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EDITORIALS

The work-force crisis, funding and the bureaucracies

Equitable health care can be provided with various systems of reimbursement for medical services. However, the profit driven system in the United States¹ has shown itself to be ineffective in this regard. With the continuing failures in our health service, it is not surprising that Helen Clark's government has looked at alternatives to the competitive model and the fee for service system.

Some planners and politicians believe that efficiency and quality can be produced by alteration in financial arrangements. This was one of the arguments for change to a competitive system in the 1990's 'health reforms'. The results of this experiment have not been positive. The death of a mother at the hand of her schizophrenic son in Queenstown, and the recurrence of breast cancer in women waiting too long for radiotherapy are poignant examples of the breakdown in medical planning which resulted. We hoped that with change in the government 20 months ago, this would improve. There has, sadly, been little evidence of improvement. Reasons behind this include the size of the bureaucracy and the attitudes from the previous administration which persist within it.

The most important underlying attitude is the habit of government and Health Board bureaucracies to exercise arbitrary control. This became more intrusive with the imposition of general management on the Health Sector.² With the 1990's 'health reforms' financial control of the hospitals was assumed by CCMAU and Treasury, and managers sometimes under coercion acceded to their demands. This system of financial control diminishes democratic involvement and resulted in hospital clinicians being unable to contribute to planning for clinical needs. This led to problems identified in reports such as Stent, Gisborne Hospital and Cervical Screening, and to breakdown of the psychiatric inpatient / community care interface and cancer services. Many working in general practice feel a similar loss of autonomy as they drown in an ever more complex and often meaningless bureaucracy in the name of accountability. These problems are being repeated around the globe.³ It should be remembered that over the last 40 years the independence of general practice has been one of the main safeguards and safety nets to effective health services. Population based funding, superficially attractive from an equity standpoint, carries with it a very real risk of encouraging nationally consistent and politically correct mediocrity.

Why has this government been unable to improve the situation? First, it has been unwilling or unable to change attitudes in the CHE's / Hospital Boards. Many staff in these bureaucracies were selected for their support of the principles of the 'health reforms', and they remain in pivotal positions. With power centralised in management, short-sighted, excessive financial control has been exerted in areas where clinical appraisal should initially be made. Second, the competent and buoyant workforce is dwindling as many of our best young people and an increasing number of our recognised experts leave for Australia or elsewhere. Probably the two

factors most critical to quality in a health service are the morale of individual staff and their capabilities. Third, the government seems still to be captive to Treasury and CCMAU with their fundamentalist monetarist theories. Along with this, health professionals are still not trusted by the administrative hierarchy. Under these circumstances, more and more non-medical administration is necessary and this devours an increasing percentage of the health budget.

The overall financial allocation to health services in New Zealand is inadequate to meet demand. General practice receives an inadequate share of an inadequate budget - as does public health. Yet we learn daily of secondary care budgets hopelessly inadequate to meet ever increasing demand for high cost interventions. Successive governments have repeatedly promised to spend more in primary care and on prevention. Those working in primary care are still waiting. To meet their budgets, some Health Boards have used individual contracts to underpay selected staff groups and reward others, especially in procedural specialties. Managers are paid bonuses if they can maintain budget reductions. As staff shortages begin to bite as a result of this approach, some managements award new appointees from overseas salary levels way in excess of those of incumbent staff. This short-term 'market' answer to the problem of shortages further exacerbates underlying dissatisfaction. Any lasting solution to the impending crisis must see the removal of inequities and the restoration of morale.

Until a balance is restored in central government between the free market ideology and the needs of society as a community, then we will continue to have failure of services. If we honestly wish to restore human values to health care,⁴ we must move to greater democratisation in decision making. Hospital Boards should encourage input from and involvement of their staff and listen to the recommendations of independent professional organisations. They would then support the delivery of first-class health care. Arbitrary financial constraints undermine this aim. The resulting failures force the administration to misrepresent issues through expensive public relations activities.

It is claimed that we cannot keep our best health professionals in New Zealand because they will be paid more overseas. History refutes this as a cause in itself. In the past we have kept many of our best people because conditions were conducive to good work and systems were supportive rather than antagonistic. Such an environment can only be restored through a major shift in attitude of Hospital Board managements, the Ministry of Health, CCMAU, and Treasury with the support and guidance of our politicians.⁵

The Editors

1. Seddon ME. Managed care in America: Lessons for New Zealand. *NZ Med J* 2000; 113: 318-21.
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5. Parsons K, Evans S. Lack of leadership may be a contributory cause. *BMJ* 2001; 322: 1361.

The Booking System: a therapeutic intervention in need of clinical validation

AD MacCormick, *Lecturer in Surgery*; IG Martin, *Professor of Surgery, Middlemore Hospital*; BR Parry, *Head, Division of Surgery, Auckland Hospital, Professor of Surgery, University of Auckland, Auckland.*

The New Zealand Health System has recently seen the roll out of the much touted Booking System in place of the Waiting List. This is a move away from the 'bad old days' of waiting one's turn in an ever-increasing queue. The Booking System is based on the concept of booking a patient for surgery, at the time of assessment, much as we book an airline ticket or make a hotel reservation. The system has the objectives of national equity of access, transparency of process, and patient certainty of services provided.¹ These are to be achieved through the use of Clinical Priority Access Criteria (CPAC). The CPAC are used to prioritise patients for surgery on the basis of a priority score.² Service provision guarantees have also been developed. The first is that no patient should wait longer than six months for specialist assessment. The second is that no patient should wait longer than six months from assessment until surgery. To enable the second provision to be met within limited budgets, a priority score threshold (Financially Sustainable Threshold, FST) has been proposed. The FST would be a movable target determined by funding levels from central government.

Philosophical objections aside, some significant problems exist with the implementation of this system. The ethical basis of the criteria included within CPAC has been debated. Originally criteria were based on patient urgency of need and their ability to benefit.² However this was criticised in a subsequent report commissioned by the then Health Funding Authority which recommended that ability to benefit should be removed on the ethical grounds of distributive justice.³

Specific criteria have been developed by literature review and consensus methods for some procedures (coronary artery bypass graft, total hip joint replacement, trans-urethral resection of prostate, grommets, laparoscopic cholecystectomy).^{4,5} However, other procedures including the bulk of general surgery have only generic criteria. This is possibly due to a lack of evidence or a lack of time and money to have developed specific criteria. Within general surgery this has meant that no nationally consistent CPAC have been developed for procedures to date. Hence multiple tools exist on a regional basis.

Additionally, these multiple tools are inconsistent in the methods by which they give weighting to, and summation of, criteria. Some of these have been mathematically flawed and force the distribution of patient priority scores away from clinical judgement.⁶ This is in contravention of the stated aim of CPAC being to assist clinical decision making.¹

Contrary to the recommendations of Fraser et al² the CPAC have not yet been formally tested and evaluated. Dennett et al, investigating some of the different tools at Auckland Hospital,^{6,7} found that there was no consistency between these tools and, that in some cases, the tools were not prioritising patients with malignancies. Further studies have investigated patient outcomes.⁸⁻¹¹ However, these have been predominantly in the area of coronary artery bypass graft surgery, not in the arguably more difficult area of generic CPAC.

Lack of validation is a significant problem. Should mere opinion become the yardstick, the system becomes open to

politicisation. This could result in a low rate of clinician buy-in or, more maliciously, intentional subversion of the system. Furthermore the lack of validation is pertinent with respect to clinical governance and responsibility for care, particularly for doctors in managerial roles.¹² Additionally, medico-legal challenge is possible if CPAC results in adverse outcomes for those under active review (delayed) or returned to their general practitioner (denied).

Whatever the format of CPAC, they determine access to therapy and are therefore themselves a form of therapy. Additionally the prioritisation process, depending on the ethical basis, may act as a prognostic indicator in that it reflects urgency on the basis of possible morbidity and mortality. As such we would argue that they require the assessment that any therapeutic intervention or prognostic test should undergo. Evidence based medicine would mandate the validation of CPAC using the rigour of a randomised controlled trial (RCT) comparing, say, CPAC with everyday clinical judgement.

There are objections to using a RCT to assess patient outcomes. These include the time and money required. We would argue that, given the aims of the Booking System, the time and money should be an essential prerequisite. Any such project would benefit from the ethical and methodological scrutiny that research projects normally undergo. Considering the plethora of different tools currently in use, we believe, no objection could reasonably be raised to recruiting patient participation and support.

In summary, we believe in the pressing need for clinical trials of CPAC and their attendant patient related outcomes. Hence, we welcome the moves by the Ministry of Health to fund research towards this end but would make a plea that the resource allocation of both money and time be sufficient to complete the task(s). It is axiomatic that the Ministry should be disinterested in the process by ensuring academic freedom and intellectual ownership of the studies for all participants. We also feel that it is important that the study is expedited without undue delay, impacting as it does on the future and current health of all New Zealanders.

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The Booking System for surgery: evaluate or abandon

The Booking System for surgery continues to operate in spite of continued concerns about associated ethical, scientific and practical problems. Ethical concerns were first expressed by the Canterbury Ethics Committee to the Health Funding Authority (HFA) in mid 1998 (Letter to Pryke P, HFA from Scott M, Canterbury Ethics Committee, 22 June 1998; Letter to Malpass P, HFA from Scott M, Canterbury Ethics Committee, 30 July 1998). The HFA then commissioned an ethical review by the University of Otago.¹ The HFA subsequently had that review reviewed by the Harvard Medical School.²

Unfortunately, the expressed concerns remain largely unaddressed and the recommended safeguards have not been put in place. An offer to run a prospective scientific study of

the System was turned down by the Ministry of Health in October 1999 (Letter to Roake J, Christchurch School of Medicine from Feek C, Ministry of Health, 29 October 1999) and other attempts have been endlessly frustrated. Furthermore, there are no published data on the cost effectiveness of the System. It is time for the Booking System to be either transparently evaluated or abandoned.

Philip Bagshaw,
Deputy Editor.

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Genetic modification and medicine

At the end of July 2001, after fourteen months of hearings, huis, and deliberation, the Royal Commission on Genetic Modification presented its report to Government. The commission considered over 10 000 written submissions and held thirteen intensive weeks of hearings. The 49 recommendations made by the commission will help shape government policy on the future use of genetic modification (GM) technology in this country. At the outset of the chapter dealing specifically with medicine, the report makes two salient statements on the relationship between medicine and genetic modification: (1) "Genetic modification is widely accepted in the prevention, diagnosis and treatment of disease, and (2) "Significant future opportunities for advancement in health are offered by genetic modification". The report was a strong, positive endorsement of GM as a technology of crucial importance for medicine and the research base upon which medical practice so depends.

The Commission made several recommendations that, if acted upon by government, will impact directly on medical research or clinical practice. Apart from endorsing gene technology, a key recommendation is the establishment of a Bioethics Council to help patients, health professionals and regulatory agencies manage the challenges posed by genome technology and the knowledge it brings. This will provide a forum for ongoing debate and discussion of issues as or before they arise. The contentious issues of xenotransplantation and mammalian cloning highlight the need for such a body and are specifically addressed by the report, as was the need for formal medical review of all gene therapy procedures, whether in the public or private sector. Enhancement of Medsafe was also recommended to enable improved risk assessment of imported medicines and 'pharmaco foods' (foods that convey a specific medicine or

vaccine) containing live genetically modified organisms, and to avoid unnecessary duplication of regulatory processes. To prevent a repeat of the inadvertent release of a vaccine containing live genetically modified organisms, the need for application to ERMA and Medsafe early in the development of protocols was emphasised.

The report spells out amendments to the Hazardous Substances and New Organisms (HSNO) Act. These should lead to more sensible and realistic regulation of laboratory procedures with contained genetically modified organisms than currently prevails. In its current form, HSNO is overzealous and inhibits standard medical research procedures. To keep projects operating within the current law demands excessive time and resources. Researchers are not properly funded to manage these high compliance costs. As a result, many projects have been delayed or curtailed altogether. With minor changes, HSNO would cease to frustrate and inhibit research, while continuing to serve the important regulatory functions for which it was established. Although debate on some recommendations of the report will undoubtedly occur, amendments to HSNO are amongst the least contentious and should be implemented without delay.

Methods of disease prevention, diagnostics, and treatment are becoming increasingly dependent on the products of gene technology. It is therefore not surprising that the role of genetic modification in medicine and research is endorsed by the Royal Commission's report. We urge government to embrace the report's recommendations so that New Zealanders' continue to enjoy a progressive, research-based approach to medical care.

Martin Kennedy and the Editors

Use of a computer model to identify potential hotspots for dengue fever in New Zealand

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Abstract

Aims. To describe the areas of potential dengue fever risk in New Zealand for present climatic conditions and projected scenarios of climate change.

Methods. A computer model, the HOTSPOTS System, was developed. This allowed the integration of climatic, topographical, entomological, demographic, trade and travel data to generate spatial information describing vector introduction risk, potential vector distribution and dengue fever risk.

Results. Under present climatic conditions, Auckland and Northland, and some coastal areas of other northern parts

of the North Island, have a potential risk for dengue outbreaks supported by the vector *Aedes albopictus*. Greenhouse gas induced climate change could make these areas also receptive to *Aedes aegypti* - the more efficient tropical dengue vector - and increase the potential distribution of *A. albopictus* to much of the South Island.

Conclusions. Given the introduction of a competent vector, there is an appreciable risk of dengue fever occurring in New Zealand under present climatic conditions. Greenhouse gas induced climate change would substantially increase the magnitude and spatial extent of this risk.

NZ Med J 2001; 114: 420-2

Dengue fever is a vector-borne viral disease currently limited to tropical and sub-tropical countries where competent mosquito vectors are found. Clinical manifestations range from classical dengue fever characterised by fever, myalgia and arthralgia to the potentially fatal forms of the disease: dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS).

No mosquito species currently found in New Zealand has a proven competence to transmit dengue in the human population.¹ However, previous studies have suggested that the establishment, in New Zealand, of competent vectors is almost inevitable in the long term given the vector introduction risks, and projected warming of the climate associated with greenhouse gas induced global climate change.²⁻⁴

Worldwide, the two most important vectors of dengue fever are *Aedes aegypti* and *Aedes albopictus*. Climate is a key determinant of the potential distribution of dengue vectors and dengue fever risk.⁵⁻⁸ *A. aegypti* is widely distributed in neighbouring tropical and subtropical countries in the Asia-Pacific area. *A. albopictus* has a higher cold tolerance, is found in more temperate parts of Asia, and has recently colonised areas of northern Italy and North America.^{9,10}

Apart from climatic conditions, it is recognised that a range of biophysical factors, including habitat availability and various ecological interactions, typically influence mosquito distribution. However, given the proven colonisation efficiency of these two species and the fact that mosquito habitats in New Zealand are abundant and under-exploited, it is likely that introduced dengue vectors would be able to sustain breeding populations wherever favourable climatic conditions are found.^{3,4,11,12} Therefore, apart from any deliberate intervention that might limit actual distribution, it is a reasonable assumption that, in New Zealand, climatic conditions would act as the key constraint to the potential distribution of dengue fever vectors.

With rapid air transport and increases in trade, travel and migration between New Zealand and dengue fever endemic

regions, the risk of vector and virus introduction has increased. *A. aegypti* and *A. albopictus* have both been intercepted at our borders and there are regular reported cases of dengue fever in travellers returning from endemic regions.^{4,13} With the introduction and establishment of a local vector population, it need only take one viraemic traveller to trigger an outbreak of dengue fever. The appearance of *Aedes camptorhynchus*, a competent vector for Ross River virus, in Hawkes Bay in 1998 and its apparent establishment in Kaipara Harbour in February 2001 has again highlighted the risk of mosquito introduction and vector-borne disease in New Zealand.

To describe and characterise the dengue fever risk in New Zealand, we aimed to identify which areas in New Zealand, if any, are at risk of dengue fever outbreaks under current and projected future climatic conditions.

Methods

It was assumed that a dengue fever outbreak would require the spatial convergence of four factors: suitable climatic conditions for vectors, initial introduction of the vector, a susceptible human population and the introduction, by an infected traveller, of one of the four dengue virus serotypes.

To analyse these risks a computer model, known as HOTSPOTS, was developed.¹⁴ The model provided the capability to spatially describe potential vector distribution for present climatic conditions and for scenarios of climate change, and to generate spatial layers describing vector introduction risk, virus introduction risk and demographic risk.

To model potential vector distribution, climatic tolerances of *A. aegypti* and *A. albopictus* were parameterised. Precipitation parameters were provided by simple minimum and maximum rainfall thresholds. The temperature-related parameters used were:

- **thermal accumulation requirement** - defined as a degree day requirement for vector survival and population growth (excludes areas not warm enough in summer);
- **cold stress** - a stress factor that accumulates if a specified threshold thermal requirement is not reached (excludes areas too cold in winter);^{15,16}
- **midwinter isotherm** - the mean temperature of the coldest month of the year (a commonly used approach to exclude areas too cold in winter).¹⁷

Parameter values for both *A. aegypti* and *A. albopictus* were calibrated against current and historical vector distributions in Asia, North America, South America, Italy, Japan and Australia.

Potential distribution risk layers for both vectors were generated under four sets of climatic conditions representing current climate and variability and a range of uncertainty in future climate change projections. (Table 1).

Table 1. Description and technical details of climate scenarios used in this study.

Scenario	Technical details
Present average climate	Based on a 30 year climate record from 1951 to 1980.
Present 'warmer-than-usual' conditions	Reflected by a uniform incremental adjustment of present average temperatures by +1°C
Mid-range scenario of climate change	The parameters selected in this scenario construction were: SRES B2 Greenhouse Gas Emission Scenario; Mid-estimate Climate Sensitivity; and DARLAM GCM pattern.*
High-range scenario of climate change	The parameters selected in this scenario construction were: SRES A2 Greenhouse Gas Emission Scenario; High-estimate Climate Sensitivity; and, DARLAM GCM pattern.*

*The HOTSPOTS System Description and Users' Guide¹⁴ provides a detailed description of the data, models and parameters used in climate scenario construction.

The virus and vector introduction risk layers used demographic, travel and trade data to calculate an entry risk score for each of the 20 largest towns and international ports. A radius of influence for each potential entry node provided the basis for spatial interpolation of introduction risk. Human population density and a Deprivation Index¹⁸ were used to characterise the demographic risk layer. High risk areas were assumed to be those with the highest densities and highest deprivation score.

Overlay of all four risk layers was used to identify areas of spatial convergence of risk – the 'hotspots' for dengue fever. The overall risk score was described by a scale from 0 to 10 where 10 indicated maximum dengue fever risk and 0 the excluded areas where the climate would not support the vector population. An epidemic potential model¹⁹ allowed further characterisation of 'at-risk' areas by providing information on the climatic suitability for dengue virus replication and transmission by *A. aegypti*.

Results

The results of the *A. aegypti* analysis and *A. albopictus* analysis are reported separately. The reported risk scores for the two vectors are not directly comparable since they do not account for the greater transmission efficiency of *A. aegypti*.

Aedes aegypti

The model indicated that under present average climatic conditions it is unlikely that *A. aegypti* would become established in any part of New Zealand. However, for the vicinity of Kaitaia and areas north of Kaitaia, the only limiting factor is insufficient summer warmth. With warmer-than-usual present day climatic conditions, the model suggested there were foci in this northern area which would be at risk (score = 1 to 3). The mid-range climate change scenario showed that a similar risk limited to the northernmost parts of Northland would gradually develop after 2050. Under the high scenario of climate change, Auckland city (score = 7) and foci in Northland were identified as at risk by 2050. By 2100 almost all of Northland has a dengue fever risk (score = 2 to 5), but the greater Auckland area has the highest risk score (5 to 8). Other areas that would be at risk (with scores up to 4) are the Waikato and Hauraki Plains as well as coastal areas of the Coromandel, Bay of Plenty, East Cape, Hawkes Bay, Taranaki and Wanganui (Figure 1).

The epidemic potential model indicated that suitable climatic conditions for viral transmission already regularly occur in summer in the high risk areas identified, and become increasingly favourable under the climate change scenarios.

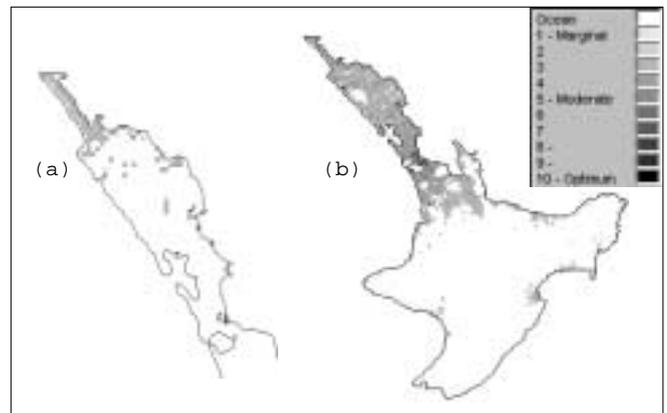


Figure 1. Dengue fever risk maps for *Aedes aegypti* on the North Island for a high-range climate change scenario for: (a) the year 2050; and (b) 2100.

Aedes albopictus

For *A. albopictus*, under present average climatic conditions, the model identified high risk areas in greater Auckland (score = 5 to 7) and in Northland, the Waikato and Coromandel (score = up to 4) and in coastal areas of the Bay of Plenty, East Cape, Hawkes Bay, Taranaki and Wanganui (score = up to 3) – and no indication of risk in the South Island. With warmer-than-usual present day conditions, risk areas expanded to include almost all coastal areas of the North Island and the coastal areas of Marlborough and Nelson (score = 1 to 2). The mid-range climate change scenario for 2050 generated a similar pattern of risk. By 2100 under the mid-range scenario, these risk areas intensify and expand to include the Christchurch urban area (score = 4), the Banks Peninsula and some coastal areas between Christchurch and Blenheim and on the northern West Coast.

Under the high climate change scenario, conditions would be increasingly suitable for *A. albopictus* through most of the North Island, and by 2100 only the central plateau and other similarly elevated areas are deemed unsuitable. In the South Island, by 2050 the areas of risk increase in Nelson and Marlborough, expand in northern parts of the West Coast and include Christchurch and the Canterbury Plains (scores up to 4). By 2100 most coastal and non-mountainous areas of the South Island north of Dunedin are identified as at risk (scores up to 4) (Figure 2).

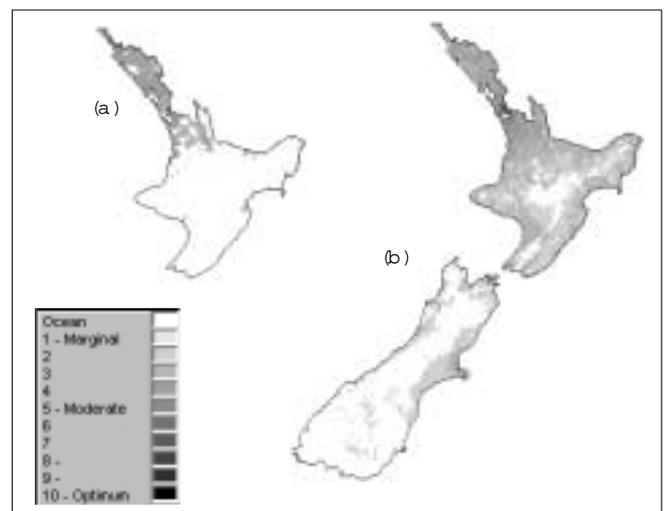


Figure 2. Dengue fever risk maps for *Aedes albopictus* for: (a) present average climatic conditions; and, (b) a high-range climate change scenario for 2100.

Discussion

This study confirms that there is a risk of dengue fever in New Zealand and that greenhouse gas induced climate change would substantially increase the magnitude and spatial extent of this risk. Conversely, it demonstrates the potential benefits of domestic and international initiatives to curb the growth in global greenhouse gas emissions.

To summarise the findings, we estimate that under present climatic conditions the greatest dengue risk is in limited, but significant, areas in the North Island and the vector would be *A. albopictus*, a less efficient vector than *A. aegypti*. Future climate change, however, may have two important outcomes:

1. Increasing receptivity of the North Island to *A. albopictus* and a change in status of the South Island from being an unlikely area of dengue risk to becoming an area of risk;
2. The change in status of the North Island (including Auckland), and therefore New Zealand itself, from an unlikely area of dengue risk from the most efficient dengue fever vector, *A. aegypti*, to an area at risk.

The limitations of the modelling approach should be considered in interpreting our results. The main limitation in developing the vector distribution modelling capability was the lack of data describing interactions between mosquito biology and climatic variables such as temperature, rainfall and humidity. The approach used, which calibrated climatic parameters against known distributions, allowed the identification of areas with climatic parameters known to be favourable for the vector, but is not fully able to account for all possible climatic variable interactions, micro-climatic conditions or weather conditions that may allow the vector to establish in areas beyond those defined by the climatic parameters used. Hence, the vector distribution model applied to New Zealand gives better information about where vectors could survive than about where they definitely can not survive. The methodology is also not able to account for specific socio-economic conditions and aspects of the human response that may modify risk, or for vector physiological and behavioural adaptability that may modify the distribution of vectors. This limits its application to the broad-scale analysis of average patterns of relative risk rather than to a more quantitative or probabilistic risk analysis.

Through this study we have constructed risk maps and modelling capability valuable for targetting and enhancing biosecurity and public health intervention measures that would comprise a direct response to present and future dengue risk. Specific measures supported might include the allocation of additional biosecurity resources to ports and airports in high risk areas, the targetting of sentinel surveillance and in the event of vector introduction or dengue fever outbreak, the guidance of delimitation surveys, and control measures.

While such measures may comprise an appropriate direct response to dengue risk, it is important to respond at a more fundamental level – that is, in terms of the drivers of risk. There is widening support for the notion that anthropogenic disruption of ecosystems may have an adverse impact on human health.²⁰ It may be argued that from a global perspective, the risk of dengue fever in New Zealand results from ecosystem disruption on three levels. First, land use change and deforestation in Asia providing a disturbed

natural environment in which *A. albopictus* thrived and proliferated.^{21,22} Second, introduction and establishment of *A. albopictus* as an alien on other continents, facilitated by increased globalisation and international trade – in particular the trade in used tyres.²²⁻²⁴ Third, anthropogenic global climate change which is likely to facilitate the increase in global distribution of dengue vectors and their establishment in countries such as New Zealand.

These trends and the HOTSPOTS analysis lend support to the argument that disrupted ecosystems and an anthropogenically altered climate system may have an important influence on human health risks. This highlights the need for a broader ecological understanding of the determinants of health – an understanding that may require revision of current definitions of human health and, where appropriate, modification of pathways of social, economic and technological development.

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Limiting the use of gastrointestinal decontamination does not worsen the outcome from deliberate self-poisoning

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Abstract

Aim. To review the current epidemiology of patients with deliberate self-poisoning presenting to Christchurch Emergency Department, and to compare this with 1996, 1992, and 1989 data.

Methods. A retrospective analysis of computer and case records over the twelve-month period of 1999 was conducted and compared with published data from 1996, 1992 and 1989.

Results. There were 561 presentations of deliberate self-poisoning to Christchurch Hospital, representing 0.87% of total presentations (compared with 1.1% in 1996, 1.2% in 1992, and 1.0% in 1989). The female to male ratio was 2.2:1.0 (compared with 1.9:1.0, 1.5:1.0, and 2.1:1.0). The principal drugs ingested were antidepressants 30.8% (compared with 20.1%, 24.4%, 15.7%), paracetamol 23.5% (compared with 16.7%, 16.9%, 10.6%), benzodiazepines 23.0% (compared with 11.1%, 23.6% 22.8%) and antipsychotics 17.8% (compared with 10.7%, 16.1%, not

reported). Gastrointestinal decontamination was performed in only 14.4% of patients (compared with 61%, 73%, 61%). Activated charcoal was given alone in 13.2% (compared with 54%, 46%, 0.4%), activated charcoal and gastric lavage in 0.7% (7%, 26%, 53%), and whole bowel irrigation in 0.5% (not recorded in previous papers). 70.4% were admitted (compared with 69%, 59%, 64%), 7% to intensive care (10.2%, 10.6%, 18%). There were two deaths (compared with 6, 2 and 2).

Conclusions. Over the time periods studied the drugs ingested and admission rates remain similar, although a large proportion are now being observed in the emergency short stay ward, reducing admission rates to the ward and intensive care. Trends in gastrointestinal decontamination have changed dramatically over the four time periods, but there has been no worsening in the outcome of patients with deliberate self-poisoning.

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Deliberate self-poisoning (DSP) as a suicide or parasuicide attempt, is a common reason for patients to present to emergency departments. Presentations to Christchurch Hospital Emergency Department for this reason have been reviewed for the periods 1989,¹ 1992,² and 1996.³ These publications have shown a trend in the management of patients with DSP, in particular describing dramatic changes in the choice of gastrointestinal decontamination. Since these publications there have been further changes in the management of patients with DSP. The aim of this study was to review a further twelve months of patient presentations to Christchurch Hospital Emergency Department with DSP to determine whether changes in practice might have had an influence on outcome.

Methods

Christchurch Hospital provides a sole Emergency Department servicing approximately 330 000 patients in the Christchurch urban area, covering approximately 452 km². The Emergency Department receives approximately 65 000 patient visits per annum and all patients who attend have details recorded on a computer database, including reason for presentation, diagnosis on discharge from the department and interventions received.

For the period 1 January to 31 December 1999, the computer database was used to identify all patients with a discharge diagnosis of DSP. The Emergency Department records and inpatient hospital notes were reviewed and data were collated regarding age, gender, drugs ingested, treatment given, disposal of patients, length of stay and whether psychiatric assessment was sought. These data were compared to previous data regarding presentations in 1989, 1992 and 1996. In keeping with the previous reviews, only patients with DSP were included, so that accidental ingestion of poisons, alcohol intoxication without deliberate self-poisoning, children under the age of fourteen years, and recreational drug abuse were excluded from the analysis. Patients who deliberately self-poisoned with carbon monoxide inhalation were analysed separately from those who had deliberately self-poisoned by ingesting a drug or a substance. This is in keeping with the previous publications and with the observation that this group of patients differs significantly from those who ingest poisons.

Results

There were 561 presentations of DSP to Christchurch Hospital during this study period, representing 0.87% of the

total presentations (64 343). The comparison with the other time periods for this and other data is presented in Table 1. The female to male ratio was 2.2:1 and the average age was 31.8 years (range of 14-82 years). 57.9% of patients ingested only one drug, 22% ingested two drugs and 10.5% ingested three drugs. The most popular drugs ingested were the antidepressants (30.8%), paracetamol (23.5%), benzodiazepines (23%), and antipsychotics (17.8%). Table 2 shows a full list of drugs ingested.

Gastrointestinal decontamination was performed in only 81 patients (14.4%). Specifically 13.2% of patients were given activated charcoal alone, 0.7% were given activated charcoal and gastric lavage, 0.5% were given whole bowel irrigation and 85.6% received no gastrointestinal decontamination at all.

70.4% of patients were admitted, 7% of these being to the Intensive Care Unit, 19.1% to a general medical ward, 0.4% to surgical specialties and the remainder were observed in the Emergency Department short stay observation ward. The short stay observation ward caters for patients who stay less than eight hours, unless they present late at night, when they remain overnight to be reviewed by the psychiatric team next morning.

There were two deaths in the twelve month period. The first was a deliberate heroin overdose and the second a poly-drug overdose consisting of morphine, diazepam, temazepam, prednisone and ethanol. Both deaths were in males in their 30s.

66.3% of patients had psychiatric follow up prior to discharge from hospital, another 18.4% were seen by the psychiatric services and transferred to a psychiatric hospital, 4.1% were discussed with the psychiatric service over the telephone and 1.4% left the hospital or refused to see the psychiatric team. Only 8.7% of patients were not referred to the psychiatric service.

Carbon monoxide data were reviewed separately. There were 29 patients who had deliberately self-poisoned with carbon monoxide and presented to the Emergency

Table 1. Frequency and proportion of presentation, drugs ingested, gastrointestinal decontamination received, and outcome.

	1989	1992	1996	1999	p value for frequencies	p value for proportions
Total presentations	55313	51832	64818	64343	0.19	-
No. of DSP (% of Total)	531 (1.0)	622 (1.2)	713 (1.1)	561 (0.9)	<0.0001	<0.0001
Female to male ratio	2.1:1.0	1.5:1.0	1.9:1.0	2.2:1.0	-	0.21
Antidepressants (%)	85 (15.7)	149 (24.4)	143 (20.1)	173 (30.8)	0.09	<0.0001
SSRIs (%)	NR	21 (3.4)	57 (8.0)	94 (16.8)	0.003	<0.0001
TCAs (%)	85 (15.7)	124 (19.6)	71 (10.4)	72 (12.8)	0.92	0.11
MAOIs (%)	NR	9 (1.5)	12 (1.7)	7 (1.2)	0.25	0.53
Paracetamol (%)	58 (10.6)	106 (16.9)	121 (16.7)	132 (23.5)	0.49	0.004
Benzodiazepine (%)	122 (22.8)	149 (24)	78 (11)	129 (23)	0.0004	<0.0001
Antipsychotics (%)	NR	100 (16.1)	76 (10.7)	100 (17.8)	0.07	0.0004
Activated charcoal alone (%)	2 (0.4)	286 (46)	385 (54)	74 (13.2)	<0.0001	<0.0001
Activated charcoal & gastric lavage (%)	281 (53)	162 (26)	50 (7)	4 (0.7)	<0.0001	<0.0001
Whole bowel irrigation (%)	NR	NR	NR	3 (0.5)	-	-
No gastrointestinal decontamination (%)	39	27	39	85.6	<0.0001	<0.0001
Admission (%)	350 (66)	367 (59)	491 (69)	395 (70.4)	0.001	0.56
ICU admission (%)	96 (18)	68 (10.6)	73 (10.2)	39 (7)	0.001	0.04
Death (%)	2 (0.38)	2 (0.32)	6 (0.84)	2 (0.36)	0.16	0.28

SSRIs = Selective serotonin reuptake inhibitors. TCAs = Tricyclic antidepressants. MAOIs = Monoamine oxidase inhibitors. NR = not recorded. P values derived using chi-squared and comparing 1999 with 1996 figures.

Department in this time period compared with 34 patients in 1996. Of these 18 (62.1%) were male (compared with 76.5% in 1996) and 69% were admitted to hospital. There were no fatalities in this group.

Discussion

There was a reduction in the number and proportion of presentations for DSP between 1996 and 1999. DSP, however, accounted for approximately 1% of patient presentations (approximately 600) during each of the four study periods. The female to male ratio of approximately 2:1 and an average age of approximately 32 years, remained constant.

Agents used for DSP are commonly those readily available to the patient, either because they are prescribed or because they are easily purchased. Hence, antidepressants, antipsychotics, benzodiazepines and paracetamol remain the favoured agents. It is interesting that the proportions of patients taking antidepressants, paracetamol, benzodiazepines and antipsychotics have increased since the last review, although the frequency of presentations for these drugs shows less significant change. In addition, comparison with the 1992 and 1989 data suggests that the only sustained trends for DSP are an increasing use of paracetamol and antidepressants, and the increase in antidepressant use is due to increased use of selective serotonin reuptake inhibitors with no change in the use of the other classes of antidepressants. The observation that the increased use of selective serotonin reuptake inhibitors has not resulted in a decreased use of potentially more dangerous antidepressants for DSP, is noteworthy.

The proportion of DSP to total admissions to hospital has not changed significantly over the time periods, although practice has changed so that now a significant proportion are observed in a short stay ward, managed by the Emergency Department staff rather than being admitted to inpatient teams. The admission rate to the Intensive Care Unit has declined over the periods studied. There are two possible reasons for this. Firstly, the Emergency Department has a greater ability to deal with unwell patients than before. Secondly, it may reflect a population of patients who were less unwell than in previous study periods. However, the type of patient, the drugs ingested, and the total rate of admission suggests that the study populations were similar.

Gastrointestinal decontamination trends have changed dramatically in Christchurch over the study periods, and

previous changes have been discussed.⁴ The options available for gastrointestinal decontamination include induction of emesis (syrup of ipecacuanha), consumption of activated charcoal orally or via a nasogastric or orogastric tube, gastric lavage or whole bowel irrigation. Choice of these modalities has been heavily influenced by previous work in our Department and elsewhere and by the influential position statements of the American Academy of Clinical Toxicology (AACT) and the European Association of Poisons Centres and Clinical Toxicologists (EAPCCT) published in 1997.⁵ In these position statements, which reviewed the published literature for gastrointestinal decontamination after poisoning, the evidence base for each modality was questioned.⁶ Ipecacuanha-induced emesis is no longer an option in New Zealand as the syrup is no longer available. Demand had declined over the years as evidence mounted that its efficacy in recovering the toxin was poor and variable.⁵⁻⁹ In addition, its use delayed the administration of activated charcoal and it could not be given to patients who had ingested corrosive or volatile substances or who had (or may develop) an altered level of consciousness or convulsions.⁵⁻⁹ In Christchurch ipecac induced emesis was offered to 25% of DSP patients in 1989, but was not used in 1996 or 1999.

Gastric lavage using a large orogastric tube and lavaging with water, is now used infrequently in our Department. This is in keeping with the position statements of the AACT and EAPCCT⁵ which question its usefulness and suggest it should only be used within 60 minutes of the ingestion of a life threatening poison, where the patient has an intact airway, and not after the ingestion of corrosive substances.

Whole bowel irrigation with, for example, polyethylene glycol may have value in removal of substances not absorbed by activated charcoal such as iron, lead, zinc or packets of illicit drugs. However, there is no conclusive evidence of its value and, as a consequence, this modality is employed infrequently at Christchurch Hospital.

Single dose activated charcoal can be given orally as a drink or via a nasogastric or orogastric tube (after gastric lavage), to promote binding and excretion of the toxin. This was our preferred modality in 1992 and 1996 for drugs known to be adsorbed by charcoal. However in 1999, only a small proportion of patients received activated charcoal and this, too, is in keeping with the position statements of the AACT and the EAPCCT. There is no evidence that activated charcoal improves the clinical outcome, although

experimental studies suggest it has some efficacy. In particular, it is recommended that it only be given to patients presenting within one hour of the ingestion, if the ingested is bound by activated charcoal, and if the patient is alert and willing to take the activated charcoal by mouth.⁶

Table 2. Drugs ingested.

Drug	Taken alone or in combination (patient numbers)	% of cases
Antidepressants (total)	173	30.8
TCAs	72	12.8
MAOI	7	1.2
SSRI	94	16.8
Paracetamol	132	23.5
Hypnotics/Anxiolytics (total)	182	32.4
Benzodiazepines	129	23.0
Zopiclone	53	9.4
Antipsychotics (total)	100	17.8
Phenothiazines	73	13
Butyrophenones	8	1.4
Diphenylbutylpiperidines	2	0.4
Atypical antipsychotics	17	3.0
Opiates	60	10.7
NSAIDs (total)	53	9.5
Aspirin	19	3.4
Other NSAIDs	34	6.1
Anticonvulsants	50	8.9
Combined Preparations (total)	34	6.1
Mersyndol	2	0.4
Digesic	9	1.6
Orthoxicol	1	0.2
Coldrex	1	0.2
Paradex	7	1.2
Codcomol	12	2.1
Ergodril	1	0.2
Diacheck	1	0.2
Promethazine	20	3.6
Anticholinergics	16	2.9
Lithium	14	2.5
Antihypertensives	12	2.1
Thyroxine	7	1.2
Antihistamines (excluding promethazine)	8	1.4
Antibiotics	8	1.4
Adrenergic agonists	6	1.1
Diuretics	6	1.1
Steroids	3	0.5
Insulin	3	0.5
Antimigrane medications	5	0.9
Decongestants	3	0.5
Others - Prescription	19	3.4
Other - Over the Counter	1	0.2
Other - Household Substances	19	3.4
Unknown Agents	12	2.1

SSRIs = Selective serotonin reuptake inhibitors. TCAs = Tricyclic antidepressants. MAOIs = Monoamine oxidase inhibitors. NSAIDs = Non steroidal anti-inflammatory drugs.

The AACT and the EAPCCT have recently published guidelines for the use of multidose activated charcoal, which state that it should be considered if the patient has ingested a life threatening amount of carbamazepine, dapson, phenobarbital, quinine or theophylline as it may obviate the need for extra corporeal techniques.¹⁰ Multiple dose activated charcoal is used to enhance the elimination of drugs already absorbed into the body and, as such, it is a method of elimination, and not a form of gastrointestinal decontamination. No patients in our review received multiple dose activated charcoal.

Of the evidence to support the use of gastrointestinal decontamination techniques, there are only a handful of

clinical studies⁵ and these have tended to randomise patients to gastric lavage with or without activated charcoal, or activated charcoal alone. They have not included randomisation of patients to no gastrointestinal decontamination. Although this review of patients presenting to Christchurch Hospital Emergency Department involves a comparison of four time periods, and patients were not randomised to any modalities, it does provide observations not made previously. In each of the study periods, the proportion of patients attending, the female to male ratio, the age distribution and the poisons ingested were similar. However in 1989 the largest proportion of patients received gastric lavage with only a small number receiving activated charcoal alone and approximately one third receiving no gastrointestinal decontamination. In 1996, over one half of patients received activated charcoal alone and less than one quarter received no gastrointestinal decontamination. Although the measures of outcome are crude, there was no significant difference in the proportion admitted to hospital, there was a reduction in rate of admission to ICU, and there was a trend towards a decreasing proportion who died, although this did not change significantly.

Although there were minor differences in the presenting patient population with time, none would be expected to result in an improved outcome independent of the treatment they received. There may have been other differences not measured, and there may be further unrecognised differences in practice which were influential. Nevertheless, this study suggests that limiting the use of gastrointestinal decontamination does not worsen the outcome for patients with DSP.

In summary, patients requiring gastrointestinal decontamination continue to present to Christchurch Hospital Emergency Department. The population appears to be a reasonably stable one in terms of numbers, gender, age, and drugs ingested over the four time periods. The comparison of these four time periods suggests that the Emergency Department has taken on far more of the management of these patients by admitting fewer to the ICU and by keeping patients for observation, who would otherwise have been admitted to medical wards. In addition, and most significantly, it appears likely that limiting the use of gastrointestinal decontamination does not worsen the outcome for these patients.

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Health of farmers in Southland: an overview

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Abstract

Aim. To describe the health of farmers in Southland.

Methods. Cross-sectional study of a random sample of farmers in Southland.

Results. 586 individuals were interviewed from 286 farms with a response rate of 65.4%. The prevalence of at least one injury in the last twelve months which prevented normal farm work was 17.1%. Low back pain was common with 54.6% reporting such an episode in the last twelve months. Noise-induced hearing loss was prevalent among men with 28.7% of those 45 years and over being affected. Levels of asthma appeared low with a point prevalence of

6.8%, with 4.6% on medication. There were 19.3% of male farmers who were obese. The prevalence of alcohol use disorder among men aged 15-24 years was 57.4%, and 39.0% among farm workers. Similarly, 32.0% of men in this age-group smoked, with 35.6% of farm workers being smokers.

Conclusions. Farmers experienced high levels of injury, low back pain and noise-induced hearing loss. Community intervention programmes to prevent injury remain a priority for farmers, although lifestyle factors should also be addressed, particularly among farm workers.

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Agriculture is a vital industry for New Zealand employing 20% of the workforce in Southland.¹ It is also a hazardous occupation with a wide variety of physical, chemical, biological and psychosocial exposures. Farmers have the second highest occupational mortality rate and the second highest number of new claims for workers' compensation among New Zealand occupational groups.^{2,3} Little is known about occupational disease among farmers as adequate surveillance systems do not exist to collect this information. Overseas studies have shown that farmers may experience high rates of work-related fatal injury, stress, poorer mental health, suicide, respiratory and musculoskeletal disorders, infectious diseases, chemical poisoning and cancers such as of the lymphatic and haemopoietic systems.⁴ However, the agricultural methods and work practices in other countries are likely to be different compared with New Zealand, particularly as stock are not housed for the winter here, so that exposures for New Zealand workers may differ due to variations in climate and farming methods. This study was carried out to describe the health of farmers in Southland.

Methods

This was a cross-sectional study where participants were identified from a random sample of farms selected from the public land valuation roll, where the telephone number of the farm owner could be found in the telephone book. All male and female farmers (owner/occupier of the property and their partner and other relatives), and all farm workers (an individual who worked on the farm full or part time for a wage) aged fifteen years or over were invited to take part. With 500 farms and a response rate of 60%, a proportion of 50% (estimated prevalence of low back pain) has a 95% confidence interval (CI) of at most ten wide (i.e. from 45-55%). About a predicted proportion of 7% (estimated prevalence of chemical related illness) the 95% CI is at most six wide.⁵

Each farmer was mailed an introductory letter, followed by a telephone call within two weeks by an experienced occupational health nurse. Three attempts were made to contact each farmer. All farmers and farm workers were invited to complete a questionnaire which included questions on general health, respiratory health (adapted from the Medical Research Council questionnaire), mental health using the 12 point General Health Questionnaire (GHQ), alcohol use using the Alcohol Use Disorders Identification Test (AUDIT), musculoskeletal health, noise exposure and chemical related illness.⁶⁻⁸ A score of two or more in the GHQ indicates psychological distress and a score of eight or more in AUDIT indicates an alcohol use disorder. Audiometry (using a Voyager 502 automatic screening audiometer, and measuring at 0.5, 1, 2, 3, 4, 6, 8 kHz), spirometry (using a Vitalograph 2120 hand held storage spirometer), blood pressure, height and weight were also measured. Moderate to severe hypertension was defined as a systolic greater than or equal to 160 mm Hg or a diastolic greater than or equal to 100 mm Hg and mild hypertension

as a systolic equal to 140-159 mm Hg or a diastolic equal to 90-99 mm Hg.⁹ Noise induced hearing loss (NIHL) was defined as: that the threshold at 4 kHz was at least 30dB and was 15dB worse than the 2 kHz threshold, and the threshold at 6 kHz was better than that at 4 kHz.¹⁰ A chemical related illness was self-reported illness associated with exposure to any chemical currently used.

Results

The response was 65.4% of farms, with 586 farmers taking part on 286 farms. Of the original 477 identified properties, 134 owners were contacted but declined to take part, 17 could not be contacted and 40 were ineligible as they were no longer farming. Of the 586 respondents, 65% were male and 35% were female, with 98.8% being European. The age and sex distribution is shown in Table 1. The majority (79.9%) of respondents were farm owners or family members, 10.1% were farm workers, 4.6% sharemilkers, and 2.7% farm managers. Two thirds of farm workers were 15-24 years, and 79.7% were male.

Table 1. Percentage and number of farmers by age group and sex.

Age-group (years)	Men		Women		Total	
	%	(n)	%	(n)	%	(n)
15-19	6.0	(23)	2.9	(6)	4.9	(29)
20-29	11.8	(45)	11.7	(24)	11.8	(69)
30-39	26.5	(101)	27.3	(56)	26.8	(157)
40-49	24.9	(95)	30.2	(62)	26.8	(157)
50-59	21.8	(83)	21.5	(44)	21.7	(127)
≥ 60	8.9	(34)	6.3	(13)	8.0	(47)
Total	100.0	(381)	100.0	(205)	100.0	(586)

Health status by sex is shown in Table 2. Smoking levels were low overall at 12.5%, but 35.6% of farm workers smoked and 32.0% of men aged 15-24 years smoked. There were 57.4% of men aged 15-24 years, and 39.0% of farm workers who had an AUDIT score ≥ 8. For mental health, 41.7% of women aged 15-24 years scored two or more on the GHQ compared with 16.3% of men in the same age-group, although the numbers were small. Chemical related illness was experienced by 23.6% of men and 10.7% of women. The most common type of health problem was skin rash (22.1%), headaches (20.9%), irritation of mucous membranes (14.1%), and nausea and diarrhoea (12.3%). For hearing loss, 10.0% of farmers aged 25-44 years had a NIHL and 28.7% of those 45 years and over (28% of those aged 45-64 years,

and 31% of those aged 65 years and over). Bilateral hearing loss was uncommon as 11% of cases were in this group. The remaining unilateral hearing losses were evenly distributed between right and left ears.

Table 2. Number and percentage of health problems in farmers by sex.

Health problem	Men Total (n)	Men % (n)	Women Total (n)	Women % (n)	Total % (n)
Current chronic bronchitis	381	4.2 (16)	205	2.9 (6)	3.8 (22)
Current asthma	381	5.8 (22)	205	8.8 (18)	6.8 (40)
Asthma medication	381	4.5 (17)	205	4.9 (10)	4.6 (27)
Hay fever	381	30.4 (116)	205	31.7 (65)	30.9 (181)
Current smoker	381	14.2 (54)	205	9.3 (19)	12.5 (73)
LPB last 12 months	381	57.0 (217)	205	50.2 (103)	54.6 (320)
GHQ ≥ 2	377	20.2 (76)	203	19.7 (40)	20.0 (116)
Audit ≥ 8	381	19.9 (76)	203	3.9 (8)	14.4 (84)
NIHL	380	17.1 (65)	205	1.5 (3)	11.6 (68)
BMI ≥ 25 and < 30	379	44.9 (170)	198	32.3 (64)	40.6 (234)
BMI ≥ 30	379	19.3 (73)	198	19.2 (38)	19.2 (111)
Mild hypertension	380	1.1 (4)	204	6.4 (13)	2.9 (17)
Moderate/severe hypertension	380	3.9 (15)	204	1.5 (3)	3.1 (18)
FVC < 80% predicted	378	1.3 (5)	204	2.0 (4)	1.5 (9)
FEV1% < 75% predicted	378	14.0 (53)	204	10.3 (21)	12.7 (74)
Injury	381	20.7 (79)	205	10.2 (21)	17.1 (100)
Skin cancer (excl. Melanoma)	381	2.6 (10)	205	3.4 (7)	2.9 (17)
Leptospirosis	381	1.8 (7)	205	1.0 (2)	1.5 (9)
Arthritis in hips/knees	381	6.0 (23)	205	5.9 (12)	6.0 (35)
Chemical related illness	381	23.6 (90)	205	10.7 (22)	19.1 (112)

The prevalence of at least one injury in the last twelve months was 17.1% for events which prevented normal farming duties, with about half of these considered work-related. Among farm owners/family members it was 16.2%, 18.6% for farm workers and 25.6% for managers/sharemilkers (Table 3).

Table 3. Percentage and number of health complaints by occupational group*.

Health Problem	Occupational group		
	Owner/family member (n = 468)	Manager/sharemilker (n = 43)	Farm Worker (n = 59)
	% n	% n	% n
Current asthma	6.8 (32)	7.0 (3)	3.4 (2)
Hay fever	31.6 (148)	32.6 (14)	28.8 (17)
Current smoker	9.2 (43)	11.6 (5)	35.6 (21)
LBP last 12 months	55.3 (259)	51.2 (22)	52.5 (31)
GHQ ≥ 2	19.9 (93)	16.3 (7)	25.4 (15)
AUDIT ≥ 8	10.5 (49)	23.3 (10)	39.0 (23)
NIHL	13.9 (65)	4.7 (2)	1.7 (1)
BMI ≥ 25 and > 30	45.5 (213)	39.5 (17)	27.1 (16)
BMI ≥ 30	21.8 (102)	14.0 (6)	10.2 (6)
FVC < 80% predicted	1.5 (7)	0.0 (0)	1.7 (1)
FEV1/FVC < 75%	13.2 (62)	4.7 (2)	10.2 (6)
Injury	16.2 (76)	25.6 (11)	18.6 (11)
Chemical related illness	19.4 (91)	27.9 (12)	15.3 (9)

* Excludes sixteen respondents not classified into one of these three groups.

Discussion

This is the first study in New Zealand that has examined the health of farmers involving farm visits and health checks. Postal studies have been carried out in the past but these have not involved face-to-face interviews.^{5,11,12} Southland farmers had a point prevalence for asthma of 6.8%, with 4.6% currently taking asthma medication, and 12.7% had an FEV1/FVC below 75%. A national population survey found a twelve month period prevalence of asthma of 15.5% in

those aged 15-44 years, with 8.3% of men aged 35-44 years with asthma, and with 6.9% on medication.¹³ In our study, 7.1% of men aged 35-44 years had current asthma with 5.7% taking medication. A postal survey of New Zealand farmers found a 12 month period prevalence of asthma of 11.8%, with the highest rate being found among pig farmers (18.2%).¹¹ A study of farmers in Denmark found a reported asthma prevalence of 7.7% and in France 5.3%.^{14,15} Southland farmers had a prevalence of hay fever of 30.9% which was significantly lower than the 36.7% found in a selected sample of regional populations.¹⁶

Poor mental health, stress and suicide are believed to be particular problems for farmers, however the Southland group had lower levels of psychological disturbance than the national population at 25%.^{4,17} A significantly lower proportion of Southland female farmers had a psychological disturbance compared to the national population at 30%, although Southland women aged 15-24 years with a level of 41.7%, were very similar to a comparably aged national population.¹⁷ In a study of psychiatric disorder among rural and urban women in New Zealand there was no difference in mental health scores between rural and urban women.¹⁸ In a US study it was found that male farmers had similar levels of depression and positive affect compared with other occupational groups but with different factors causing stress. For example, farmers were more affected by financial events and family conflict whereas nonfarmers were more affected by low incomes and adverse events happening to friends.¹⁹

Southland farmers had high rates of injury, with a quarter of managers/sharemilkers experiencing one injury or more in the previous twelve months. Farmers in New Zealand have the second highest work-related fatal injury rate at 20/100 000, just behind drivers and mobile machinery operators, (many of whom work on farms) and the second highest number of new claims for workers' compensation behind labourers.^{2,3} Many other countries including Canada, USA and Australia have very high rates of injury among farmers.²⁰⁻²²

The prevalence of low back pain among Southland farmers was nearly twice that of the national population.¹⁷ In the USA, 26% of farmers reported an episode of back pain lasting for a week or more in the previous twelve months, with forestry and horticultural farmers having higher rates.²³ Although there is evidence that back injury is associated with heavy workloads and manual handling, driving and vibration, other factors may also be involved including lack of regular physical activity.²⁴

High proportions of Southland farmers were overweight or obese. Slightly more Southland male farmers were overweight compared to the national population (at 40.4%), and 19.3% of male farmers were obese compared with 14.7% in the national population.²⁵ The proportions for female farmers were very similar.²⁵ These differences were not completely explained by differences in age distribution between Southland farmers and the national population. There is evidence from elsewhere that activity levels among farmers are not as high as might be supposed and that much time is spent driving vehicles, interspersed with short episodes of intense activity (such as manual handling). These work patterns may be contributing to higher BMIs and low back pain.²⁶

Hearing loss was common among Southland farmers as 17.1% of men had a NIHL. NIHL is known to be common among farmers.⁴ In the USA it was found that farmers had a 10 dB higher threshold on average compared to non-farmers, with a greater loss at 4 and 6 kHz and 10% of farmers aged 30 years, 30% of farmers aged 40 years and 50% of farmers aged 50 years had a higher frequency hearing loss.²⁷ These figures were very similar to the rates found in Southland

where 10% of farmers aged 25-44 years had a NIHL, 28% of those aged 45-64 years, and 31% of those aged 65 years and over, although the method for determining NIHL was different in this study.

Use of tobacco and alcohol were lower among Southland respondents compared to the national population as 12.5% of Southland farmers were smokers compared with 25% in the national population, and 14.4% of Southland farmers scored as having an alcohol use disorder compared to 17.3% of the national population.¹³ However, Southland farm workers had a higher level of alcohol use disorder and smoking. More men in the Southland group aged 15-24 years smoked compared with the national population, where 25% of males 15-24 years smoked. Also, for Southland men 15-24 years, 57.4% had an alcohol use disorder compared with 41% nationally.¹⁴ A study of US farmers and farm workers found that farm workers had higher rates of alcohol use and injury but fewer chronic diseases than farm owners.²⁸

Although a higher response rate would have been preferable in this study the prevalence of injury and illness reflects patterns found elsewhere.^{4,21} Selection bias may have arisen through use of the valuation rolls as the sampling frame, as only those farmers who could be identified in the telephone book were included. Recall bias may have occurred for events which took place in the past although injury events in the previous twelve months are usually recalled with reasonable accuracy.²⁹ A survivor bias may have occurred if farmers who had become ill or injured had left farming. However, it has been found that farmers were less likely than other occupational groups to retire or change jobs for a health reason. Conversely, farm workers were more likely to do so, the main reasons being economic dissatisfaction and illness.³⁰

This study has found that Southland farmers experienced the same or better mental health compared to the national population but experienced higher levels of obesity. Health problems peculiar to farmers included high levels of injury, low back pain, NIHL and chemical related illness. A particular problem exists for young men in Southland in relation to tobacco and alcohol consumption. Community based intervention programmes targeting injury in the broadest sense as well as health promotion programmes for diet, aerobic physical activity and drug consumption are required.

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PRELIMINARY COMMUNICATION

The Healthline pilot: call centre triage in New Zealand

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Abstract

Aims. To acquaint New Zealand doctors about nurse telephone triage using call centre technology, and to report the activities of Healthline, a pilot call centre telephone triage project in New Zealand.

Methods. Data for the second quarter of Healthline's activities are reported.

Results. Healthline received about 100 calls a day, mostly after hours, and typically from symptomatic patients seeking health advice. Women and children were the most frequent users; Maori used the service in proportion to their representation in the population. Common symptoms were similar to those encountered in primary medical care.

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Requests for specific health information were usually about the health issues of the day. Callers were more often directed to contact general practitioners than any other care providers. The triage advice provided was often different from the caller's original intention about the timing and kind of care they would have sought. Satisfaction with the service among Maori and non-Maori callers was high.

Conclusions. Healthline is providing a safe and acceptable primary care triage service in its pilot regions and appears to be meeting its first objective of providing timely and appropriate access to health advice and services.

Call centre technology has progressed quickly so telephone access to a single site is now available for large populations and for endeavours as diverse as banking, travel, computer assistance, and now health advice. Health call centre services range from primary triage to determine the level and timing of care needed, to the management of chronic illness.¹

Nurses in general medical practices and emergency departments have traditionally triaged calls, and are effective in reducing doctor workload.² In fact general practitioners (GPs) currently bear most of the cost of nurse telephone consultation and benefit least from the savings.³ The application of call centre technology means nurses working from a remote site can use decision support software to receive, assess and manage calls from patients or their carers. The safety and effectiveness of telephone triage by nurses have been demonstrated in Britain.^{4,5} In the United States over 90% of callers were satisfied with a nurse triage service,⁶ the service was cost-effective⁷ and adherence to advice was similar to that for telephone-based physician recommendations. We present here data from the second quarter of a pilot telephone triage project, Healthline.

Methods

Healthline began in 2000 in four pilot areas: Gisborne and East Coast North Island, Northland, Westland and Canterbury. Evaluation of the results will determine whether the service is extended nationwide after two years. The Health Funding Authority's primary objective was to increase timely and appropriate access to health advice and services by population groups which had poor access or utilisation.

Healthline uses decision software in the form of binary chain logic algorithms to support its nurses. The algorithms were designed to help the nurse rule out important conditions (however rare), and stop at the condition that cannot be excluded; they thus set the level and timing of the intervention. There are over 570 symptom-based algorithms, and over 1200 self care instructions. The algorithms are able to triage patients safely to appropriate care, while at the same time providing comprehensive automated call documentation and reporting for analysis, risk management and quality improvement.^{6,7} The algorithms have been shown to triage more callers from emergency departments to GPs and self care than either protocols, guidelines or nurse judgement alone, and to do so safely.^{6,7}

Callers telephone a free 0800 number 24 hours a day seven days a week. The nurse creates a caller chart, identifies the caller region, records the clinical complaint and selects and traverses the appropriate algorithm, reaches a triage outcome or endpoint, delivers access options searches for an appropriate provider or offers self care advice and refers if necessary.

Endpoints of the call are:

- **Emergency:** immediate ambulance transfers and call out required.
- **Urgent care:** caller is advised to seek care via emergency department (ED) or GP within 2-24 hours.
- **Speak to provider (STP):** caller is advised to speak to their/a GP within time specified (2-24 hours).
- **Appointment:** caller is advised to seek care at GP during regular hours; 3 day or 2-week timeframe specified.
- **Self care:** caller is advised of self-care measures. Follow up call is offered.

Data collected by Healthline's automated call documentation software are normally analysed for risk management and continuous quality improvement purposes, but have also been used to provide quarterly reports to the Health Funding Authority. The second quarterly report covered 1 August to 31 October 2000 and provides the basis for this paper. The second quarter was chosen because of the unrepresentative nature of many of the calls during the first quarter as callers were familiarising themselves with the service.

Results

Healthline received 9400 calls from 1 August – 31 October 2000. Weekly call volume ranged from 520 to 939. The average weekly call volume was 706, or 101 calls a day. The overall utilisation rate (the assumed annual use of the service by the pilot population) for the quarter was 5.7%. 67% of calls were made outside business hours (Figure 1). 68% were symptomatic (an algorithm was accessed and a triage completed), 14.9% were for general health information (asymptomatic caller) and 4.9% were seeking information on local health services. 'Other' - 12% - were immediate hang-ups: children ringing, wrong numbers and unknown, callers requesting referral to nonmedical services Healthline could not support, business enquiries, compliments from patients and calls to advise of patient outcome.

67% of Healthline callers were women or girls. Those aged 0-16 years were the largest group (39%), and those aged 17-35 years (34%) the second largest.

Adult algorithms were most commonly used, and those for the elderly least. 47% of the adult calls were triaged using the 20 most used adult algorithms, and 73% of paediatric calls using the 20 most used paediatric algorithms (Table 1).

Often, callers with no symptoms (as opposed to those seeking triage for symptoms) sought health information. The health topics asked for most often were those topical at the

time – whooping cough, chickenpox, meningitis, hand-foot-and-mouth disease, hepatitis, Depo-Provera.

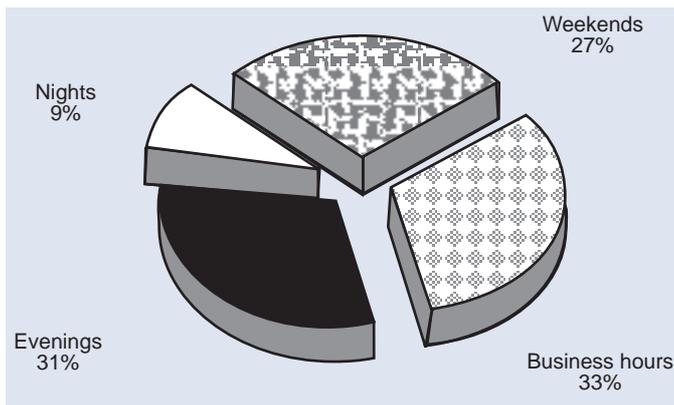


Figure 1. Timing of calls.

For symptomatic calls 2% resulted in advice to call 111, 11% to seek urgent care, 27% to speak to provider (usually the GP), 16% to make an appointment with the provider and 44% to self care.

Table 1. The twenty most commonly used adult and paediatric algorithms: percent frequency.

ADULT	percent	PAEDIATRIC	percent
Abdominal pain	7.1	Vomiting	11.3
Skin problems	3.8	Skin rash	10.3
Lightheaded weak dizzy	3.0	Upper respiratory illness	6.5
Chest pain	3.0	Paediatric cough	6.3
Patient not available	3.0	Diarrhoea	5.2
Upper respiratory illness	2.7	Abdominal pain	3.9
Sore throat	2.6	Provider evaluated cough	3.5
Cough	2.5	Eye problems	3.3
Headache new	2.4	Temperature	3.3
Diarrhoea	2.3	Crying baby	2.9
Vomiting	1.9	Trauma head	2.7
Trauma limb	1.8	Constipation	2.2
Irregular menses	1.8	Ear pain	2.2
Lumps masses swollen glands	1.5	Stuffy nose	1.9
Lower back pain	1.4	Headache new	1.6
Depression	1.4	Stool abnormalities	1.4
Numbness	1.4	Oral problems	1.4
Dysuria	1.3	Sore throat	1.4
Painful red or swollen eye	1.2	Urinary complaints	1.3
Vaginal bleeding	1.2	Possible insect bites	1.2
Total top 20	47.1	Total top 20	73.5

Symptomatic callers were asked, “What would you have done if the Healthline service had not been available?” 1050 callers had intended to use emergency or urgent care services, but only 224 (21%) of them were triaged to that level of care, and 434 (41%) were triaged to self care. Of the 2952 callers who did not intend to contact a doctor, 1486 (64%) were recommended to do so, 55 required 111 call outs, and 68 were recommended to seek care at the emergency department.

The nurse recorded whether or not the caller intended to act in accordance with the triage recommendation. Agreement with the recommendation was 94% for the quarter. Nearly all of 20 users interviewed were satisfied with the service provided, while all said they would use the service in the future.

14.1% of callers identified themselves as Maori, about the same as the 14.6% who identified as Maori in the populations of the four pilot regions. A survey of sixteen Maori callers at the end of the second quarter showed high satisfaction, likelihood of using the service again, comfort, and agreement with the nurse’s recommendation.

Discussion

Two thirds of the callers in our survey phoned outside usual business hours, and two thirds sought advice on symptom management. The pattern of symptoms and the demographics of the callers match those of primary medical care – with the important exception that the elderly were not high users of Healthline, an observation common to other countries’ telephone triage services. The high utilisation rate by parents calling about their children is consistent with overseas programmes. The high rate of after hours utilisation suggests that Healthline is filling a gap in service provision at these times.

Very often the triage advice given differed from the caller’s original intention. Only a third of those who had intended to call 111 actually required emergency care; on the other hand of those who regarded their symptom as nonurgent, about 5% were advised to call 111 or were directed to the emergency department, and about 10% to seek urgent GP care. In New Zealand as elsewhere, people have difficulty in assessing the urgency of their symptoms and the appropriate place to seek help. This ‘navigational assistance’ provided by Healthline appears to fulfil a need.

Maori used the service as much as non-Maori (in proportion to their presence in the population); they were as satisfied with the service as the overall user group.

Early results suggest that telephone triage is acceptable to the New Zealand public, fills a niche of providing advice and appears to be a valuable method of helping symptomatic people access care at the right place and at the right time, especially after hours.

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Ibuprofen induced acute renal failure in an infant

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Paracetamol has been the mainstay of analgesic and antipyretic management in children. In recent years, however, non steroidal anti inflammatory drugs (NSAIDs) have become more widely available in a paediatric dose form. This has encouraged their use in both primary care and hospital practice. We describe an infant with iatrogenic ibuprofen (Brufen) induced acute renal failure to highlight a worrying trend in prescribing policy for children.

Case report

A previously healthy nine month old girl of Maori descent presented to her family practitioner (GP) with a 24 hour history of diarrhoea, vomiting and fever. She was prescribed oral rehydration therapy (ORT), paracetamol for fever control and discharged home. Her symptoms persisted for a further 48 hours, so advice was sought once again from her GP. Her mother was advised to continue with ORT but paracetamol was changed to ibuprofen at a standard dose of 50 mg (5mg/kg/dose) three times daily. Seven doses were given over the next 40 hours, but the child's clinical state deteriorated, with drowsiness and less frequent wet nappies. She presented to the Emergency Department eighteen hours after the last dose with increasing lethargy and no wet nappies.

Examination revealed an afebrile infant who was 5% dehydrated, weighing 9.1 kg. There was a fine maculopapular rash on her trunk, her blood pressure was 90/50 and the pulse rate was 118/minute. Investigations demonstrated: serum urea 12.4 mmol/L, creatinine 0.19 mmol/L, sodium 137 mmol/L, potassium 5.6 mmol/L, blood pH 7.41, bicarbonate 17 mmol/L and pCO₂ 3.7KPa. Her stools were Rota virus positive.

In spite of an adequate fluid challenge (40 mL/kg) and 2 mg/kg of intravenous frusemide, she remained anuric and became oedematous, her weight increasing to 9.8 kg. Twelve hours after admission, her renal function had deteriorated; serum creatinine 0.21 mmol/L, urea 13.8 mmol/L, sodium 131 mmol/L and potassium 6.9 mmol/L. 20 hours after presentation, her bladder was catheterised and 13 mL of clear urine was collected. This showed 30 leucocytes, 640 red cells, no protein and no bacterial growth consistent with the clinical diagnosis of acute tubular necrosis. Shortly after bladder catheterisation, she spontaneously passed urine then passed 1037 mL over the next 24 hours. A renal ultrasound showed bilaterally hyper-echoic kidneys, consistent with the clinical diagnosis. Renal function slowly recovered and four days after admission her creatinine was 0.08 mmol/L and three weeks later was 0.04 mmol/L.

A urine specimen taken upon removal of the urinary catheter grew *E coli* with 310 white cells. She was initially treated with intravenous cefuroxime and completed a course of cefaclor. A micturating cystourethrogram six weeks later

demonstrated grade 2/5 left-sided reflux. Ongoing antibiotic prophylaxis was recommended.

Discussion

Whereas several studies of ibuprofen have shown it to have a useful role in childhood antipyresis,^{1,2} most have looked at children who are relatively well with no signs of acute dehydration. Concerns regarding the use of ibuprofen in paediatric fever and pain management have been highlighted by Lorin.³ The adverse renal effects of the drug documented in other case reports^{4,5} have been countered by a large randomised control trial in children which showed that there was no increase in the risk for gastro-intestinal bleeding or renal failure.² However, children in this trial were not significantly dehydrated during therapy. Moreover, the total number of doses of ibuprofen given to participants, was unclear. Furthermore, renal function tests were not routinely performed. Despite the size of the study, the authors admitted that they could not exclude the possibility that serious side effects could occur.

This case highlights the danger of using ibuprofen as an antipyretic in young children with an illness associated with extracellular volume depletion. The therapeutic margin for dosing is narrower than for paracetamol and when used in a clinical setting of dehydration, acute renal failure may occur even if dosing recommendations are followed.

The infant's urinary tract infection occurred after bladder catheterisation and did not contribute to her renal failure. The underlying unilateral grade 2 vesicoureteric reflux is also unlikely to have contributed although renal scintigraphy was not undertaken to diagnose acute parenchymal involvement.

Ibuprofen has been licensed in New Zealand for the treatment of fever and pain in children older than six months since 1985 (Ministry of Health, personal communication). It is our impression that ibuprofen is increasingly used for analgesia and fever control in infants and children. This case demonstrates the dangers of using ibuprofen in young children. It is our opinion that it should not be used in young children as analgesia or fever control, especially if the underlying illness is likely to be associated with dehydration. If it is used for fever control, caregivers must be alerted to its potential dangers and to discontinue treatment immediately if diarrhoea and/or poor fluid intake occurs.

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A compensation perspective on error prevention: is the ACC medical misadventure scheme compensating the right sort of injury?

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Error in medicine has emerged as a major public health concern for health care systems throughout the developed world.¹ A 2000 report by the Institute of Medicine (IOM) brought the alarming morbidity and mortality consequences of errors to a wide audience, both in the United States and internationally.² Recent studies highlight the burden of iatrogenic injury in Australia³ and New Zealand.⁴ These studies have also contributed to the discovery that most errors are not attributable to substandard care but to the actions of competent physicians practicing in health care environments that are poorly designed to prevent such errors and mitigate their consequences.

Responding to this insight, cutting-edge approaches to patient safety tend to focus on two related strategies. First, development of reporting mechanisms that can effectively track the incidence and causes of injuries; and second, design and implementation of 'systems' approaches to preventing medical injury.² In addition, researchers and policy-makers are increasingly turning to consider how the systems used to compensate patients after an injury has occurred, may affect the success of these two strategies.

In most developed countries, this means scrutiny of the impact of medical malpractice litigation on patient safety. A number of experts have opined that the adversarial nature of malpractice regimes induces silence among physicians and hospitals, frustrating efforts to understand and prevent errors.^{5,6} Moreover, it is argued that the individual, blame-oriented focus of tort law conflicts with much-needed systems-oriented efforts aimed at improving quality.⁶

In contrast, New Zealand's compensation model ostensibly avoids such vices. The ACC scheme's no-fault basis arguably places New Zealand in an enviable position for moving forward with error prevention initiatives. Nevertheless, we believe the current climate provides a valuable opportunity to examine whether the scheme is realising its potential for enhancing patient safety. In this article, we briefly evaluate the scheme from an error prevention perspective, focusing particularly on the criteria used by the ACC to determine compensable medical injuries.

The ACC medical misadventure scheme

New Zealand is unusual but not unique among developed nations in channelling compensation to victims of medical injury through a no-fault scheme. Sweden, Norway, Denmark and Finland operate similar administrative systems.⁷ Proponents of the no-fault approach tout a number of comparative advantages over litigation, including better patient access to compensation, lower administrative costs, faster resolution of claims, and uniformity among awards. In addition, the Woodhouse Commission report that led to the establishment of the ACC scheme emphasised that the prevention of accidents should be at the forefront of any compensation scheme.⁸

Despite ongoing criticisms about aspects of its performance, the ACC scheme appears to have delivered relatively well on most of these measures.⁹ New Zealand

patients enjoy one of the simplest systems in the world to navigate.⁹ Administrative costs absorb approximately 10% of the scheme's expenditures¹⁰ compared to 50-60% among malpractice systems abroad.¹¹ Governing law mandates that claims be decided within nine months, although most are settled within 3-4 months (Neville Johnston, ACC Medical Misadventure Unit – personal communication), a fraction of the waiting time for most plaintiffs in tort regimes.¹¹ Finally, fixed award schedules mean that patients with similar disability receive similar awards.

Despite these apparent successes, the scheme's progress on the injury prevention front has been disappointing in several ways. First, little effort has been made to date to capitalise on the information accumulated by the ACC on the nature and cause of the injuries that present as candidates for compensation.¹⁰ One major study currently underway (funded by Health Research Council of New Zealand to Professor PB Davis et al) seeks to remedy this situation, and there are encouraging signs of growing interest in this pursuit.¹² Nonetheless, as other countries now scramble to initiate fledgling reporting systems in the hope of providing much-needed data on how, where and why injuries occur, it is striking that this potential resource for improving the quality of healthcare has gone largely untapped.

Second, and more fundamentally, the capacity of the ACC data to present an informative picture of preventable injury in the New Zealand health care system is undercut by some critical aspects of the scheme's design. To explain this limitation it is necessary to review the compensation criteria used by the ACC from a patient safety perspective.

ACC compensation criteria

When the ACC scheme was introduced in 1972, 'medical misadventure' was left undefined, to be determined by the decision-making processes established under the enabling legislation. In 1992, the Accident Rehabilitation and Compensation Act introduced a more rigid definition of compensable injury, designating two distinct types of medical misadventure.¹³ The first type, 'medical error,' was defined as "the failure of a registered health professional to observe a standard of care and skill reasonably to be expected in the circumstances." The second type, 'medical mishap,' was defined as "an adverse consequence of treatment, when the treatment is given properly" and the adverse consequence is both "severe" and "rare". At least fourteen days hospitalisation, 28 days significant disability, or entitlement for a disability allowance constitutes severe injury, and an outcome is rare if the risk of its occurrence is 1% or less.¹³

Figure 1 contrasts the ACC criteria with those used by Sweden's Patient Insurance Compensation Fund, the largest and longest-running scheme outside New Zealand.⁷ The first two levels of the compensation inquiry are virtually identical. Both systems first seek to ascertain whether medical management in fact *caused* the injury that is the subject of the claim. Next, both systems provide immediate compensation in cases where it is determined that the treatment that led to

the injury was substandard or inappropriate. The ACC compensates such injuries as ‘medical errors.’ Figure 1 also shows that both systems establish similar thresholds for severity of injury, based on time spent in hospital or with significant disability.

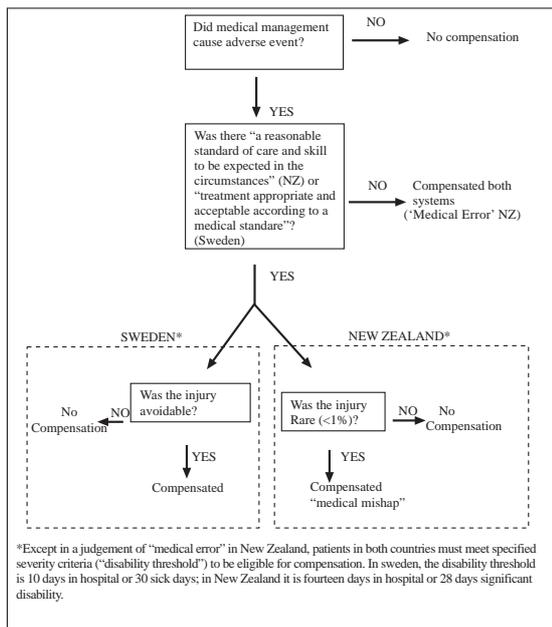


Figure 1. Compensation decision making process – New Zealand and Sweden contrasted.

At the third level of the inquiry, New Zealand and Swedish criteria diverge, with the ACC focusing on whether the injury was rare (‘medical mishap’) while the Swedish system examines ‘avoidability.’ To further illustrate the differences, Table 1 contrasts the compensability of several common events against ACC, Swedish, and tort/negligence criteria.

Table 1. Three clinical case examples and their compensability.

Case 1. An elderly patient prescribed non steroidal anti-inflammatory drug (NSAID) for arthritis. Has a known past history of gastric ulcers. Given a three month prescription with no advice or follow-up. Not given any prophylaxis for ulcers and develops a perforated peptic ulcer requiring blood transfusions and surgery.

Compensable. Tort law (failure due care), Sweden (care unacceptable), ACC (medical error).

Case 2. A 60 year old patient prescribed an NSAID for arthritis. No history of ulcers. Risks of stomach ulcer explained to patient and advised to seek help if symptomatic. Develops perforated gastric ulcer requiring blood transfusions and surgery.

Compensable. Sweden – appropriate care but event may have been avoidable by not using NSAID (eg COX-2 inhibitor instead) or using prophylaxis.

Not compensable. Tort law (appropriate care), ACC (appropriate care, outcome not rare).

Case 3. An elderly patient prescribed a drug which rarely (<1%) causes stomach ulcers as an unpredictable side effect. Develops a perforated gastric ulcer requiring blood transfusions and surgery.

Compensable. ACC (rare and severe outcome).

Not compensable. Tort law (appropriate care), Sweden (appropriate care, not avoidable).

The avoidability test employed in the Swedish model has been described in detail elsewhere.⁷ It resembles the more commonly used notion of preventability, and involves asking whether the injury in question could have been avoided if available care was rendered in an optimal manner. It is important to note that the avoidability inquiry does not reintroduce questions about the fault or negligence of providers.

Mishap, on the other hand, is a concept unique to the New Zealand scheme. It dominates successful claims in New

Zealand. In the year ending June 2000, 83% of the 1126 claims accepted by the ACC were compensated as medical mishaps.¹⁴

Appraisal of compensation criteria

Any evaluation of the competing advantages of alternative approaches to compensation must begin with the realisation that all schemes, including the existing no-fault programs in New Zealand and Sweden, prioritize particular kinds of injury over others. The Woodhouse Commission contemplated a far-reaching system – one more akin to a social insurance safety net for unexpected harms and illness.¹⁵ However, policymakers chose to focus on personal injuries attributable to accidents, largely for fiscal reasons. One legacy of this choice is some ongoing anomalies between compensable and non-compensable injuries that some may consider troubling from a social justice perspective. For example, in the medical sphere, children born with genetic anomalies such as Down’s syndrome are not compensated for their unexpected disability. On the other hand, children born with disorders such as cerebral palsy, a condition that epidemiologic evidence suggests often results from intra-uterine or perinatal events,¹⁶ will often be eligible for compensation on the basis that the outcome may have been a rare complication of birth. The children and parents involved in both birth complications face unexpected outcomes with severe consequences, yet they fall on different sides of the system’s current eligibility rules. Such tradeoffs are inevitable in any compensation program that stops short of fully-encompassing social insurance and focuses particular types of accidents.

In this context, what are the relative merits of rarity (mishap) and preventability (avoidability) criteria as bases for compensating medical injury under a no-fault scheme? From a social justice perspective, there may be good reasons for preferentially compensating events that are rare. Rare events, by definition, tend to be unanticipated, at least by patients, and they are suffered by an unlucky few.⁹ However, the equity arguments for compensating preventable events are equally if not more compelling. Patients who suffer preventable events also experience an unanticipated occurrence; the key difference is that theirs stems from deprivation of an opportunity to receive high quality and appropriate care.

But the most compelling arguments in favour of compensation criteria based on preventability relate to patient safety. Most cases of medical mishap involve entirely appropriate management and could not have been prevented (Peter Davis, unpublished observation). Conversely, many avoidable injuries do not meet the rarity prerequisite and so are never brought to light through claims. Thus, although New Zealand’s no-fault approach provides the administrative capacity to track and analyse errors and the systems of care that give rise to them, in practice, ACC compensation criteria frustrate the achievement of that goal.

The respective focuses of New Zealand, Swedish, and tort systems lead to differing emphasis on preventable events. Negligence criteria focus on a subset of the most highly preventable events. The Swedish avoidability criteria encompass events due to negligence, but extend substantially further to include a multitude of other injuries that stem from preventable action or inaction by individuals, institutions or systems. In New Zealand, medical errors correlate roughly with negligent events. However, the medical mishap criterion, by focussing attention on the rarity of the event, gives rise to a scattered array of cases in terms of preventability, only some of which are helpful to error prevention specifically and quality improvement generally.

Advantages of preventability-based compensation criteria

An approach to compensation based on preventability would be more neatly aligned with efforts to reduce medical errors. Accepting the conventional wisdom among quality improvement experts that every error in health care is a 'treasure',¹⁷ the compensation system would be geared towards gathering data on potentially preventable injuries. Successful claims for compensation may be then used to highlight and inform opportunities for institutions and practitioners to improve processes of care.

Such an approach promises several other advantages. First, a preventability focus would render the system more truly no-fault in nature. The current 'medical error' test in ACC compensation criteria clearly targets individuals, rather than systems: a ruling of medical error by the ACC is similar to a judgement of negligence, and leads to disciplinary reporting. This approach places the compensation scheme at risk of vilifying health practitioners, hindering open communication, and conflicting with the spirit of a no-fault system. Second, realignment of the scheme to further patient safety objectives would fit well with ongoing public concerns about monitoring errors and addressing systems failures, such as those identified by the recent Gisborne enquiry into cervical screening.¹⁸

A shift to preventability criteria will no doubt pose some challenges. For example, as new compensation criteria are implemented it will likely take some time to establish workable definitions of preventable events and consistent determinations about which injuries are compensable. Another important consideration is the impact on system costs. Severity and volume of compensable injuries drive costs. We know of no reasons to assume that either would necessarily increase if the scheme were oriented toward this new class of injuries. Nonetheless, epidemiological work currently being undertaken (PB Davis and colleagues) should provide information to help resolve the cost question. In any case, severity of injury threshold similar or identical to those currently used in the ACC scheme should be retained alongside preventability criteria to help channel available resources to the most severely injured patients.

Conclusions

As error reduction in health care becomes a pressing issue worldwide, New Zealand finds itself in a fortunate position in having an approach to injury compensation in place that is highly compatible with efforts to improve patient safety. A no-fault system can avoid the sort of punitive environment that chills openness and data-gathering in tort regimes. Moreover, the wide range of injuries that come within the purview of no-fault systems offers a unique window on the root causes of error. Reform of the ACC's compensation criteria for medical injury to embrace the notion of preventability would help to realise the system's potential in both of these areas. It would thus offer a significant boost to the work of clinicians, researchers, and policy-makers striving to make New Zealand's hospitals and clinics safer places to receive care.

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Prostate-specific-antigen testing for early diagnosis of prostate cancer

The PSA test detects prostate cancer at an early stage in many cases. At present, data are not yet available from large, well-designed, randomized trials to determine whether early detection is beneficial or harmful or has no effects. As a result, the optimal strategy for early detection with PSA testing remains unknown. Decision analyses suggest that given certain assumptions about its effectiveness, PSA screening could be cost effective, at least for younger men. On the basis of available data, men who are approximately 50 to 70 years of age (depending on the presence of risk factors at the lower age limit and the general state of health at the upper age limit) should be made aware of the availability of the PSA test and its potential harms and benefits, so that they can make an informed choice about screening. A discussion about testing should include the following points: the likelihood that prostate cancer will be diagnosed, the possibilities of false positive and false negative results, the anxiety associated with a positive test, and the uncertainty regarding whether screening reduces the risk of death from prostate cancer. In a recent study, these points were among those that men and their wives thought all men should know before undergoing a PSA test. Randomized trials have indicated that routinely providing such information reduces the proportion of men who decide to be tested, although substantial proportions of men still elect to do so. Clinicians should not be dismayed by either choice.

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