites in close proximity to the detected nodes rendering gamma probe spatial separation (between the injection site and lymph nodes) difficult. For one patient with a 50 mm grade III tumour, the sentinel nodes were identified because they were blue only. Two patients had sentinel lymph nodes that were radioactive only.
Seventeen of the 34 patients (50%) whose sentinel lymph nodes were retrieved were sentinel node positive on histopathology, with fifteen (44.1%) of these patients sentinel node positive on H&E only and two positive on cytokeratin staining only. All seventeen of 34 patients (50%) who had negative axillary sentinel nodes on histology were also clear on axillary dissection. No patient demonstrated disease-free axillary sentinel lymph nodes in the presence of metastatically involved non-sentinel lymph nodes. 46 of 78 (59%) sentinel nodes harboured metastasis. Of the remaining 631 non-sentinel nodes examined, 111 (17.6%) were positive. Ten of seventeen patients (58.8%) had positive sentinel and non-sentinel lymph nodes. In seven of seventeen (41.1%), the sentinel node was the only positive node. The number of sentinel lymph nodes dissected ranged from 1-4 (median=2) and the number of non-sentinel nodes ranged from 7-43. In eight patients ten internal mammary nodes were mapped lymphoscintigraphically and retrieved surgically. One of these nodes returned positive IM histology and also had positive axillary node metastasis. In this limited series, the sentinel lymph node status predicted axillary node status in 100% of patients.

**Discussion**

The optimal protocol for the detection of sentinel lymph nodes using radiotracers is contentious, with a number of factors influencing the success rate including tracer particle size, injection sites, volumes, previous biopsy and scanning techniques. We selected peritumoral injection over intradermal or intratumoral methods since the latter have a lower success rate. Furthermore, anatomically peritumoral lymphatic drainage would seem more likely to reflect cancer drainage than the overlying dermis which may sometimes be some distance from the tumour. Experience with melanoma studies suggests the intradermal technique may underestimate the lymphatic drainage patterns.17

Experience in this pilot study indicates that combined lymphoscintigraphy gamma probe and blue dye localisation result in a high identification rate of SLN’s. The 94.4% of women with sentinel nodes successfully retrieved surgically in this study is similar to that of other studies.18-20 This study, like others, demonstrates a learning curve for the technique. The two cases where the sentinel node was not retrieved using the gamma probe were undertaken in the learning stage of the study. Both the close proximity of the injection site to the sentinel node and the long time delay between injection and surgery with resulting reduced radioactivity in the sentinel node likely contributed to the difficulty finding the node. One patient had undergone excisional biopsy prior to lymphoscintigraphy and lymph node dissection, with radiotracer injected at the margins of the cavity. In this patient three lower axillary, two upper axillary and one internal mammary node were imaged.

Since this experience we have used a higher injected radiotracer activity for cases being performed the following day. We have also taken extra care with depth of injection. It is easy both with the radiotracer and blue dye to inject into the retro glandular tissue in the breast where the injectate spreads easily over a greater area across the pectoral fascia rendering separation of sentinel node radioactivity from injection site activity, difficult.

The patient in whom the sentinel node was stained blue only had a tumour diameter of 65 mm. Bembenek et al reported the accuracy of SNB in the prediction of the nodal status changed with the tumour diameter from 100% for tumours <1 cm, 97% 1-3 cm, 88% 3-5 cm, to 67% in tumours >5 cm. It has been suggested that lymphoscintigraphy may fail to identify the sentinel nodes if these nodes are grossly involved with tumour, thereby blocking tracer flow. For this reason SNB-based management of the axilla may not be appropriate for women with larger breast tumours or clinically involved axillary nodes.

Radiotracer selection and injected volumes are important factors in breast lymphatic mapping. Uren et al22 reported a preference for antimony sulphide (particle size ~ 20 mm) based on the rapid lymph flow clearance properties. De Cicco et al23 concluded that larger particle sizes (between 200 mm and 1000 mm) demonstrated fewer smaller lymph nodes and longer sentinel lymph node retention. Suggested injection volumes range from individual divided doses of 0.2 mL up to 2.0 mL, with a total volume of up to 8.0 mL.24 With the smaller particle 99mTechnetium labelled antimony trisulphide we used small injection volumes, but with sulphur colloid injections, a larger volume which demonstrated sentinel lymph nodes lymphoscintigraphically on all 36 patients. Given the interest in sentinel node tracer kinetics, we have commenced a clinical trial comparing antimony sulphide and rhenium sulphur colloid in breast cancer sentinel node localisation. Good teamwork and communication between nuclear medicine personnel and the surgeon is essential for ensuring a high rate of sentinel node retrieval. The patient needs to be scanned in the same position as for surgery and cutaneous skin marks applied at the time of lymphoscintigraphy are very helpful as a surgical guide.

In this series sentinel node biopsy was 100% accurate in predicting the status of the axilla, though we have since had one patient who was SLN negative but positive for other axillary nodes. These findings compare well with the world literature.25 In a recent meta-analysis the true false negative rate for axillary sentinel node biopsy (ie the number of patients who have positive axillary nodes on axillary dissection that are not detected by sentinel node biopsy) is in the order of 5%.26 Several learning curve studies have false negative rates of 11%-12.5%.26 It is important that surgeons include enough node positive cases in their learning curve for this technique with ensuing axillary node dissection to ensure they have a false negative rate of this order or less. To miss a positive axillary lymph node may have serious repercussions. Not only does axillary node positivity remain the single most important prognostic indicator, it may also be the factor that points to the need for adjuvant systemic chemotherapy. Non-removal of a positive lymph node can lead to local or regional recurrence. A false negative sentinel node biopsy may therefore jeopardise a woman’s long-term...
chances of cure and disease free survival. The Royal Australasian College of Surgeons (RACS) workshop held in Adelaide November 1998 recommended that each surgeon validate their technique on at least 30 cases with subsequent axillary node dissection in the hope that at least ten lymph node positive cases will have been operated on and shown to be correctly predicted by sentinel node biopsy.28 Internationally, a variety of randomised trials are underway to assess the future role of SNB-based axillary management of breast cancer compared with standard AND. In the RACS Sentinel Node Axillary Clearance (SNAC) and British Axillary Lymphatic Mapping against Nodal Axillary Clearance (ALMANAC) studies, women are randomised to have standard axillary dissection or sentinel node biopsy. Women in the SNB arm have no further surgery if SNB negative. If positive they require an axillary dissection.

We conclude from this small series that it is possible to approximate results from large overseas centres with high rates of identification and retrieval of sentinel nodes and accurate prediction of axillary nodal status using combined lymphoscintigraphy gamma probe and blue dye sentinel node techniques. Experience is necessary to achieve these results which lend some support to the view that the technique is not suitable for larger tumours. As departments of nuclear medicine and surgery gain more experience and techniques are refined, the prospect for SNB to replace AND for many women looks promising. It is important that SNB does not become market driven, as is occurring in the USA and now in New Zealand. Results of randomised trials are needed to ensure that the false negative rate for SNB does not unduly jeopardise local control or even survival for some women.

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What can the Gisborne Inquiry teach us about population-based screening in New Zealand? The most important lesson is recognition of the ethical obligations that population-based screening entails.

Population-based screening, or mass screening, is a public health intervention. Public health practice and clinical practice share common ethical concerns, such as respect for autonomy, beneficence (doing good), non-maleficence (avoiding harm), and justice.1 Because of their focus on the health of entire groups or populations, public health interventions must consider utility, or how to achieve the greatest good for the greatest number. Population-based screening raises particular ethical issues that make it unique even among public health interventions however:

“We believe that there is an ethical difference between everyday medical practice and screening. If a patient asks a medical practitioner for help, the doctor does the best he [or she] can. He [or she] is not responsible for defects in medical knowledge. If, however, the practitioner initiates screening procedures he [or she] is in a very different situation. He [or she] should, in our view, have conclusive evidence that screening can alter the natural balance of the disease and a significant proportion of those screened.”

Those who seek advice and help from the health system, usually do so because they are unwell. Aside from the usual commitment of health professionals to do their best for an individual patient, no prediction of a good outcome can be given in advance. In contrast, those who take part in population-based screening programmes are well, and participate because they have been invited to, on the understanding that the programme can offer a benefit. Clearly, once this invitation is issued, there is an ethical obligation for those who establish and maintain the programme to ensure that it can deliver the benefit claimed. This benefit cannot be assumed, as a poorly run programme may not deliver the expected benefit. Thus, it is unethical to offer screening if the screening programme is not appropriately organised and monitored.
By the time implementation of the New Zealand national cervical screening programme was announced in 1988, organised cervical screening programmes had existed in some countries for 20 years. By 1988 it had been recognised and reported that properly organised screening programmes have the greatest impact on cervical cancer incidence and mortality. Criteria for successful cervical screening programmes had been published in 1985 (Table 1). In 1988 the World Health Organisation (WHO) published technical guidelines for cytological screening in the control of cervical cancer which emphasised that screening should be seen as a public health intervention, and for it to be effective, programmes should be well organised. The WHO guidelines included specifications for the collection, processing, and interpretation of smears, along with recommendations for diagnosis, treatment and follow-up, and the associated workforce requirements. Common faults in screening programmes were identified once again, and included unclear goals, lack of adequate long-term commitment and financial support, inadequate long-term integrated planning and organisation, and lack of clear assignment of responsibility.9

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<th>Table 1. The essential elements for a successful screening programme.10</th>
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<td>1. The target population has been identified.</td>
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<td>2. The individual women are identifiable.</td>
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<td>3. Measures are available to guarantee high coverage and attendance, such as a personal letter of invitation.</td>
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<td>4. There are adequate facilities for taking the smears and adequate laboratory facilities to examine them.</td>
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<td>5. There is an organised quality control programme on taking of the smears and on interpreting them.</td>
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<td>6. Adequate facilities must exist for diagnosis and for appropriate treatment of confirmed neoplastic lesions.</td>
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<td>7. There is a carefully designed and agreed referral system, an agreed link between the woman, the laboratory and the clinical facility for diagnosis of an abnormal screening test, for management of any abnormalities found and for providing information about normal screening tests.</td>
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<td>8. Evaluation and monitoring of the total programme is organised in terms of incidence and mortality rates among those attending, among those not attending, at the level of the total target population. Quality control of the epidemiological data should be established.</td>
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Despite the wealth of information available about the features required for successful cervical screening, the programme established in New Zealand did not meet published criteria. This was recognised at the time. In October 1989 in a leading article in this Journal, How not to organise a cervical screening programme, Professor David Skegg warned that “What we cannot afford is an expensive charade that ignores the lessons learned in other countries.” Shortly after this the British cervical screening programme came under scrutiny because, despite the introduction of screening in the 1960s, there had not been an appreciable effect on cervical cancer incidence and mortality, in contrast to countries with well organised screening programmes.11,12 The lack of benefit was attributed to deficiencies in the organisation of the British programme, and it was recommended that the cervical screening programme adopt clear guidelines supported by quantified standards and appropriate evaluation.12

What were the ethical implications of inviting New Zealand women to participate in a programme that did not meet the criteria for a successful cervical screening programme? The principle of non-maleficence or avoiding harm, is relevant. Unfortunately, all population-based screening programmes have the potential to do harm, as well as to provide benefit. Screening tests are not perfect. A screening test is used to divide people into two groups; those likely to have the disease being screened for (a positive screening result), and those unlikely to have the disease (negative screening result). Further investigations are required for those with positive screening tests, to find out whether they have the disease or not. Some people with positive tests are then found not to have disease (false positive). Sometimes people with negative tests may actually have the disease (false negative). Although women with true positive results can benefit from the screening programme, the women with false positive or false negative tests may be harmed. Those with false positive smears experience anxiety and sometimes further investigations, and those with false negative smears may be falsely reassured. The problem, and relevance of non-maleficence, is that only a small proportion of the thousands of women who take part in screening will actually benefit from screening (because most women screened do not have the disease). But any harm associated with screening has the potential to affect a larger number of women.

Screening tests such as cervical cytology and mammography are difficult to interpret. It is often difficult to identify abnormalities, and if the threshold for calling a test positive is lowered in an effort to miss fewer abnormalities, this is often at the expense of many more women receiving false positive results. Although it is impossible to completely avoid false positive and negative tests, given the subjective nature of interpreting these screening tests and the possibility of human error, appropriate training and quality control can minimise the number of false positive and negative tests.13,14 Population-based cervical screening is more than just a screening test though. For the programme to be successful, every aspect of the programme, from identification and invitation of eligible women, through taking smears, preparing cytology slides, interpreting the slides, reporting the results, referral for assessment and treatment where required, to recall for re-screening must be performed to the highest standard. The best way to ensure that a screening programme is beneficial and minimise the risks of harm from screening is to ensure that the programme is properly organised and appropriately monitored.13,14 One of the accepted ways to monitor the programme is to examine the screening histories of women who have developed invasive cervical cancer. It may then be possible to identify deficiencies in the screening programme. By remedying these deficiencies, the programme can be improved, and the risk of subsequent harm to women taking part can be reduced. In countries where this type of monitoring has been undertaken, the largest category of women to be diagnosed with invasive or fatal cervical cancer is those who have never been screened. The next largest category is women whose abnormal smears were not adequately followed up, then women with a long interval between smears, and finally women with false negative smears.15 As a result of such monitoring of screening programmes in other countries, efforts have been directed to improving identification and invitation processes, creating fail-safe follow-up and recall systems, and implementing quality control in laboratories.

To monitor the cervical screening programme properly, it is important to review the screening histories of all women who developed invasive cervical cancer. In order to respect the autonomy of these women, it may seem imperative to seek their informed consent to review their medical records. It may appear unethical not to seek informed consent from all the women, however requiring their informed consent may not be in the best interests of the thousands of other women participating in the
cervical screening programme. There are many reasons that informed consent might be unobtainable. It may not be possible to trace some women, others might not reply to letters or telephone calls, and some may have decided not to be screened (or declined follow-up when it was offered) and may fear that they will be ‘blamed’ for their subsequent illness. If the screening histories of these women are not included, only a partial understanding of the reasons contributing to the development of invasive cervical cancer in the population will be possible. The group of women from whom it is possible to obtain informed consent may not be representative of the group. Thus the review of screening histories could be biased, and the relative importance of deficiencies in the screening programme may be obscured. It should be emphasised that a review of screening histories does not imply any loss of confidentiality. Such reviews are carried out by health professionals with due regard to confidentiality, and individual women are not identified in any reports arising from the audit.

In New Zealand, concerns on the part of ethics committees, and the interpretation of privacy legislation by the Ministry of Health prevented a national audit of this type in relation to the national screening programme. Similarly, considerations of privacy mean that there is no record of women who decline an invitation to participate in the national breast screening programme, BreastScreen Aotearoa. Where participation rates in BreastScreen Aotearoa are lower than expected it will be impossible to determine whether this is because women have declined to take part, or because the programme has failed to identify and invite eligible women. The latter possibility has ethical implications, not only with respect to monitoring the programme, but also in relation to equity of access. Reports from the BreastScreen Aotearoa Independent Monitoring Group have already shown lower participation rates among Maori and Pacific women.10 Thus, one of the most important criteria for population-based screening has not been met, despite several letters to the previous and present Ministers of Health.

In must be recognised that in order to protect and promote the health of those who participate, screening programmes will have an impact on individual autonomy. In this respect, screening is similar to other public health practices that aim to protect and promote the health of populations. For example, in communicable disease control, it is accepted that details about people with infectious diseases are notified to the Medical Officer of Health, in order to protect the population from epidemics. It is even accepted that an individual’s autonomy can be restricted to the extent that the person’s liberty is curtailed (for instance an HIV positive individual who is unable or unwilling to practice safe sex, or a patient with tuberculosis who refuses medication) in order to protect the wider population.

In New Zealand, there is considerable inconsistency in the requirement (or otherwise) for consent to disclose information. For example, information about individuals is transferred in the Inland Revenue Department and Work and Income New Zealand, without consent, in order to protect the New Zealand taxpayer from misuse of public funds. Information held on owners of registered motor vehicles can be accessed by the police, without consent for disclosure, in order to maintain law and order. Interestingly, private individuals may also access information on vehicle ownership, without the knowledge or consent of the owner of the vehicle. Information held by credit agencies about individuals is also routinely disclosed without their consent, in order to protect commercial interests. In none of these examples are the stakes necessarily as great as the potential for harm resulting from a poorly monitored screening programme, but disclosure of information without consent is accepted.

Disclosure of medical information without consent also occurs in New Zealand. Hospitals are allowed to provide patients’ medical records without obtaining informed consent, if this is for the purpose of audit.

Normally, ethics committee approval is not required for the use of health information for monitoring or internal audit undertaken by staff involved in the institution or service.17 Population-based screening programmes must be audited in order to protect those who participate. These programmes should not be undertaken unless there is acceptance of the ethical obligation to monitor them appropriately. Perhaps this is a choice to be made; if we wish to have population-based screening, we accept the ethical obligation to monitor screening properly, including appropriate disclosure of information, or if considerations of privacy are paramount, we accept that this precludes the establishment of screening programmes in New Zealand.

Finally, the report of the ministerial inquiry states that recommending compensation for the women affected by the unacceptable level of under-reporting at Gisborne “would mean that the women affected were treated differently from other persons who have suffered a personal injury either by accident or by criminal mischief that . . .” and that “It is difficult to see any reason why in principle the women affected by the unacceptable level of under-reporting at Gisborne should be treated differently . . .” 18 This is difficult to understand; these women are in a different situation already, since in a population-based screening programme the initial contact is made by the health system, not the women, on the understanding that screening is beneficial. These women were invited to participate in a screening programme that did not meet internationally accepted criteria for success. But only programmes that meet accepted standards can be expected to deliver the anticipated benefit. No amount of money can restore the health of these women or their trust, but compensation is important because it is a public acknowledgement that a wrong has been done. We have seen that there is a price to pay for screening programmes that do not meet internationally accepted criteria for success. Compensation would ensure that the women involved do not pay this price alone.

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Insulin resistance and type 2 diabetes: time for a new hypothesis

RS Stubbs, Gastro-Intestinal Surgeon; SK Wickremesekera, Research Fellow, Wakefield Gastroenterology Centre, Wakefield Hospital, Wellington.


Non insulin dependent, (NIDDM) or Type 2 diabetes accounts for approximately 85% of all cases of diabetes. It is a heterogeneous disorder thought to be caused by defects in insulin secretion and action leading, to what has been termed ‘insulin resistance’.1 While the site and mechanism of insulin resistance is poorly understood both genetic and acquired factors are thought to be involved.

The three major targets of insulin action are liver, skeletal muscle and fat. It is thought that insulin resistance in the liver plays an important role in fasting hyperglycaemia by increasing hepatic glucose production or gluconeogenesis.2 Skeletal muscle on the other hand accounts for 75% of glucose disposal and insulin resistance at this site is thought to be important in the pathogenesis of post-prandial hyperglycaemia.3 A causal relationship between obesity and insulin resistance is suggested by the fact that 70-80% of those with NIDDM are obese4 and insulin resistance increases with weight gain and decreases with weight loss.5 It has been postulated that a messenger produced or released by an increased fat cell mass interferes with insulin action leading to insulin resistance. The possible mechanisms are not well understood.

A number of factors have been suggested and investigated as putative mediators of insulin resistance.1 These include free fatty acids, leptin, tumour necrosis factor (TNFα), and a variety of hormones including amylin. Free fatty acids are presently favoured as the major player in insulin resistance.4 Levels are elevated in the obese and are thought to relate to increased release from an expanded fat cell mass, abnormal fat distribution particularly abdominal obesity6 or primary insulin resistance in adipose tissue.7 Infusions of a mix of lipid and heparin in humans, resulting in raised serum free fatty acids have been shown to affect insulin sensitivity in two ways.8 Firstly, inhibition of insulin stimulated glucose uptake occurs within four hours of the infusion and is thought to relate to increased uptake and intracellular oxidation of fatty acids.9 Secondly, there follows a late effect which is achieved by inhibition of glycogen synthase activity in muscle.

Leptin, an adipocyte-derived cytokine concerned with energy homeostasis,2 is the gene product of the ob gene initially isolated in mice10 and is exclusively synthesised in adipose tissue. Serum leptin levels rise with increasing fat cell mass11 and are influenced by both the number and size of adipocytes.12 Leptin has three known metabolic actions. It decreases food intake,13 it increases thermogenesis and metabolic rate14 and it modulates insulin action on fat and liver cells. Studies in which isolated rat adipocytes were incubated with increasing concentrations of leptin and subsequently stimulated by insulin showed that at higher levels of leptin there was a significant decrease in insulin stimulated glucose transport, glycogen synthesis, protein synthesis and lipogenesis.15 Other studies investigating human hepatocytes demonstrate that, when these cells are exposed to leptin, there is both an insulin like agonist and antagonist effect.9 It is therefore evident that leptin has variable effects on insulin action.

TNFα is a pro-inflammatory cytokine with diverse immunological functions. Interestingly, it is synthesised and secreted by adipocytes and is elevated in the obese state,16,17 as indicated by increased levels of TNFα mRNA within the adipocytes of obese individuals. TNFα decreases insulin-mediated glucose transport and receptor phosphorylation in fat and muscle1,17 resulting in decreased peripheral glucose utilisation. Furthermore studies in obese rodents in which TNFα is neutralised by a TNF receptor fusion protein,16 reveal a two to three fold increase in peripheral glucose uptake suggesting improved insulin sensitivity.18 Such an effect may be achieved by a paracrine and/or endocrine mechanism.

A number of gut hormones play a role in glucose metabolism and homeostasis. Pancreatic glucagon causes glycogen breakdown and glucose release and thus promotes gluconeogenesis in the liver.19 Glucose-dependent insulinotropic peptide (GIP) previously known as gastric inhibitory peptide, and glucagon like peptide-1 (GLP-1) or enteroglucagon are collectively known as ‘incretins’ because they are produced in the gut and increase the secretion of insulin, and are part of what is referred to as the “entero-insular axis”20. GIP, secreted by cells in the proximal small intestine, increases insulin secretion and inhibits gastric emptying and gastric acid secretion. GLP-1 is secreted by cells in the distal small intestine and may exert a more important effect.20 It has been shown in both animal and human studies to increase insulin secretion, decrease pancreatic glucagon secretion, and to inhibit gastric emptying. Intravenously administered GLP-1 has been shown to control blood glucose in patients with Type 2 diabetes22 and Exendin, a GLP-1 analogue, is currently being assessed in patients with Type 2 diabetes in phase 3 trials.23

Amylin, a 37 amino acid peptide, co-secreted with insulin from pancreatic β islet cells appears also to be involved with glucose metabolism.24 Animal studies demonstrated that amylin potently inhibits glucagon secretion and gastric emptying thereby modulating plasma glucose levels and aiding maintenance of glucose homeostasis.23 It has been shown to be deficient in patients with Type 1 diabetes and those with Type 2 diabetes using insulin.25 Clinical studies using the human amylin analogue, pramlintide in diabetic patients improves glycaemic control, but is more effective in Type 1 diabetes than Type 2.26

It is apparent that Type 2 diabetes is a complex disease and the contribution to its expression of the aforementioned factors and perhaps others, requires further elucidation. We and others have noted that Type 2 diabetes in severely obese individuals is almost always resolved by obesity surgery and the gastric bypass operation in particular.20,29 Our own experience is of 39 patients with Type 2 diabetes, only three of whom remain diabetic after gastric bypass. What is more, gastric bypass surgery has recently been shown to confer a clear survival advantage on those with Type 2 diabetes.30 Of those with ‘morbid obesity (BMI >40) some 25% suffer from Type 2 diabetes and a further 10% have glucose intolerance.28 This is but one manifestation of the underlying insulin resistance that is probably universal in the severely obese. If such patients undergo gastric bypass there is an immediate resolution of diabetes in 90-95% of instances within 7-10 days of
surgery. While intuitively it may seem that this effect is related to either diminished caloric intake or malabsorption, this is not likely to be the case. Rather it is highly suggestive of loss of insulin resistance ahead of expected weight loss. While reduced caloric intake may well play a part in the overall improvement of glucose metabolism, the effect is observed remarkably rapidly. It has been demonstrated that these patients have a normal oral glucose tolerance test postoperatively, and an intravenous glucose tolerance test (IVGTT) which is greatly improved. Interestingly, when an IVGTT is performed postoperatively, the basal fasting insulin and stimulated insulin levels are markedly reduced compared with pre-operative levels, yet with similar or improved glucose control, (Stubbs and Wicks unpublished data). This is indicative of reduced insulin resistance or improved insulin sensitivity.

From these data it may be hypothesised that the upper gastrointestinal tract plays an important role in the phenomenon of insulin resistance and that there is likely to be a humoral factor mediating the effect. Serendipity may have played her hand again. Study of obese, diabetic patients undergoing gastric bypass surgery may well unlock the secrets of insulin resistance. We are presently engaged in such a study at a clinical, biochemical and cellular level and may as a result have the opportunity to challenge the current paradigm of insulin resistance.

Correspondence. Mr RS Stubbs, Wakefield Gastroenterology Centre, Wakefield Hospital, Wellington.

Music tunes up memory in dementia patients
Autobiographical recall in patients with dementia improves significantly when music is playing, say researchers from Royal Holloway, University of London, UK. “We’re excited because it’s not just sound per se that helps; music has a greater facilitatory effect than either quiet or background noise”, reported Elizabeth Valentine at the British Psychological Society’s London Conference (Dec 20, 2000). Valentine and colleague Nicholas Foster examined recall of personal facts in 23 older adults with mild-to-moderate dementia. Participants were tested in each of four auditory background conditions presented randomly, one week apart: quiet, cafeteria noise, familiar music (first movement of Vivaldi’s “The Four Seasons”), and novel music (Fitkin’s “Hook”). Questions were drawn from three life eras: remote (up to age 20; for example, where were you born?); medium-remote (approximately ages 20-50; for example, have you ever been married?); and recent past and present (for example, where do you live now?).

28. Insulin resistance. We are presently engaged in such a study undergoing gastric bypass surgery may well unlock the secrets of a humoral factor mediating the effect. Serendipity may have played her hand again. Study of obese, diabetic patients undergoing gastric bypass surgery may well unlock the secrets of insulin resistance. We are presently engaged in such a study at a clinical, biochemical and cellular level and may as a result have the opportunity to challenge the current paradigm of insulin resistance.

Hamster health care
Across the globe doctors are miserable because they feel like hamsters on a treadmill. They must run faster just to stand still. In underdoctored Britain Hamster health care

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Performance was significantly better with sound (mean percentage recall, 67%) compared with quiet (61%), and with music (68%) compared with cafeteria noise (66%). There was no difference between familiar and novel music; recall for both was about 68%.

“Music should be played when physicians are interviewing or attempting to get information from patients with dementia and should also be tried in combination with other treatments for dementia management”, concludes Valentine.


Hamster health care
Across the globe doctors are miserable because they feel like hamsters on a treadmill. They must run faster just to stand still. In underdoctored Britain doctors must see ever more patients, fill in more forms, and sit on more committees just to keep the NHS afloat. In the government sponsored, single payer a formal fee for service system, salaried practice, or in systems where doctors are paid a certain amount for each patient each year, doctors have been brought under increasing pressure as they try to provide better care, and they are caught between stingy payers and patients with high expectations.

A nurse-run hospital clinic can successfully lower lipid levels in patients with ischaemic heart disease. W Benjamín, J Elliott, K Gilbert, GD Gamble, C J Ellis. Department of Medicine, Auckland Hospital, Auckland.

Patients with ischaemic heart disease should achieve a total cholesterol (TC) level of <5 mmol/L (Heart Foundation Guidelines) or ideally <4 mmol/L, applying recent trial data. However, previous studies have shown that this is rarely achieved. We studied 44 patients with chronic stable angina enrolled for a multinational trial from January to September 1998. At entry, patients were on standard community care for lipid control. We set TC targets of <5 mmol/L, ideally <4 mmol/L, for a nurse-run, cardiologist-supported clinic.

The patients (range 49-83, 73% male), with 59% having a history of myocardial infarction, 39% coronary angioplasty and 32% coronary surgery. The mean TC at baseline was 5.13 mmol/L (95% CI 4.85-5.41). 24 patients (55%) had TC >5 and 4 patients (9%) >4 mmol/L. TC was checked at least 6-monthly.

At baseline, 34 patients (77%) were on lipid-lowering therapy (14 fibrates, 1 fibrate + acipimox, and 19 statins). Of the 10 patients not on lipid-lowering, 5 did not qualify for the previous PHARMAC statin subsidy (TC >5 mmol/L). At follow-up (mean 18 months, range 12-24), TC was significantly reduced to 4.1 mmol/L (95% CI of change -1.39 to -0.76, p<0.0001). 42/44 patients had TC <5 mmol/L (93% <5 mmol/L; 49% <4 mmol/L). 95% of patients were on lipid-lowering therapy (1 fibrate, 1 statin + fibrate, 40 statins).

In conclusion, a hospital-based, nurse-run clinic using simple lipid targets can successfully improve the uptake of lipid medication and reduce lipid levels in patients with ischaemic heart disease. This finding may have implications for the delivery of good secondary prevention for patients with ischaemic heart disease.

The rapid rise of elective angioplasty at Christchurch Hospital: integration within the Cardiology Day Unit. MG Hart, JM Sands, CM Hart, DW Smyth, JM Elliott. Department of Cardiology, Christchurch Hospital, Christchurch.

We have conducted a retrospective review of the growth in procedures performed in the Cardiology Day Unit during the last three years.

Our elective angioplasty (PTCA) service began in July 1998. In the first year (July 1998 to July 1999), 509 elective PTCA were performed (296 inpatients and 213 outpatients). In the 1999 calendar year, 601 elective PTCA were performed (352 inpatients and 249 outpatients). The monthly total of inpatient elective PTCA grew steadily from in July 1998 to a peak of 40 in December 1999. The monthly total of outpatient elective PTCA began at 5 in September 1998, peaking at 24 in May 1999. This resulted in a waiting list reduction from 223 in July 1998 to 23 in December 1999, and a fall in waiting time from 2-3 months. Between 35 and 54 direct PTCA for acute myocardial infarction have been performed each year since May 1995. Diagnostic angiography and electrophysiology procedures have increased steadily, thus total procedures have increased from 1885 in 1997 to 2524 in 1999. Staffing has increased from 8.8 in 1997 to 11.1 in 1999, with reorganisation of shifts for longer coverage.

The Angioseal produces direct arterial haemostasis by using an intra-arterial anchor and suture to pull a small collagen plug firmly against the anterior wall of the femoral artery. Potential advantages include reduced nursing time, less bleeding and earlier mobilisation and discharge. We report in-hospital outcomes and results of a questionnaire mailed to consecutive patients.

Between 1 November 1999 and 31 March 2000, 107 Angioseals were used, with 74.6 fr. and 33.8 fr. devices; 46 were deployed after angiography and 61 after angioplasty. Angiogram patients were mobilised 60-90 minutes after Angioseal stitch-cutting and 3 hours after hand-pressing. Bleeding was not controlled in 12 Angioseal patients: device kinked (n=2), device deployed but bleeding when delivery system removed (n=1), patient transferred to bed (n=2), stitch cut (n=3), no obvious reason (n=4). A second device was deployed successfully in one, and a normal sheath was returned in another. All patients who had an Angioseal successfully deployed were sent a questionnaire, with an 83% response rate. All but one patient preferred the Angioseal over hand-pressing. Reported complications in the 79 patients who returned questionnaires are shown in the table.

In summary, failure to control bleeding after Angioseal occurred in 11%. The Angioseal is certainly preferred by patients and enables earlier mobilisation, but bleeding and bruising still occur.


Direct current cardioversion (DCCV) is an established treatment for atrial fibrillation. Historically, this elective procedure has been performed in the cardiac care unit by doctors. We report our experience with DCCV patients managed by a nurse who monitors warfarin therapy, organises admission, cardioverts patients according to a specific protocol, coordinates outpatient clinic follow-up and discharges patients.

A retrospective review of DCCVs performed at Waikato Hospital was carried out over a one-year period from June 1998 to July 1999. 61 patients were admitted for elective DCCV, 37 male and 19 female, mean age 61 years (range 32-79). All had received anticoagulation for ≥3 weeks. The median INR at admission was 2.7 (range 1.8-5.2). 36 had a latest INR result between 2 and 3, and 5 had an INR of <2. Twenty had an INR of >3, the highest being 5.2. During this 12-month period, a protocol for the administration of shocks was developed, this being 200, 300, 360 x 2 joule synchronised DC shocks, all using anterior-posterior (AP) paddle placement. 51/62 (82%) were successfully cardioverted. Seventeen patients cardioverted at 200 joules, sixteen patients at 300 joules, one patient at 300 joules x 2, eight patients at 360 joules x 1 and five patients at 360 joules x 2. The complications were few. Minor complications occurred in five patients, including transient asystole (3), hypotension (1) and bronchospasm (1). Recommendations regarding medication changes as documented in the cardiologist referral letter were made with patients being discharged at two hours post-procedure. Ongoing management was arranged as per the cardiologist’s instructions.

We conclude that nurse-led elective cardioversion is safe. Placing a single person in charge of elective direct current cardioversion procedures has facilitated tight control of anticoagulation, and improved the efficiency of delivery of the service.

In-Stent thrombosis: analysis of the first 1000 coronary angioplasties at Christchurch Hospital. DS Barmby, JM Sands, PG Bridgman, JM Elliott, AM Richards, DW Smyth. Department of Cardiology, Christchurch Hospital.

In-stent thrombosis remains a potentially catastrophic complication following intracoronary stenting. We assessed the incidence, management and outcomes following treatment of in-stent thrombosis at Christchurch Hospital. Between May 1995 and February 1 2000, 1000 coronary angioplasty procedures were performed. At least one stent was implanted in each of 823 patients. The indications for stenting were acute infarction in 12.3%, unstable angina in 26.3%, chronic stable angina in 59%, and stable angina in 33.3%. The majority of patients received
ticiopidine or dipyridamole after stenting. As at April 1, stent thrombosis had been documented in 13 patients stented at Christchurch Hospital (3% of those treated for AMI, 1.1% of unstable angina and 1.5% of stable angina) and in six patients who had received a stent at another hospital. In-stent thrombosis occurred after a median delay of 13 days (range 8 hours to 177 days), with a mean delay of 29 days. 39% occurred within 7 days, 56% within 14 days, and 32% occurred after 28 days. Two patients received thrombolysis without resolution of symptoms. Coronary angiographic change in patients with successful recanalisation was achieved in 17 of 19 using angioplasty alone in 12, further stents in 4 and intracoronary thrombolysis in 1. 30-day mortality was 0%. This analysis suggests that urgent angiography should be considered in all patients re-presenting with rest pain or ST changes within 2 months. Mortality is low if normal flow is re-established.

Atrial fibrillation, stroke and anticoagulant use. C Jayaraman, R Fisher, G DeWlin and P Friedman. Departments of Cardiology and Rehabilitation Medicine, Waikato Hospital, Hamilton.

Atrial fibrillation is reduced by anticoagulant therapy in high-risk patients with atrial fibrillation (AF). Evidence, however, suggests that patients are undertreated. Our aim was to assess anticoagulant use in patients with ischaemic stroke and AF in Waikato Hospital.

A retrospective review was made of all patients admitted with stroke over a one-year period (1/1/99 to 31/12/99). Ischaemic stroke occurred in 189 patients. AF was noted in 21% (39/189) of this group. The majority (23/39, 59%) were female, mean age 79 years. Hypertension was present in 48% (18/39), diabetes in 15% (6/39) and past cerebrovascular events in 4 (1/39). Post-stroke, 15% (3/39) were anticoagulated. 15% (3/18) were not because of contraindications. The 17 patients who were anticoagulated were high-risk for embolic events. However, only 47% of this group (8/17) were on warfarin prior to the stroke. The mean INR in these patients, on admission, was subtherapeutic, 1.5 (range 1.2-2.5). The maximal INR achieved was high-risk features for embolic events, only commenced warfarin post-event.

We conclude that patient selection for anticoagulant use, following ischaemic stroke in the presence of atrial fibrillation, appears appropriate. A significant proportion of patients with atrial fibrillation and high-risk characteristics with no apparent contraindication to warfarin are not treated prior to the event. This may represent physician reluctance to anticoagulate elderly patients.

Prediction of frame counts 90 minutes after thrombolysis by myocardial protein levels at presentation. K Ramanathan, J K French, JT Stewart, HD White. Cardiology Department, Green Lane Hospital, Auckland.

Successful early restoration of Thrombolysis in Myocardial Infarction (TIMI) grade 3 flow, or a corrected TIMI frame count (CTFC) of <40, results in improved survival after acute myocardial infarction (AMI). We aimed to establish whether patients could be triaged at presentation to identify those who are unlikely to perfuse completely at 90 minutes. At 90 minutes) for AMI, we measured levels of troponin T, creatine kinase (CKMB (mass)) and myoglobin, using discrimination thresholds of ≤85 g/L respectively. We then determined whether incomplete reperfusion (CTFC <40) in patients at 90 minutes after admission. Thus patients who may benefit from further thrombolytic therapy can be predicted by CKMB (mass) and/or troponin T levels at admission. K Ramanathan, J K French, JT Stewart, HD White. Cardiology Department, Green Lane Hospital, Auckland.

Incomplete reperfusion (CTFC ≤40) in patients at 90 minutes after thrombolysis can be predicted by CKMB (mass) and/or troponin T levels at admission. Thus patients who may benefit from further thrombolysis can be predicted by CKMB (mass) and/or troponin T levels at admission. K Ramanathan, J K French, JT Stewart, HD White. Cardiology Department, Green Lane Hospital, Auckland.

Oestrogen attenuates post-infarction left ventricular remodelling. P Bridgman, M Forrester, H I Kramer. Department of Cardiology, Christchurch Hospital, Christchurch.

Oestrogen has powerful effects on the vasculature and numerous other tissues. We examined the effect of oestrogen on postinfarction left ventricular remodelling in a rat coronary artery ligation model.

Ventricularised rats were randomised to undergo either coronary artery ligation with or without oestrogen treatment. Both groups were then randomised to undergo coronary artery ligation at 6 weeks. The mean infarct size was 25.3% in the placebo-treated rats and 23.6% in the oestrogen-treated rats (p=NS). Follow-up invasive haemodynamic study found no difference in systemic pressures between the oestrogen- and placebo-treated rats. Both groups were anticoagulated. The mean infarct size was 22.7% in the placebo-treated rats (p=NS) and 23.1% in the oestrogen-treated rats (p=NS). Placebo-treated rats had a significantly greater increase in left ventricular mass than did oestrogen-treated rats (from 546 ± 20 mg to 671 ± 14 mg vs from 561 ± 25 mg to 617 ± 12 mg, p<0.05). Compared with control, high-dose ADM increased the heart rate and cardiac output. Adrenomedullin stimulated the sympathetic system and renin without a concurrent increase in aldosterone. Urinary parameters were unaltered.

Hypertension and cardiovascular events after myocardial infarction. AM Richards, MG Nicholls, TG Yandle, RW Troughton, J Turner. Cardiology Department, Christchurch Hospital, Christchurch.

As part of a study to compare neurohormonal status, ventricular remodelling and cardiovascular outcomes in hypertensive (HT) and non-hypertensive (NT) patients after myocardial infarction (MI), plasma neurohormones and radionuclide ventriculography were performed on patients (<65 NT) 1-4 days and 3-5 months after acute MI. Data were collected over 2 years follow-up. Early post-MI plasma ANP (402 ± 342 pmol/L), BNP (312 ± 7 ± 21 µg/L), NT-proBNP (192 ± 12 ± 68 pmol/L) and norepinephrine (2930 ± 113 ± 7596 pmol/kg/min) were studied in a placebo-controlled, cross-over design. Each patient received one placebo and one intervention dose of ADM (39 pmol/kg/min and 68 pmol/kg/min for 2 hours each) or vehicle (haemaccel) infusion on day 4 of a controlled metabolic diet (Na 80 mmol/day, K 100 mmol/day).

Plasma ADM reached pathophysiologically levels during infusion (18.8 ± 9 pL/mmol/L in low, 31.88 ± 9 pL/mmol/L in high-dose ADM), with a concurrent rise in plasma cAMP (+8 ± 4.12 pL/mmol/L with control; p<0.05). Compared with control, high-dose ADM increased the peak heart rate (+17 ± 8.23 bpm, p=0.01), and lowered the systolic (-24.6 ± 10.9 mm Hg; p<0.01) and diastolic blood pressure (-21.9 ± 14.4 mm Hg; p<0.01). Cardiooutput increased (+1.3 ± 1.7 L/min; p<0.001) and left ventricular stroke work index and high-dose ADM, p<0.01 for both). Despite a rise in plasma renin activity during high-dose ADM (p<0.05), aldosterone levels did not alter. Norepinephrine levels increased by +129 ± 222 pmol/L (p<0.001) and epinephrine by +7.4 ± 15 pmol/L (p<0.05) with high-dose ADM compared with control. ADM had no significant effect on urine volume and sodium excretion.

In subjects with essential hypertension, adrenomedullin infusion at pathophysiological levels produced significant falls in arterial pressure and increased the heart rate and cardiac output. Adrenomedullin stimulated the sympathetic system and renin without a concurrent increase in aldosterone. Urinary parameters were unaltered.

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The current study assessed long-term haemodynamics during omapatrilat treatment from an initial group of 45 omapatrilat naive patients (mean age 67.3 years, 41 male) with symptomatic heart failure (ejection fraction <40%, mean New York Heart Association class 2-4). Echocardiographic and digital annotation tonometry measurements were made at three-monthly intervals. The attrition of patients during the study period was mostly due to random assignment to treatment other than omapatrilat after three months of omapatrilat treatment (as per a multicentre protocol).

### Change in haemodynamic parameters compared with baseline

<table>
<thead>
<tr>
<th>HR</th>
<th>LVEF</th>
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*p<0.05, †p<0.001. bpm=bears per minute, HR=heart rate, LVEF=left ventricular ejection fraction, MAP=mean arterial blood pressure, SBP=systolic blood pressure.

These results indicate that omapatrilat has sustained beneficial effect on haemodynamics, including afterload, suggesting that the agent has a potentially important role in the treatment of chronic heart failure.

### Acute myocardial infarction and unstable angina, 1997-1999: has on-site elective angioplasty changed management?

We report our ongoing experience of 25 cases of percutaneous pacemaker (and ICD) lead extraction (PLE), using the Cook lead extraction kit. Between July 1997 and 31 December 1997 and from 1 October to 31 December 1998. We also reviewed the treatment of unstable angina (UA) in the last three months of 1997, 1998 and 1999 using the patient management system database. Baseline characteristics (age, sex, cardiac risk factors) of MI patients were identical except for prior angiography (54.8% in 1997 and 43.6% in 1998, p=0.02). Amongst those in whom thrombolysis was indicated and not contraindicated, more MI patients received thrombolysis in 1998 than in 1997 (74.4% vs 61.0%, p=0.038). Investigation and outcomes after MI are summarised in these tables:

### In-hospital management (predischarge) Discharge to 1 year

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<tr>
<td>Time to complete (days)</td>
<td>147</td>
<td>97</td>
<td>59</td>
</tr>
<tr>
<td>Stable angina (%)</td>
<td>16</td>
<td>35</td>
<td>49</td>
</tr>
<tr>
<td>Prior CABG (%)</td>
<td>21</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>13</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Lesions/patient</td>
<td>1.8</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Stents/UA patient</td>
<td>1.3</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Stent length (median [IQR])</td>
<td>1.6 [8-23]</td>
<td>1.6 [8-23]</td>
<td>1.6 [8-23]</td>
</tr>
<tr>
<td>Procedural success (%)</td>
<td>96.8</td>
<td>98.4</td>
<td>96.8</td>
</tr>
<tr>
<td>In-hospital deaths</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Fluoroscopy time decreased over time (p<0.04). The number of stents inserted in unstable patients (p=0.03) and decreased in stable patients (p=0.04). In the last quartile, Reopros was used in 22% of unstable patients and 25% of stable patients. Success rates were high in all quartiles, there was one death and no patients received same day bypass surgery.

### Percutaneous lead extraction: the Waikato experience

We report our ongoing experience of 25 cases of percutaneous pacemaker (and ICD) lead extraction (PLE), using the Cook lead extraction kit. Between July 1997 and April 2000, 25 patients have undergone PLE, 18 (72%) for infection (8 pocket infection only, 2 recurrent septicaemia only, 8 septicaemia and myocardial infarction, 15 with left main disease. In this series of 307 distal anastomoses, two thirds

### Treatment of heart failure guided by plasma amino-terminal Brain natriuretic Peptide (N-BNP) levels improves outcome

In conclusion, percutaneous lead extraction offers a very viable alternative in the management of this difficult group of patients. However, the risks should not be underestimated. New equipment may reduce these risks and further improve success rates.

### Acute myocardial infarction and unstable angina, 1997-1999: has on-site elective angioplasty changed management?

We compared treatment of heart failure guided by plasma levels of the cardiac peptide amino-terminal brain natriuretic peptide (N-BNP) with clinical assessment (p=0.034). Changes in left ventricular function, quality of life, renal function and adverse events were similar in both groups. In summary, N-BNP guided treatment of heart failure reduced total cardiovascular events and delayed the time to the first event compared with intensive clinical guided treatment. N-BNP guided treatment represents a new objective approach to optimisation of drug therapy for cardiac failure.

### A new elective angioplasty programme: trends in the first 500 cases at Christchurch Hospital

We analysed patient and procedural characteristics in each quartile of the first 500 cases to assess whether technique and outcomes changed over time. There were no significant trends in median age (63 years [IQR 55-71]), gender (71% male) or previous PTCA (25%). Most patients (84%) in the first quartile were in-hospital patients with unstable angina (UA): this reflected departmental policy and surgical backup limitations. There was a further increase in stable angina patients treated in the 3rd and 4th quartiles, coinciding with a waiting list contract and an increase in case numbers.

### Fluoroscopy time decreased over time (p<0.04). The number of stents inserted in unstable patients (p=0.03) and decreased in stable patients (p=0.04). In the last quartile, Reopros was used in 22% of unstable patients and 25% of stable patients. Success rates were high in all quartiles, there was one death and no patients received same day bypass surgery.

### Beating heart coronary surgery with the octopus tissue stabilizer

The Medtronic Octopus suction device stabilises small myocardial areas and facilitates accurate coronary anastomoses without cardiopulmonary bypass.

Between December 1997 and March 2000, 110 patients had coronary grafting using Octopus models 1, 2 or 2 Plus. Preoperative features included 14 patients with previous cardiac valve surgery with anticoagulation (INR = 2.0) and temporary pacing sheath lost temporarily in breast tissue. In conclusion, percutaneous lead extraction offers a very viable alternative in the management of this difficult group of patients. However, the risks should not be underestimated. New equipment may reduce these risks and further improve success rates.

### Acute myocardial infarction and unstable angina, 1997-1999: has on-site elective angioplasty changed management?

We compared treatment of heart failure guided by plasma levels of the cardiac peptide amino-terminal brain natriuretic peptide (N-BNP) with clinical assessment. Sixty-nine patients with impaired systolic function (left ventricular ejection fraction <40%) and symptomatic heart failure (New York Heart Association class II-IV) were randomised to receive treatment guided by either plasma N-BNP level (the BNP group) or standardised clinical assessment (the clinical group).

During follow-up (minimum 6 months, median 9.5 months), there were fewer total cardiovascular events (death, hospital admission or new heart failure decompensation) in the BNP group than in the clinical group (19 vs 54, p=0.02). At 6 months, 27% of patients in the BNP group and 33% in the clinical group had experienced a first cardiovascular event (p=0.034). Changes in left ventricular function, quality of life, renal function and adverse events were similar in both groups. In summary, N-BNP guided treatment of heart failure reduced total cardiovascular events and delayed the time to the first event compared with intensive clinical guided treatment. N-BNP guided treatment represents a new objective approach to optimisation of drug treatment for cardiac failure.

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### In-hospital management (predischarge) Discharge to 1 year

<table>
<thead>
<tr>
<th>Quartile 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>Time to complete (days)</td>
<td>147</td>
<td>97</td>
<td>59</td>
</tr>
<tr>
<td>Stable angina (%)</td>
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</tr>
<tr>
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<td>13</td>
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<td>96.8</td>
</tr>
<tr>
<td>In-hospital deaths</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Community thrombolysis is an effective means of reducing treatment times for acute myocardial infarction (MI) patient has been shown to reduce treatment delays and improve clinical outcomes. There are conflicting data, however, as to appropriate targets for this therapy in rural communities.

The Comoronal region comprises several communities 10 to 90 minutes by road from the nearest hospital. In 1998 a CT programme was commenced for those patients >30 minutes away. Retelase was given for patients with pain of less than 12 hours duration who had ST elevation on an ECG transmitted to the base coronary care unit for diagnostic confirmation. A comparison of treatment times was obtained using a historical cohort of patients with pain of less than 12 hours duration who had ST elevation on an ECG transmitted to the base coronary care unit for diagnostic confirmation. The median age was 70 years, 61% were men, 20% were current smokers, and 37% has a history of prior MI. One third had acute anterior MI, and of the 40% who were eligible for thrombolysis, 67% received thrombolysis or direct angioplasty in 1997 and 76% in 1998 (p=0.06). The table compares treatment at discharge in patients with ST elevation (ST ↑) and patients with raised troponin T but creatinine kinase levels of less than twice the upper limit of normal (TNT +ve).

Community thrombolysis (CT) for the acute myocardial infarct (MI) patient is in use in Auckland Hospital and the regional hospitals. In Auckland Hospital, the target door-to-needle time is 30 minutes. Community thrombolysis is an effective means of reducing treatment delays for acute infarct patients. In-hospital delays must be added to transport times in order to target this service at appropriate communities. Delays in initial patient presentation remain a major problem requiring ongoing patient education.

### Seasonal, weekly and hourly admissions to a Coronary Care Unit: resource implications. Data from the Auckland Hospital Cardiology Database. J Ellis, G Gamble, W Benjamin, J Elliott, D Parks, G Gordon. Department of Medicine and Cardiology, Auckland Hospital, Auckland.

Hospital units are funded according to the workload and case-mix of patients. We prospectively recorded demographic data and the provisional diagnosis of all patients admitted to Auckland Hospital coronary care unit from 1 August 1997 to 31 January 1998. 1695 patients (median age 66 years [IQR 54-76], 46% female) were admitted. There was no variation in admissions by month (p=0.4). As the principal reason for patient admission, the following diagnostic categories were recorded: 1) Definite or possible acute ischaemic syndrome: 931 (55%; 221 definite myocardial infarction (MI), 411 definite angina/non-Q-wave MI, 63 chest pain of uncertain cause); 2) Dysrhythmia: 471 (28%; 254 atrial fibrillation/flutter, 82 other tachyarrhythmia, 59 bradyarrhythmia, 76 syncope/pre-syncope); 3) Other cardiac condition: 235 (14%; 91 heart failure, 86 elective admission, 8 pericarditis, 8 pulmonary embolus, 3 aortic dissection, 3 infective endocarditis, 44 other); 4) Non-cardiac: 58 (3%). There were no seasonal variations in diagnostic categories. Fewer patients were admitted on Saturday (198) or Sunday (191) than on weekdays (249-276) (p=0.035).

We conclude that accurate data collection can be of major assistance with resource allocation in a coronary care unit, and should be a core function of a hospital service.


There is little information on the management of acute myocardial infarction (MI) in New Zealand outside of clinical trials. We have performed a retrospective case-note audit of all MI patients admitted to Christchurch Hospital from 1 October 1997 to 31 December 1998 and from 1 October 1998 to 31 December 1999. The median age was 70 years, 61% were men, 20% were current smokers, and 37% had a history of prior MI. One third had acute anterior MI, and of the 40% who were eligible for thrombolysis, 67% received thrombolysis or direct angioplasty in 1997 and 76% in 1998 (p=0.06). The table compares treatment at discharge in patients with ST elevation (ST ↑) and patients with raised troponin T but creatinine kinase levels of less than twice the upper limit of normal (TNT +ve).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>1997</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ST ↑</td>
<td>TNT +ve</td>
<td>All ST ↑</td>
</tr>
<tr>
<td>n</td>
<td>228</td>
<td>87</td>
</tr>
<tr>
<td>Echocardiogram (%)</td>
<td>60</td>
<td>79</td>
</tr>
<tr>
<td>Angiogram (%)</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Medline 78 (days)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Discharged alive (%)</td>
<td>90</td>
<td>87</td>
</tr>
<tr>
<td>Aspirin (%)</td>
<td>90</td>
<td>96</td>
</tr>
<tr>
<td>β-blocker (%)</td>
<td>63</td>
<td>72</td>
</tr>
<tr>
<td>Calcium blocker (%)</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>ACE inhibitor (%)</td>
<td>47</td>
<td>46</td>
</tr>
<tr>
<td>Lipid-lowering (%)</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

In conclusion, patients with ST elevation are more likely to have an echo or angiogram and to be discharged on a β-blocker and lipid-lowering agents than troponin-positive patients.

### Survival of Intestinal Fibroblasts in severely Ischaemic Myocardium. LC Armiger, KS Woo, MWI Webster, HD White, JB Gavin. Department of Pathology, University of Auckland; Cardiology Department, Green Lane Hospital, Auckland; and Department of Medicine and Therapeutics, Chinese University of Hong Kong, Hong Kong.

Thrombolytic therapy for acute coronary occlusion is beneficial even when initiated after affected myocardial cells have become irreversibly injured. A possible reason for this is the salvage of interstitial fibroblasts, which promote healing and stabilisation of the infarct. We investigated fibroblast survival in an in vitro model of severe myocardial ischaemia, using left
ventricular muscle from 5 normal miniature pigs. Transmural blocks of tissue were placed in airtight jars and incubated at 37°C. After 1, 2, 3, 4, 6, 12 or 24 hours, blocks were removed from the incubator, trimmed of cut edges, epicardium and endocardium, sampled for electron microscopy, and then minced finely for tissue culture (6 replicates per time interval per heart). 90% of cultures from unincubated control tissue were positive. This percentage fell to 79, 29 and 21 for tissue made ischaemic for 1, 2, and 3 hours, respectively. No cells grew after longer intervals of ischaemia. Allowing for the time taken to set up the cultures (approximately 2 hours), these results indicate that some fibroblasts are still salvageable after 5–6 hours of maximal ischaemia such as occurs in the subendocardial layer of an infarct (where myocardial cells become irreversibly injured in 40–60 minutes). These in vitro studies for the first time suggested that fibroblast survival time would likely be considerably longer. Hence fibroblast salvage may contribute to the beneficial effects of late thrombolysis.

**Infective Endocarditis: why bother with guidelines? SC Dalton, MK Shires, RA Fishman, CM Wade, GP Devlin. Department of Cardiology, Waikato Hospital, Hamilton.**

International guidelines for the prevention and treatment of infective endocarditis (IE) exist, with evidence from France suggesting that compliance is poor. The aim of our study was to assess management of IE at Waikato Hospital, particularly with respect to adherence to established guidelines.

A retrospective chart review was made for all patients admitted with IE over a two-year period (1/7/97-30/6/99). 37 admissions occurred in 32 patients, with 24 (65%) male and a mean age of 59 years. Clinical diagnosis correlated well with Dukes criteria, with patients managed by cardiologists with specialist microbiology expertise in 28 cases (75%). Echocardiography is considered a vital evaluation, the commonest valve involved being the aortic, in 16 cases (43%). A causative organism was identified in 33 cases (89%), the commonest pathogen being Streptococci, in 16 cases (43%). In 7 cases (19%) a possible iatrogenic portal of entry was suspected, with prophylaxis status confirmed correct in only 2 patients.

Medical management was successful in 23 cases (62%), with 6 patients (16%) undergoing surgery for acute valve failure (4), root abscess (1) and persistent bacteraemia (1). Three patients (8%) died. In only 22 cases (59%) was antibiotic therapy considered appropriate when compared with guidelines, with the commonest discrepancies encountered being a shorter duration of therapy and inadequate B-lactam dosing. A trend to better patient outcome was noted when guidelines were followed, with success in 70% (16/23) vs 45% (6/14) (p<NS).

We conclude that international guidelines for the management of infective endocarditis are not closely adhered to at Waikato Hospital, improving the French experience. This practice may adversely affect patient outcome.

**Characteristics and survival of patients following out-of-hospital cardiac arrest in Auckland, New Zealand. K Ramanathan, SM Turner, DJ Heaven, WM Smith. Cardiology Department, Green Lane Hospital, Auckland.**

With increasingly successful resuscitation, many patients survive to reach hospital following a cardiac arrest (CA). In the absence of acute myocardial infarction (AMI), the long-term prognosis remains poor in spite of changing management.

We sought to retrospectively review the characteristics, management and survival of local patients successfully resuscitated following an out-of-hospital cardiac arrest. Between 1 January 1992 and 31 December 1996, 195 patients were admitted to Auckland Hospital following CA. Survival data were complete in 189 patients (96.8%). The mean age was 61 years (SD 15, range 15–80), with 80% being male. The index rhythm documented was ventricular fibrillation in 90%. Cardiac arrest was associated with an AMI in 55%. The incidence of previous CA was 2%. In-hospital mortality was 5.5% and the median hospital stay was 15.1 days. Only 12 patients received an implantable cardioverter defibrillator (ICD) post-arrest. The total mortality was 40%, with median follow-up of 4 years.

Factors significantly associated with a poor prognosis were a previous history of congestive cardiac failure (p<0.001), left ventricular function (p=0.03), New York Heart Association functional class at discharge (p=0.03) and pre discharge surgical or percutaneous revascularisation (p=0.003).

In summary, for survivors of cardiac arrest in Auckland, a majority had an acute myocardial infarction (AMI), their long-term prognosis remains poor in spite of changing management.

**Diabetes Mellitus is an independent risk factor for impaired endothelial function in coronary artery disease. KS Woo, P Chook, WA Taylor, D Heaven, WM Smith. Cardiology Department, Green Lane Hospital, Auckland.**

Diabetes mellitus (DM) is an important risk factor for coronary events, and adversely affects the prognosis. Arterial endothelial dysfunction (ED) has been implicated in plaque rupture and cardiovascular events.

In summary, the prevalence of DM on development of ED in patients with coronary disease (CAD), 96 patients with CAD documented angiographically were studied. Of these, 21 patients (14 male, mean age 59.5±7.2 years) had DM requiring hypoglycaemic medications. ED was assessed by flow-mediated dilation of the brachial artery (FMD as % change in diameter), using high-resolution B-mode ultrasound, and compared with age- and gender-matched non-DM patients. The two groups were also matched for their smoking status (19%), blood pressures, body mass indices, blood lipid profiles, renal function and coronary scores. FMD (but not nitroglycerin response (NTG)) was more severely impaired in the DM group.

<table>
<thead>
<tr>
<th>Blood sugar (μmol/L)</th>
<th>Non-DM</th>
<th>DM</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.9±1.4</td>
<td>9.1±2.4</td>
<td></td>
<td>0.002</td>
</tr>
<tr>
<td>Haemoglobin A1-C (%)</td>
<td>5.5±1.1</td>
<td>7.5±2.3</td>
<td>0.005</td>
</tr>
<tr>
<td>FMD (%)</td>
<td>5.7±1.9</td>
<td>4.1±2.3</td>
<td>0.014</td>
</tr>
<tr>
<td>NTG (%)</td>
<td>16.0±8.8</td>
<td>13.9±8.1</td>
<td></td>
</tr>
</tbody>
</table>

On multivariate analysis, DM (but not sugar control) was an independent risk factor for ED (multiple R=0.68; F=3.0; p=0.01).

We conclude that diabetes mellitus is an independent risk factor for impaired endothelial function in coronary disease patients, and interactions with other risk factors may be implicated.

**Left ventricular flow propagation velocity to detect ischaemia during dobutamine stress echocardiography. C Young, E Hasan, M Milne, P Bridgman. Department of Cardiology, Christchurch Hospital, Christchurch.**

Left ventricular flow propagation velocity is a new tool for assessing diastolic function using colour Doppler M-mode. We studied flow propagation velocity during dobutamine stress echocardiography (DSE). 28 consecutive patients (18 males) of age range 22 to 80 years (median 64) undergoing DSE were studied. Patients were classified by whether or not baseline left ventricular function was impaired and by the presence or absence of inducible ischaemia.

None of the subjects with inducible ischaemia (irrespective of resting left ventricular function) had a peak flow propagation velocity greater than 100 cm/s. In those with no inducible ischaemia there was, however, a wide spread of values both above and below this figure.

This study suggests that flow propagation velocity during dobutamine stress echocardiography is influenced by both inducible ischaemia and resting left ventricular systolic function. The method may be of use as an adjunct in detecting ischaemia in those with normal resting left ventricular systolic function.

**Cardiology support required by the New Zealand Liver T transplant Service. CJ Ellis, G Gamble, S Munn. Liver Transplant Unit and Cardiology Department, Green Lane Hospital and Auckland Hospital, and Cardiology Department, Green Lane Hospital, Auckland.**

The New Zealand Liver Transplant Unit was established at Auckland Hospital in December 1997. Many clinical services in Auckland have supplied specialist support to this new unit. Some patients require cardiac input for transplant assessment or perioperative assistance.

From December 1997 to March 2000, 86 patients (mean age 47 years [IQR 39–57], 60% male), were formally assessed for orthotopic liver transplantation (OLT) in Auckland. In total, 15 patients did not meet the transplant criteria and 71 patients were listed for OLT. Of these patients, 48 have received a donor liver, 6 remain on the active waiting list, 9 died whilst awaiting a donor, and 7 were delisted (3 patients had an improvement in their clinical state and 4 patients deteriorated beyond the help of OLT).

Specialist cardiac assessment was required in 40 patients; in 3 patients this was initially from their referring centre. A further 3 patients had cardiac catheterisation which precluded formal assessment. Cardiovascular problems included the assessment of coronary artery disease and ventricular dysfunction, concomitant valve abnormalities, and the quantification of pulmonary hypertension — a specific problem for some patients with end-stage liver disease. In total, 20 patients underwent cardiac catheterisation (3 a full right and left study) and 16 a dobutamine stress echocardiogram. Of the 43 patients assessed, 6 patients were not suitable OLT candidates (2 left main and 1 severe diffuse coronary disease, 1 severe pulmonary hypertension, 2 failed other OLT criteria).

The New Zealand Transplant Service has acquired a unique group of interesting patients who require cardiology support and interdepartmental collaboration.
Is cytomegalovirus involved in the pathogenesis of indigenous Australian cardiovascular disease? LA Green, Saint John's Hospital, Rockhampton, Australia.

Indigenous Australians (Aboriginals) have a life expectancy 20 to 25 years less than Caucasians largely due to cardiovascular disease. As part of a cardiovascular risk factor study amongst Indigenous Australians in Central Queensland, cytomegalovirus IgG antibody, microalbuminuria, tryglicerides and HDL were measured and malnutrition was assessed from the incidence of low birth weight over the same period in the same area. Chronic cytomegalovirus antibody status was 97.2% of 711 entrants ranging between 6-69 years. Microalbuminuria was found in 39% of the same cohort and low birth weight for 477 births over the same period was 12% (three times Caucasian average). Tryglicerides were elevated, HDL was low and cholesterol in the normal range. Prevalence of obesity was high and height less than the male and female Caucasian average. Cytomegalovirus and antibody is associated with heart disease. Microalbuminuria is a potent predictor of cardiovascular disease.

The thesis is that early Cytomegalovirus infection in the foetus and infant may be responsible for the early vascular changes seen in the same age groups and may be considered the ‘missing link’ or play some part in the concept of the foetal hypothesis.

Comparison of vasopeptidase inhibition with ACE inhibition in the long-term symptomatic management of chronic heart failure. D Barmby, DR McClean, CM Young, MHume, Hykrman. Department of Cardiology, Christchurch Hospital, Christchurch.

Despite modern management, there is significant morbidity and mortality associated with chronic heart failure. Omapatrilat, which blocks both angiotensin-converting enzymes (ACE) and the neutral endopeptidase, was assessed as an agent in chronic heart failure management. However, there are few long-term data regarding vasopeptidase inhibition, and so we compared omapatrilat with lisinopril in the management of heart failure.

Data were analysed from three-monthly assessments to one year, identifying both the individual and combined endpoints of death, hospitalisation and requirement for increased frusemide.

<table>
<thead>
<tr>
<th>Requirement for increased frusemide dose</th>
<th>Months from baseline</th>
<th>Omopatrilat group</th>
<th>Lisinopril group</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Omopatrilat group</td>
<td>2 (8%)</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Omopatrilat group</td>
<td>2 (8%)</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Omopatrilat group</td>
<td>4 (16%)</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Omopatrilat group</td>
<td>4 (16%)</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>

The requirement for an increase in diuretic dosage showed a nonsignificant trend towards a lesser requirement with omapatrilat than with lisinopril. There was no significant difference in mortality or hospitalisation.

Different revascularisation rates between cardiologists reflect the concept of the foetal hypothesis. CJ Ellis, J Pang, W Benjamin, J Elliot, G Gamble. Department of Cardiology, Auckland Hospital, Auckland.

Cardiologists debate the precise role and value of coronary angioplasty and surgery. CJ Ellis, J Pang, W Benjamin, J Elliot, G Gamble. Department of Cardiology, Auckland Hospital, Auckland.

The 'foetal hypothesis' links foetal, neonatal, and childhood malnutrition with adult cardiovascular disease, hypertension and diabetes. Cytomegalovirus antibody prevalence in the under 20’s of this cohort was 94.5%.

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We conclude that within the same hospital environment, the revisacularisation strategy for patients appears to differ, and this may reflect the cardiologists’ approach.

Increase in lipid-modifying prescriptions seen in patients following PHARMAC easing their restrictive statin policies. CJ Ellis, J Pang, W Benjamin, J Elliot, G Gamble. Department of Medicine, Auckland Hospital, Auckland.

Use of statin and fibrate drugs benefits patients with ischaemic heart disease, but previous studies show poor uptake by patients, probably due in part to conservative prescribing by doctors and the restrictive policies of PHARMAC.

Of approximately 1700 patients admitted to Auckland Hospital coronary care unit during the 24 months that preceded those with an initial diagnosis of a definite myocardial infarction (MI) and recorded discharge drugs.

From 1 August 1997 to 31 January 1999, 319 patients (mean age 64 years [IQR 54–75], 65% male) were admitted with an initial definitive MI; 24 patients died, 171 patients received thrombolytic therapy. Of 295 survivors at discharge, 98 (30%) patients were prescribed a lipid-modifying drug (74 (23%) statins, 24 (8%) fibrates). At admission, patients were reviewed by 1 of 5 cardiologists. Individual prescribing improved, with an increase in the number of patients receiving lipid-modifying drugs over 18 months:

<table>
<thead>
<tr>
<th>Dr</th>
<th>0 to 6</th>
<th>6 to 12</th>
<th>12 to 18</th>
<th>Total 0 to 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/11 (9%)</td>
<td>1/5 (20%)</td>
<td>4/12 (33%)</td>
<td>6/28 (21%)</td>
</tr>
<tr>
<td>2</td>
<td>1/12 (9%)</td>
<td>2/12 (17%)</td>
<td>7/14 (41%)</td>
<td>9/29 (31%)</td>
</tr>
<tr>
<td>3</td>
<td>7/14 (21%)</td>
<td>3/18 (24%)</td>
<td>10/14 (26%)</td>
<td>26/106 (25%)</td>
</tr>
<tr>
<td>4</td>
<td>11/29 (38%)</td>
<td>15/35 (44%)</td>
<td>20/23 (43%)</td>
<td>36/87 (41%)</td>
</tr>
<tr>
<td>5</td>
<td>6/29 (21%)</td>
<td>6/19 (32%)</td>
<td>7/21 (33%)</td>
<td>19/69 (28%)</td>
</tr>
</tbody>
</table>

On 1 December 1998, PHARMAC lowered the level of cholesterol at which patients could be prescribed a statin from 26 mmol/L to 5.5 mmol/L (4.5 mmol/L for revascularisation patients). We saw a doubling of lipid-modifying prescriptions (cardiologist 1: from 14% to 50%; cardiologist 2: from 27% to 43%; cardiologist 3: from 23% to 36%; cardiologist 4: from 40% to 67%; cardiologist 5: from 25% to 60%; total: from 28% to 47% (p=0.01).

In summary lipid-modifying medications were prescribed more often when PHARMAC eased their restrictive policies.

Insulin-Like Growth Factor-I In The Dysfunctional Heart. KG Matthews, GP Devlin, JA Jensen, R Doughty, SP Stuart, G Parkinson, P Subранanawam, JV Conaglen, JJ Bass. AgResearch Ruakura Agricultural Research Centre, Hamilton; Waikato Academic Division, School of Medicine, University of Auckland, Waikato Hospital, Hamilton; and Department of Medicine, School of Medicine, University of Auckland.

Following myocardial infarction (MI), the cardiomyocyte insulin-like growth factor-I (IGF-I) axis is activated, suggesting that IGF-I has a role to play in the maintenance of postinfarct cardiac function. Improvement in function following IGF-I administration, either subcutaneously or via an indwelling catheter into the pericardial sac, or to receive either subcutaneous or intrapericardial saline. Left ventricular ejection fraction (EF) was studied serially by echocardiography prior to, during and after treatment.

Using a technique of recurrent coronary microembolisation, the ejection fraction was titrated to ≤40% in 4 groups of sheep (n=3 in each group). Animals were randomised to receive IGF-I (150 µg/kg/day), either subcutaneously or via an indwelling catheter into the pericardial sac, or to receive either subcutaneous or intrapericardial saline. Left ventricular ejection fraction (EF) was studied serially by echocardiography prior to, during and after treatment.

No significant difference in EF was noted with placebo or subcutaneous delivery of IGF-I and intrapericardial IGF-I group, one animal failed to respond due to a blocked catheter. The EF of the remaining 2 animals increased from a mean pretreatment baseline of 27±2% to a peak of 42±1%, remaining elevated for some time following cessation of treatment. No acute response to IGF-I was observed.

We conclude that intrapericardial delivery of IGF-I in an animal model of heart failure.

Changes in Atherosclerosis markers after Atorvastatin lipid-lowering therapy in patients with coronary artery disease. KS Woo, LLT Chan, PC hook, ASP Cheung, RCW Chu, KT Tang, WWM Chan, CK Wong, WH Fung, JE Sanderson. Chinese University of Hong Kong, Hong Kong.

Changes in plasma microalbuminuria (IMT) and brachial artery flow-mediated, endothelium-dependent dilation (FMD) correlate with coronary artery disease (CAD) and cardiovascular events.
To evaluate the impact of atorvastatin therapy in CAD patients on these surrogate atherosclerosis markers, 30 CAD patients with fasting low-density-lipoprotein cholesterol >3.5 mmol/L after 12 weeks of dietary control were studied. Their mean age was 60.0±10.6 years, 25 were males, and 3 patients were active smokers. They were given a titrating dosage of atorvastatin (10-40 mg) for 24 weeks. Carotid IMT & FMD (% change in diameter) were measured by high-resolution ultrasound.

Lipid profiles improved significantly within 12 weeks of atorvastatin therapy, with a 34.3-37.3% drop in total cholesterol (TC), 43.8-47.9% in low-density-lipoprotein cholesterol (LDL-C) and 23.5-29.4% in triglycerides, and a 9.1% increase in high-density-lipoprotein cholesterol, but no significant changes in blood fibrinogen or other biochemical parameters:

<table>
<thead>
<tr>
<th>Atorvastatin (mg/day)</th>
<th>Week 0</th>
<th>Week 12</th>
<th>Week 24</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC (mmol/L)</td>
<td>6.7±1.4</td>
<td>4.4±1.0</td>
<td>4.2±1.0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LDL-C (mmol/L)</td>
<td>4.8±1.2</td>
<td>2.7±1.0</td>
<td>2.5±1.0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>FMD (%)</td>
<td>5.5±1.4</td>
<td>5.8±1.7</td>
<td>6.8±1.7</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Carotid IMT (mm)</td>
<td>0.92±0.35</td>
<td>0.89±0.32</td>
<td>0.87±0.32</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

There were continuous improvements in flow-mediated dilation and carotid intima-media thickening. In conclusion, atorvastatin treatment as secondary prevention is potent in lipid-lowering and improving atherosclerosis.