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## **New Zealanders' love affair with “alternative” medicine: reason for concern?**

Edzard Ernst

In this issue of the *Journal*, Tonia Nicholson shows that more than one-third of patients presenting to her emergency department in Hamilton, New Zealand are using some type of oral remedy which we might call “alternative”. The survey concludes that the use of such medication is high.<sup>1</sup> Should we be pleased that our patients take responsibility for their own health or should we be worried?

A glance at the most popular treatments is revealing; Arnica, Rescue Remedy, and St John's wort are on top of the list. To many orthodox healthcare professionals, these names might sound like ‘Double Dutch’.

Arnica is a plant (*Arnica montana*) which is toxic when taken by mouth. But, in its highly dilute, homeopathic form it is largely free of adverse effects. For homeopaths, Arnica is the standard remedy to promote healing of various physical traumata. Therefore its appearance on the list is not surprising. But does it work? The short answer is no; a systematic review of the trial data failed to produce compelling evidence for its efficacy.<sup>2</sup>

The second on the list, Rescue Remedy, belongs to the family of ‘Flower Remedies’. These are highly dilute preparations invented about a century ago by E. Bach to normalise emotional imbalances, which he thought were at the root of all human illness. Flower remedies are devoid of pharmacological actions and all the available randomised clinical trials show that they have no clinical effects beyond placebo.<sup>3</sup>

By contrast, the third remedy, St John's wort (*Hypericum perforatum*), is of proven benefit for mild to moderate depression.<sup>4</sup> Self medication with this herbal antidepressant is, however, not unproblematic: it powerfully interacts with about 50% of all prescription drugs.<sup>5</sup> Looking at the other remedies used by New Zealanders and checking this information against the hard evidence for (or against) efficacy and safety, I find little reason to be pleased—the majority of these treatments are not supported by efficacy data and several have the potential to do harm.<sup>6</sup>

To make matters worse, Nicholson also shows that 61% of users were not aware that “alternative” medicines might cause adverse effects and 57% did not report their remedy usage to their doctor.<sup>1</sup> The lack of awareness of risk combined with the absence of communication must potentiate any danger that “alternative” medicines might entail.

We may well then ask, why do patients not tell us? The reasons are fairly obvious: they do not consider “natural” treatments as drugs and they fear that doctors will frown upon their love of these “alternatives”. But the much more poignant question is: why do doctors not routinely include these issues in their medical history taking? I predict that this failure will soon be considered negligent, simply because it can be detrimental to the health of our patients.

Of course, the bug does not stop here. Once we know that a patient uses this or that remedy, we need to advise responsibility to them. Most healthcare professionals know next to nothing about “alternative” medicine, and therefore they would not be able to issue much sensible advice (this is presumably why they do not ask their patients in the first place!). The conclusion is obvious and sounds simple: doctors need to learn the essentials about this area. At the same time it is, however, problematic because there is a lot to learn<sup>6</sup> and doctors have little time to spare.

Nicholson’s data also suggest that 67% of users benefited from their choice of “alternative” medicines. This may seem surprising vis-à-vis my statement that most of the remedies are not supported by compelling evidence. I have to admit that I am not at all amazed. “Alternative” remedies are taken mostly for self-limiting conditions. Thus the natural history of the disease in combination with a placebo response (possibly enhanced by self-payment—“the more you pay the more it is worth”) are sufficient to explain the phenomenon, even in the absence of specific effects. And lastly we should remember one important principle: the absence of evidence is not evidence of absence of an effect. Some of these remedies might actually work—without the proper research we cannot tell.

So should we be concerned or pleased about our patients’ love affair with all things “alternative”? I think we should be encouraged to see that many patients are prepared to spend time and money on their own health. We might, however, consider ways of channelling their enthusiasm more wisely. What is needed, I believe, is reliable information<sup>6</sup> (and the will to take it in) both for patients and healthcare professionals.

In the absence of sound knowledge, any treatment presents a risk. “Alternative” remedies are clearly no exception. Seeing how carelessly consumers self-administer potentially harmful medicines, noting how poorly these preparations are regulated, and observing how resiliently ignorant healthcare professionals have remained (despite the current boom in “alternative” medicine), I for one am troubled.

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## **Influenza vaccination among New Zealand healthcare workers: low rates are concerning**

Lance Jennings

Influenza remains a high-profile public health issue in New Zealand, with the seasonal influenza vaccination programme launch in March 2006, subsequent national campaign, and the continuing focus on pandemic preparedness.

Influenza is a serious disease. It affects New Zealanders every winter with increased primary care consultations and hospital admissions—some winters more than others.<sup>1,2</sup> However, with avian influenza A (H5N1) virus now endemic in Asia and spreading globally in poultry and associated human infection,<sup>3</sup> the possibility of the evolution of a virus (which could cause another human pandemic of influenza) is real.<sup>4</sup> Now, more than ever before, healthcare professionals should be focusing on the national influenza immunisation campaign.

What is the national campaign all about? The campaign focuses on increasing awareness among public and healthcare professionals about the seriousness of influenza, and making them aware that there is an effective vaccine against this disease.

Those that benefit most from influenza vaccination are individuals at greatest risk of developing complications following influenza—the elderly, because their immune systems are on the wane; children 6 months or older (the vaccine is not approved for children under 6 months of age who are most at risk of complications and hospital admission); and adults with underlying medical conditions.<sup>5</sup> These people are more likely to develop pneumonia or other complications and be admitted to hospital or die.

The primary healthcare sector is pivotal in promoting and administering influenza vaccine to those at risk in the community. Indeed, research overseas and here in Canterbury clearly identifies a general practitioner's or practice nurse's advocacy as being the most important influence on a patient receiving influenza vaccine.<sup>6</sup>

If this is so, then what role do healthcare professionals in the secondary sector have in our national programme? They have a role, as advocates to their patients, and as advocates to their own colleagues. As frontline doctors and nurses during the influenza season, they are in daily close contact with patients, whom because they are in hospital, are most vulnerable to influenza.

Annual immunisation of healthcare workers is the most efficient way to minimise their exposure to a potentially lethal virus.<sup>7</sup> There is research that clearly shows that with the increasing compliance of frontline clinical staff to having the vaccine, hospital nosocomial influenza infection rates diminish.<sup>8</sup> Indeed, it has been suggested that annual immunisation should be a compulsory requirement of every healthcare worker with direct patient contact, unless there is a specific reason otherwise.<sup>9</sup>

Additional benefits to healthcare staff from immunisation are reduced rates of febrile illness and absenteeism during the winter influenza season.<sup>10</sup> Staff are also less likely to take influenza back into their families at home.

So why are influenza vaccine uptake rates amongst hospital staff (especially nurses) so abysmal? About 33% of all Canterbury District Health Board (CDHB) employees received free influenza vaccine in 2004 and again in 2005. Highest rates of uptake were amongst laboratory and administrative staff, followed by doctors, then nurses (estimated at 16%). Surveys suggest similar coverage rates (20–40%) are being achieved in other New Zealand DHBs.

Anecdotal explanations for the poor response from nursing staff (from studies carried out in Auckland, Hawke's Bay, and Dunedin) are varied, but largely relate to a lack of personal concern over influenza and concern over adverse reactions to the vaccine. Such myths about influenza vaccination clearly indicate that the major barrier is really educational. Appropriate knowledge on the seriousness of influenza and the benefits of influenza vaccination to themselves and their patients do not seem to be getting through to this sector, or they are not acting on the knowledge.

Communicating the vaccination message to healthcare workers can be approached using different strategies. These include lectures and seminars (with support from the infection control teams) held during the pre-winter vaccination period; messages on the hospital intranets; and displays in meeting areas. Support of senior staff is essential.

All DHBs in New Zealand make free influenza vaccine available to their staff, however, time constraints often make it difficult for staff to attend vaccination clinics. Consideration of mobile vaccination clinics to access staff who cannot leave their workplace, and "I have received influenza vaccine" stickers may assist staff to keep working, rather than waste time in a queue and wait for the usual observation period.

What else can be done? Targets for vaccination coverage do not exist for healthcare settings, although a national target for 75% coverage of those 65 years and older has been set by the Ministry of Health. Although controversial at present, targets could be included in standards of hospital practice and as a requirement for accreditation. Hospitals could also consider influenza vaccination as part of the conditions of employment of staff.

With our national focus on pandemic planning, there is a heightened awareness of the need to control seasonal outbreaks of influenza in all settings, including the healthcare environment. The WHO recommends that all healthcare workers who may come in contact with a patient with Highly Pathogenic Avian Influenza, should be vaccinated with the current seasonal influenza vaccine to lessen the possibility of a simultaneous infection and the re-assortment of the human and avian viral genes to create a human pandemic influenza strain. This recommendation is relevant to frontline clinical staff, especially those in hospital acute assessment and intensive care areas.<sup>11</sup>

Influenza vaccination provides the best protection against influenza, however the vaccine does not work unless it has been given and is in someone's arm. With healthcare professionals, it is more than a personal protection issue, it is an issue of social responsibility.

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## **Complementary and alternative medicines (including traditional Māori treatments) used by presenters to an emergency department in New Zealand: a survey of prevalence and toxicity**

Tonia Nicholson

### **Abstract**

**Aim** To establish the prevalence of use of complementary and alternative medicines (CAM), including traditional Māori therapies, their perceived benefit, and frequency of adverse effects among presenters to an emergency department (ED) in New Zealand.

**Method** An analytical cross-sectional survey of a convenience sample of patients and relatives presenting to a large tertiary ED (Waikato Hospital, Hamilton) was undertaken. Consenting participants completed a specifically designed questionnaire.

**Results** 1043 people completed the questionnaire (participation rate 97.2%). 1 in 3 (397 or 38.1%) people had used CAM, including 29 who had used a traditional Māori therapy. CAM use was significantly more likely in females ( $p < 0.0001$ ), those aged 20–60yrs ( $p < 0.001$ ), and in those of European ethnicity ( $p = 0.01$ ). Only 148 (37.3%) people had told their medical practitioner that they were using CAM, and 103 (25.9%) had used conventional medicines concurrently. Most people (266, 67%) believed that CAM had been beneficial. Adverse effects were reported by 16 people (4% of users).

**Conclusions** Many ED presenters in New Zealand use CAM. These may be associated with adverse effects, toxicity, and interactions with conventional medicines, although the incidence of these appears to be low. Doctors in New Zealand should routinely specifically enquire about the use of CAM during patient assessment.

Complementary and alternative medicines (CAM) is a widely used term, but it has no commonly accepted definition. For the purposes of this paper, the definition of CAM chosen is *any product including herbal remedies, vitamins, minerals, and natural products that can be purchased without a prescription at a health food store, supermarket, or from alternative medical magazines and catalogues, with the purpose of self treatment.*<sup>1</sup>

The use of CAM is known to be widespread in many Western countries, with billions of dollars being spent on treatments each year. Factors believed to contribute to the popularity of CAM include the perception of treatments as “natural and therefore safe”, the goal of treating the individual not the illness, and the requirement of the patient to take responsibility for their healing process.

However, these beliefs may result in problems for CAM users. Indeed, herbal therapies may produce adverse effects, cause toxicity, or interact with conventional medicines. Moreover, in the majority of countries (with the notable exceptions of Germany, France, and Sweden) herbal products are marketed without proof of testing

for efficacy or safety. They are sold as food and dietary supplements under regulations for Current Good Manufacturing Practice, which ensures that they are produced under sanitary conditions but provides no guarantee of purity or efficacy.

Recent studies have reported that CAM have been used by up to 68.1% of ED presenters in Australia<sup>2</sup> and 24% of ED presenters in the USA.<sup>3</sup> Studies in New Zealand have looked at the prevalence of use in certain subgroups of patients<sup>4-7</sup> but none has looked at the use in ED presenters.

Therefore, this project was designed with the primary aim of assessing the prevalence of use of CAM (including use of traditional Māori treatments) among presenters to a tertiary hospital ED in New Zealand. Secondary aims were to determine if any patient subgroups are more likely to use CAM, and what types of CAM are used.

Additionally it was hoped to determine where people get their information about CAM from, where they purchase the products from, how many inform their medical practitioner of their use of CAM, how effective they believe the treatments are, and how many suffer adverse effects or toxicity.

## Method

The study was an analytical, cross-sectional convenience sample of all patients (regardless of their presenting complaint) and their relatives who presented to an ED. It was undertaken between December 2004 and January 2005 at Waikato Hospital in Hamilton, New Zealand. This is a tertiary referral and trauma centre, which sees approximately 49,000 presentations per year. The study was approved by the Waikato Ethics Committee.

The survey forms were self explanatory, anonymous, and required short written answers or a tick response to the questions. They were handed out to patients and their relatives either upon presentation to ED by clerical staff or the triage nurse, or at some point during their stay in the department by their primary nurse.

Children less than 14 years of age were excluded from the survey, although the parents of paediatric patients were asked to complete the survey for themselves. Any patients who either were too ill, had dementia, or could not read English well were also excluded.

Those patients who presented with a condition that needed emergent treatment were also initially excluded, but could be reconsidered later for participation once their condition had improved. The forms were available for distribution 24 hours a day for 7 days of the week. People who did not wish to participate in the survey were asked to tick the "No" box in the consent section, and return the form to their primary nurse.

Sample size calculation was difficult due to the paucity of systematic review of this topic in the literature in New Zealand. However, it was decided that a pilot sample of 1000 patients would be able to provide indicative results.

The questionnaire first collected data relating to the patient's age, sex, and ethnicity. It was subsequently divided into two parts. The first part enquired about the use of complementary and alternative medicines, which will be discussed here. The second part asked about the use of herbal party pills, and this information is the subject of a separate paper published in the April 2006 issue of *Emergency Medicine Australasia* (Vol. 18, Issue 2).

Most of the results are reported descriptively with 95% confidence intervals fitted around simple proportions. However, ordinal logistic regression was used to investigate the effect of age, sex, and ethnicity on the use of CAM. Frequency of use was used as the ordinal outcome variable, with age, sex, and ethnicity used as the explanatory variables.

Ordinal logistic regression was also used to investigate the relationship between the source of information about CAM (used as the ordinal outcome variable), and knowledge of the contents of the CAM and possible adverse effects (used as the explanatory variables).

## Results

During the period of the study, 5880 patients were seen in the Emergency Department at Waikato Hospital. Of these patients, a convenience sample of 1073 were invited to participate in the survey, and only 30 declined (thus a participation rate of 97.2%). The mean patient age was 40.6 years with a range of 14–97years.

616 of the responders (59%, CI 56.0–62.0) were female and 412 (39.5%, CI 36.6–42.5) were male (15 people, or 1.4%, did not state their sex). Table 1 below describes the ethnicity of the study sample.

**Table 1. Ethnicity or citizenship of respondents to the questionnaire (N=1043)**

Ethnicity	Number of people (n)	Percentage of people (95% CI)
New Zealand European	633	60.7% (57.5–63.6)
Māori	223	21.4% (19.0–24.0)
Other European †	52	5% (3.8–6.5)
“Other”	37	3.5% (2.6–4.9)
“Other” specified:		
Chinese	5	0.5% (0.2–1.2)
Samoaan	5	0.5% (0.2–1.2)
Fijian	4	0.4% (0.1–1.0)
Pacific Islander (island unspecified)	3	0.3% (0.06–0.9)
Cook Islander (island unspecified)	3	0.3% (0.06–0.9)
South African	3	0.3% (0.06–0.9)
African	2	0.2% (0.01–0.76)
Australian	2	0.2% (0.01–0.76)
Canadian	2	0.2% (0.01–0.76)
Indian	2	0.2% (0.01–0.76)
Niuean	1	0.1% (-0.04–0.6)
Rarotongan	1	0.1% (-0.04–0.6)
Tongan	1	0.1% (-0.04–0.6)
Sri Lankan	1	0.1% (-0.04–0.6)
“Other” not stated	2	0.2% (0.01–0.76)

†Europeans were distinguished from New Zealander Europeans in terms of their country of birth.

Since vitamin and mineral supplements are generally considered free of significant adverse effects when not taken in excess, people were asked not to give information regarding these products, and if information was given then it was not analysed. The data that was analysed, however, revealed that the use of CAM was common, with approximately one in three responders reporting CAM use.

Table 2 compares the sex and ethnicity of CAM users with non-users.

**Table 2. Comparison of sex and ethnicity of users and non-users of complementary and alternative medicines (CAM) [N=1043]**

<b>Demographic variable</b>	<b>Number surveyed</b>	<b>Number of CAM users (n=397)</b>	<b>% surveyed who were CAM users (95% CI)</b>	<b>Number of CAM non-users (n=646)</b>	<b>% surveyed who were CAM non-users (95% CI)</b>
<b>Sex</b>					
Female	616	295	47.9% (44.0–5	321	52.1% (48.2–56.0)
Male	412	97	23.5% (19.7–27.9)	315	76.5% (72.1–80.3)
Not stated	15	5	33.3% (15.1–58.5)	10	66.6% (41.5–84.9)
<b>Ethnicity</b>					
New Zealand European	633	245	38.7% (35.0–42.6)	388	61.3% (57.4–65.0)
Māori	223	75	33.9% (28–40.4)	148	50.1% (42.7–58.6)
Other European	52	25	48.1% (35.1–61.3)	27	51.9% (38.7–64.9)
Other	37	12	32.4% (19.6–48.7)	25	64.9% (48.7–78.2)
Not stated	98	40	40.8% (31.6–50.7)	58	59.2% (49.3–68.4)

Eighty-seven of the 397 people who had used CAM (21.9%, CI 18.1–26.3) reported use of only one course. 199 (50.1%, CI 45.2–55) reported occasional CAM use, whilst 70 (17.6%, CI 14.2–21.7) reported use on a regular basis. (Forty-one people didn't answer.)

There was strong evidence of an association of age ( $p < 0.0001$ ), sex ( $p < 0.001$ ), and ethnicity ( $p = 0.01$ ) with the use of CAM. Specifically, females were more likely to use CAM than males; Europeans (NZ- and Europe-born) were most likely (and those of "Other" ethnicity least likely) to use CAM; and those aged 20–60 years were more likely to use CAM than younger (<20 years) or older (>60 years) people.

Respondents reported the use of a total of 75 different types of CAM. Table 3 describes the 21 most commonly used treatments and/or their indication, excluding Māori therapies. Arnica was the most commonly used CAM (77 people or 19.4%), with Rescue Remedy and St John's wort next most used, respectively. Together these therapies were used by 38% of users (either alone or with other treatments). Many CAM were used by only a few people, and 23 were used by only 1 person. Five people (1.3%) considered marijuana to be a CAM.

**Table 3. The top 21 commonest complementary and alternative therapies (CAM) used by ED presenters to Waikato Hospital during December 2004 and January 2005 (excluding Māori therapies) [N=397]**

Name of CAM therapy	n	% people using therapy (95% CI)	General indications for use of therapy
Arnica	77	19.4% (15.8–23.6)	Assists natural healing of joints and soft tissues
Rescue Remedy	46	11.6% (8.8–15.1)	To reduce stress & promote relaxation
St Johns wort	28	7% (4.9–10)	Depression
Aloe Vera	12	3% (0.6–3.4)	Minor wounds/skin irritation. Constipation (laxative effect)
Aid with morning sickness or pregnancy	10	2.5% (1.3–4.7%)	Morning sickness or pregnancy
Aid with childbirth	9	2.3% (1.1–4.7%)	Childbirth
Joint treatment	9	2.3% (1.1–4.7%)	Osteoarthritis/other joint pain
Bee pollen	8	2% (0.9–4)	To increase energy & rejuvenate the body
Echinacea	8	2% (0.9–4)	To treat & prevent colds or flu
Aid to lactation	7	1.8% (0.8–3.7)	Breast feeding difficulties
Evening Primrose Oil	6	1.5% (0.6–3.4)	Premenstrual syndrome
Hay fever treatment	6	1.5% (0.6–3.4)	Hay fever
"Cleanser"	5	1.3% (0.5–3.0)	To improve general health
Marijuana	5	1.3% (0.5–3.0)	To achieve euphoria & relaxation
Treatment to increase immunity	5	1.3% (0.5–3.0)	During an acute illness or as a preventative
Treatment for menstrual pain	5	1.3% (0.5–3.0)	Menstrual related pain
Garlic	4	1.0% (0.3–2.7)	To treat & prevent coughs & flu
Treatment for insomnia	4	1.0% (0.3–2.7)	Difficulty sleeping
Cranberry	4	1.0% (0.3–2.7)	Treatment & prevention of urinary tract infections
Treatment for menopause	3	0.7% (0.2–2.3)	Depression, irritability & hot flushes associated with the menopause
Chinese herbal medicine	3	0.7% (0.2–2.3)	Assorted disorders

Of those who had used CAM, 29 (7.3%, CI 5.1–10.3) had used traditional Māori therapies. Of these, 24 people (82.8%, CI 64.8–92.7) were of Māori ethnicity, whilst 3 (10.3%, CI 2.9–27.4) were New Zealand Europeans. (The remaining 2 people didn't state their ethnicity).

The total number of Māori responding to the questionnaire was 223. Thus, in this population sample, 10.7% (CI 7.3–15.5) of Māori presenting to ED used traditional Māori therapies. The total number of Māori responders that had used CAM was 75. Of these, 17 (22.7%, CI 14.6–33.5) reported use of only traditional Māori therapies, whilst 7 (9.3%, CI 4.4–18.4) also reported use of non-Māori CAM.

Interestingly, more Māori used non-Māori CAM (51 or 68% of those reporting use, CI 56.7–77.4) than used traditional Māori therapies (29 or 13.1% of those reporting use, CI 9.2–18.1). The majority of people grew or collected the plants needed, and then made the Māori therapy themselves (15 people or 51.7%, CI 34.5–68.6).

Table 4 describes the different traditional Māori therapies used with their indication where known.

**Table 4. Types of traditional Māori treatment used by the ED presenters**

Name of Māori Treatment	Number using treatment	% (of those using Māori treatment) & 95% CI	Indications for use (with description of how the plant is used) if known
Kumaraho	12	41.4% (25.6–59.3)	General cleanser. (Leaves boiled to produce a tonic that's drunk and causes diarrhoea, which is believed to cleanse the body.)
Kawakawa	6	20.7% (9.6–38.9)	To help wound healing. (Hot water is poured over mature leaves to form a poultice. Initially the leaves are put vein side down on wounds to draw out exudate. When wound is dry, leaves are turned over to help healing. Leaves can also be boiled, strained, and the juice drunk as a cleanser.)
Rongoa†	3	10.3% (2.9–27.4)	
Dock leaves	2	6.9% (1–23.3)	To stop bleeding. (Leaves are heated over a flame, then squeezed over a wound so that the juice falls directly onto the wound.)
Harakeke§	1	3.4% (-0.7–18.9)	General cleanser. (The roots are boiled to produce a juice which is drunk and causes diarrhoea, believed to cleanse the body.)
Kohekohe	1	3.4% (-0.7–18.9)	
Manuka honey	1	3.4% (-0.7–18.9)	To help wound healing. (Placed directly onto wounds to help with healing.)
Ponga‡	1	3.4% (-0.7–18.9)	Elevated blood sugar level. (Hair & skin are removed from the black curl, which is then boiled. The mixture is then strained & the juice produced drunk to lower the blood sugar level. Primarily used by diabetics.)

†Rongoa is not a specific treatment but is the Māori word for all traditional medicines; ‡Only the Mamaku Ponga is used; §Harakeke is the Māori word for flax plant.

**Note:** Traditionally, plants must be blessed by a Māori elder before use, and the residue must be returned to the earth (buried) after use.

Seven main sources of CAM were reported. Most people (170 or 42.8%, CI 38.0–47.7) reported buying products from health shops. 118 (29.7%, CI 25.4–34.4) people reported buying products from a specialist in alternative therapy (such as a herbalist or homeopathist). Sixty-six people (16.6%, CI 13.3–20.6) reported buying products from a pharmacy, whilst 23 (5.8%, CI 3.9–8.6) reported growing and/or making the treatment themselves. Ten people (2.5%, CI 1.3–4.7) reported buying CAM from a supermarket. A small number reported using either a mail order company (5 or 1.3%, CI 0.5–3.0) or a company representative (four or 1%, CI 0.3–2.7) as their source. Seven people (1.8%, CI 0.8–3.7) reported a different, unspecified source to those above, and 120 (30.2%, CI 25.9–34.9) reported multiple sources.

Table 5 describes the origins of information about CAM that were reported. The commonest source reported was friends and family, followed by specialists in alternative medicine and shop assistants. Eighteen people (4.5%) reported receiving their information from their midwife.

**Table 5. Origin of information about complementary and alternative medicines (CAM)**

Source of information about CAM	Number of people	% of users of CAM (95% CI)
Friend	188	47.3% (42.5–52.3)
Specialist in CAM	141	35.5% (31.0–40.3)
Shop assistant	100	25.1% (21.2–29.7)
Advertisement	44	11.1% (8.3–14.6)
Packaging	33	8.3% (6.0–11.5)
Midwife	18	4.5% (2.8–7.1)
Own reading (Internet or books)	16	4.0% (2.5–6.5)
GP	11	2.8% (1.5–5)

Only 129 people (32.5%, CI 28.1–37.3) reported that they knew what the CAM they had used contained; hence 245 (61.7%, CI 56.8–66.4) reported that they did not know the contents (23 people didn't answer the question). There was no evidence that receiving information about CAM from a specialist in alternative therapy had any influence on the knowledge of the content of CAM ( $p=0.25$ ).

132 people (33.2%, CI 28.8–38.0) reported that they were aware that the use of CAM could be associated with adverse effects; hence 243 (61.2%, CI 56.3–65.9) were unaware of this at the time of use (16 didn't answer the question). There was no evidence that receiving information from a specialist in alternative therapy had an influence on the knowledge of possible adverse effects ( $p=0.48$ ).

Just over a quarter of users (103 or 25.9%, CI 21.9–30.5) reported that they were taking conventional medicines when they used CAM; hence 276 (69.5%, CI 64.8–73.8) reported that they weren't using conventional medicines at the same time (12 didn't answer the question).

Only 148 people (37.3%, CI 32.7–42.1) reported that they had told their medical practitioner of their use of CAM; hence 227 people (57.21%, CI 52.3–61.9) reported not telling them (16 didn't answer the question).

The majority of people (266 or 67%, CI 62.2–71.4) reported that CAM had helped them. Only 92 people (23.2%, CI 19.3–27.6) reported that CAM had been ineffective, whilst 12 (3.0%, CI 1.7–5.3) reported being unsure if there had been any benefit (21 didn't answer the question).

The majority of people (349 or 87.9%, CI 84.3–90.8) reported no adverse effects from CAM. Sixteen people (4.0%, CI 2.5–6.5) reported that they had suffered an adverse effect (26 didn't answer the question). The effects reported were generally non-specific and included abdominal pain, poor appetite, indigestion, constipation, diarrhoea, and skin rash. The two most serious reactions reported were serotonin syndrome (when paroxetine was prescribed to a person already taking St John's wort), and excessive post-surgical bleeding (in a patient taking *Ginkgo biloba* preoperatively).

Of those suffering an adverse effect, only one (6.2%, CI –0.6–30.6) person reported telling their general medical practitioner about it, whilst 6 (37.5%, CI 18.5–61.5) had not told them (9 did not answer the question). For both of the most serious cases, the diagnosis of an adverse effect from a CAM was made by the responders' medical practitioner.

## Discussion

This study demonstrates that the use of CAM is common in people presenting to EDs in New Zealand. This is consistent with reports from Australia<sup>2,8</sup> and the USA.<sup>3,9–11</sup> Use in this study was significantly more likely in females aged 20–60 years, and in those of European ethnicity. This sex and age bias is also consistent with previous studies.<sup>12–15</sup>

CAM were primarily used either for general health promotion, or for the treatment of minor complaints and chronic conditions. Arnica (used to treat soft tissue injuries), Rescue Remedy, and St John's wort (used to treat anxiety, stress, and depression) were the commonest CAM used. Comparison with the recent study by Taylor et al from Melbourne<sup>2</sup> reveals a similar prevalence of use of St John's wort (in this study 6.1%, and in theirs 4.5%). However, Arnica and Rescue Remedy do not feature in the top 26 CAM reported in the Melbourne study.

Not surprisingly, traditional Māori therapies were most likely to be used by Māori and the majority were homegrown/made. As with most CAM, Māori treatments are generally used for non-specific conditions. They primarily consist of poultices made from the leaves of plants, or tonics made from boiling part (s) of the fresh plant.

Many people reported obtaining information about CAM from multiple sources, but the commonest used was family and friends. The percentage for this source (47.3%, CI 42.5–52.3) was similar to findings in other studies in the USA (62.5%)<sup>16</sup> and Turkey (43.5% for family and 57.5% for friends).<sup>17</sup>

Additionally, the US study<sup>16</sup> reported a similar percentage of people receiving information from specialists in CAM (32.5% from herbalists and 27.5% from naturopaths, compared with the total percentage for all specialists in CAM of 35.5%

in this study.) However, in the US study,<sup>16</sup> more people cited the Internet as a source of information than in this study (25% compared with 4%).

In this study, 4.5% of people reported their midwife as a source of information about CAM. In all cases, as might be expected, this was information about therapies that could be used to help with morning sickness, child birth, and lactation. However, few people stated the name of the CAM used, with most only describing its indication.

There is little evidence available regarding the safety of CAM during pregnancy and lactation, and many would recommend avoidance of CAM during these times. However, a few studies have looked for evidence of adverse effects on the offspring, and beneficial effects in mothers suffering from nausea and vomiting of pregnancy (NVP), using vitamin B<sub>6</sub>,<sup>18,19</sup> multivitamins,<sup>20</sup> and ginger;<sup>21</sup> and these have been reassuring. In general, however, the use of CAM during pregnancy and lactation should be cautioned, since there is little evidence of safety.

The lack of knowledge of the contents of CAM, and the possibility of adverse effects from treatments revealed in this study, is perhaps not surprising—but it is concerning, particularly as over a quarter of users were concurrently using conventional medicines. The Slone Survey in the USA<sup>24</sup> also assessed this issue and found that 16% of prescription drug users also used CAM. In comparison, 25.9% of CAM users in our study were also using conventional medicines.

Reporting of the use of CAM to medical practitioners in this study was moderate and consistent with other studies.<sup>3,6,23–25</sup> Reported effectiveness of CAM was very high, and this is also consistent with other studies.<sup>2,6,17</sup> Several studies have directly compared the effects of CAM against placebo and/or conventional therapies and shown a beneficial effect.<sup>18–21,36–38</sup> However, rigorous evidence for the efficacy of many CAM is lacking, and some degree of placebo effect and/or variation in symptom intensity of chronic conditions with time may also influence the perceived effect.

Previous studies have looked at the incidence of adverse effects or toxicity associated with the use of CAM in ED presenters and our findings were very similar to those of Taylor et al.<sup>2</sup> Firstly the incidence of adverse effects was not high (4.0% here compared with 4.5% in their study), and secondly, most effects were non-specific. Additionally, during the relatively short period over which this study was conducted (7 weeks) there were no presentations to the Emergency Department with adverse effects associated with the use of CAM.

The two most serious adverse effects described were serotonin syndrome from the use of St John's wort in combination with paroxetine, and postoperative bleeding associated with the use of Ginkgo biloba. St John's wort (*Hypericum perforatum*) has been compared in studies both against placebo and against commonly used antidepressants.<sup>36–38</sup> It has been shown to be effective in mild to moderate depression and has relatively few adverse effects.<sup>36–41</sup> Though its exact mechanism of action remains unclear, it is thought to involve some inhibition of serotonin reuptake. Indeed, there have been at least three case reports in the literature of symptoms consistent with serotonin syndrome occurring in people taking St John's wort.<sup>42–44.</sup>

Two meta-analyses have suggested that *Ginkgo biloba* has a positive effect over placebo in the treatment of “cerebral insufficiency without dementia”<sup>45,46</sup> and a

systematic review of its use in the treatment of dementia has also shown a suggested a positive effect.<sup>47</sup> An increased risk of bleeding is a recognised association with the use of *Ginkgo*, and is thought to be caused by Ginkgolide B, which is a terpenoid that inhibits platelet activating factor. There have been several case reports of intracerebral bleeds associated with the use of *Ginkgo*,<sup>48-51</sup> one of bleeding into the eye,<sup>52</sup> and one of postoperative bleeding after a laparoscopic cholecystectomy.<sup>53</sup>

This study has several limitations. Firstly, it used a convenience sample, and it excluded the sickest patients and those who did not speak English. In the area of New Zealand where the study was conducted, very few patients would have been excluded because of poor English, and this is unlikely to have had a significant effect on the results. However, excluding the sickest patients may have underestimated the number of severe adverse effects or drug interactions associated with the use of CAM. Also, the survey was completed by patients and their relatives/friends. It may be that more relatives/friends completed the questionnaires than patients, again resulting in an underestimation of adverse effects and toxicity from CAM in ED patients. Another confounding factor is that the survey was retrospective, and thus may have been influenced by recall bias.

Finally, the survey did not ask specifically when the responders had used CAM, so it was not possible to determine how many had used CAM on the day of presentation. It would have been useful to ask this and also how many had used CAM within the past year.

Despite the limitations of this study, it can still be concluded that the use of CAM is common in people presenting to emergency departments in New Zealand. In addition, people's knowledge about possible adverse effects from CAM and/or interactions with conventional medicines is limited, and few people volunteer the information that they are using CAM to their regular medical practitioner. Therefore, doctors should routinely enquire specifically about the use of CAM in all patients presenting to the emergency department.

Additionally, doctors should also be aware that CAM may cause non-specific adverse effects, which might be the reason for presentation, and conventional medicines might interact with CAM, which must be considered before they prescribe any treatment. The incidence of such effects appears to be low, and therefore diagnosis may be difficult. Thus all emergency departments should have a source of information about CAM readily available, and in addition, teaching about CAM should be included in continuing medical education (CME) sessions.

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## Antibiotic use for upper respiratory tract infections before and after a education campaign as reported by general practitioners in New Zealand

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### Abstract

**Aim** To assess change in general practitioner (GP) management of upper respiratory tract infections (URTIs) during a nationwide project to reduce antibiotic consumption in a half-decade (1998 to 2002–3).

**Method** Telephone survey of 100 randomly selected Auckland GPs in 1998 and 2002–3. Sixty-five GPs were in both samples.

**Results** A 69% response rate was recorded for an additional 35 GPs recruited in 2002–3. Of the 65 GPs interviewed at both periods, the number agreeing that *most patients who consult for URTIs expect antibiotics* decreased from 82% to 57%. Seventy-seven percent of GPs reported they were less likely to prescribe antibiotics, with over a quarter believing this change resulted from both GP and patient education. Common situations where GPs increased their antibiotic prescribing were patient request/expectation; smokers; older; or having sinusitis, purulent sputum, purulent nasal discharge, or imminent overseas travel. Thirty-nine percent of GPs reported an increasing use of delayed prescriptions over the half-decade. Reported use of amoxicillin clavulanate reduced from 21% to 4% ( $p < 0.001$ ).

**Conclusion** The GPs' response that they are less likely to prescribe antibiotics is consistent with the reduction in national antibiotic use. This may be related to the national campaign. The reduction may be a combination of combined GP and patient change.

Many patients presenting to their general practitioners (GPs) still receive antibiotics regardless of efficacy.<sup>1,2</sup> Indeed, antibiotics are considered to be over-prescribed.<sup>3</sup> A USA study found that the antibiotic prescribing rates for upper respiratory tract infections (URTIs) may be as high as 63% when all drug information is analysed. Another study has shown that prescribing rates for URTIs of presumed viral aetiology ranged from 17 to 60% in the UK and US, respectively.<sup>4</sup>

There is also a general trend toward increased use of broad-spectrum agents. In the USA, for example, there has been an increasing trend toward the use of broad-spectrum antimicrobials and decreasing rates of narrower-spectrum antimicrobials from 1980–1992.<sup>5</sup> In one study, the rate of broad-spectrum used increased from 24% to 48% of antibiotic prescriptions in adults ( $p < 0.001$ ), and from 23% to 40% in children ( $p < 0.001$ ).<sup>6</sup>

By 1998–1999, 22% of adult and 14% of paediatric prescriptions for broad-spectrum antibiotics were for viral URTIs. Indeed, physicians are increasingly turning to

expensive, broad-spectrum agents, even when there is little clinical rationale for their use.<sup>7</sup>

In 1999, PHARMAC (New Zealand's Pharmaceutical Management Agency which is responsible for nationwide funding of pharmaceuticals) launched the *Wise Use of Antibiotics* campaign aimed at reducing antibiotic use by educating the public that antibiotics are ineffective against viruses. The campaign involved posters in family practice waiting-rooms and pharmacies, leaflets given to patients in pharmacies and primary health care surgeries, plus small group training for GPs.<sup>8</sup> The campaign was endorsed by the Royal New Zealand College of General Practitioners.

As a result, PHARMAC reported a decrease in the national antibiotic drug bill from \$NZ36 million in 1996 to 14.5 million in 2003. This reduction is a combination of decreased volume (one-third) and price (two-thirds) of antibiotics prescribed. Additionally, from 1995 to 2002, there was also a national reduction from 7% to 3.5% ( $p < 0.05$ ) in penicillin resistance among pneumococci.<sup>9</sup>

The aim of our study was to determine any change in reported antibiotic use for URTIs by GPs in the Auckland region between 1998 and 2002, before and after the educational campaign.

## Methods

One hundred GPs were randomly selected from a list of Auckland-based practitioners supplied by the local diagnostic laboratory in 1998. In 2002–3, 65 of the initial group were available to participate in a subsequent interview. A further 35 were randomly selected to make the sample to 100. GPs were contacted by telephone or fax and asked to participate in research into primary care prescription of antibiotics for URTIs.

The total populations of GPs in the Auckland region is approximately 1000, hence 100 represents 10% of the population. From previous surveys, the authors have found statistically significant differences with such a sample size, and 100 practitioners were within the resources of the study.

Questions asked included the conditions under which they would prescribe antibiotics; their use of "as-needed" or delayed prescriptions, and the specific antibiotics they would prescribe. Data from the questionnaires was entered into a Microsoft Excel spreadsheet and analysed using Stat-Sak and SPSS version 11 statistical packages with Chi-squared statistical analysis.

## Results

From the initial randomised list of 179 GPs in the Auckland region chosen in 1998, 16 were unable to be contacted at the number given. Fifty-two GPs declined to participate, and a further 11 failed to call back within the response period. Interviews were discontinued after 100 had been conducted. This gave a response rate of 61%. Of 51 additional GPs approached in 2002–2003, 35 (69%) agreed to be interviewed.

Of the 65 GPs who were interviewed at both periods (1998 and 2002–2003), there was a decrease (from 82% in 1998 to 57% in 2003) in the numbers of GPs agreeing that most patients who see a GP for an URTI expect to be given antibiotics. Of the total of 100 GPs, 77% said they were less likely to prescribe antibiotics for URTI; 2% more likely, and 21% felt unchanged.

Similar percentage occurred in terms of patients wanting antibiotics (71% less likely, 7% more likely, and 22% unchanged). Over a quarter of the GPs believed that the change was due to education of both the doctors and patients (12% doctor from education, 14% patient from education).

When asked what would encourage them to prescribe antibiotics, there were some interesting changes over the period of time. The direction of change was the same for both the original 65 GPs and the total of 100 GPs. We report the 65 GPs' results which give greater statistical power due to use of paired comparisons (McNemar's test)—see Table 1, and the 100 GPs' results—see Table 2.

**Table 1. Comparison of reasons for GPs prescribing antibiotics in 1998 and 2002–3 (N=65)**

Reason for prescribing antibiotics	1998	2002–3	p value
Planning overseas trips in near future	77%	82%	0.029
Productive cough all day	74%	78%	0.61
Patient young, had had recurrent otitis media	71%	58%	0.049
Symptoms of sinusitis	68%	98%	0.00001
Patient sick and febrile	68%	58%	0.52
Green-coloured sputum	63%	75%	0.86
Patient expected and asked for antibiotics	62%	63%	0.832
Purulent nasal discharge	52%	71% <sup>22</sup>	0.029
Productive cough in morning	45%	40%	0.86
Patient a smoker	38%	54%	0.0169
Patient requests antibiotics	38%	62%	0.0963
Patient older	37%	68%	0.0002
Patient will go to another doctor for antibiotics if not given	32%	31%	1.0
Patient tried over-the-counter medications (OTCs) first	30%	28%	0.92
Patient expects antibiotics	26%	57%	0.0001
Persisting dry cough	18%	14%	0.45
Patient was young	14%	11%	0.836
White productive sputum	9%	6%	0.73
Cough at night	8%	11%	0.726
Rhinitis clear	0%	0%	1.0

Furthermore, there was a significant increase in the giving of antibiotics to patients for the following reasons: smoker; symptoms of sinusitis; older patients; patients expecting antibiotics; patients planning imminent overseas trip; green-coloured sputum; and purulent nasal discharge. The only significant reason for decrease in prescribing antibiotics was for otitis media.

All others showed no significant change. However a third of the doctors still reported they would prescribe antibiotics for fear that patients would otherwise go to another GP, and two-thirds were willing to give antibiotics to patients who expected and asked for them.

100 GPs interviewed in 2002-3 reported giving “as needed” or “delayed” prescriptions as follows: always 50%, often 25%, sometimes 36%, rarely 16%, and never 5%. In 1998, the proportions were 0%, 13%, 52%, 30%, and 5% respectively. There was a statistically significant increase in the number of GPs reporting that they often prescribed “as needed” or “delayed” prescriptions” between the two studies (p=0.017). Thirty-nine percent of the GPs in 2002–3 said they had increased the number of delayed prescriptions while 12% had decreased them and 46% had made no change.

The most common first-line antibiotic used by the doctors was still amoxicillin (28% vs 78%) followed by amoxicillin clavulanate (21% vs 4%) and tetracyclines (14% vs 5%) for 1998 and 2002–3 respectively (all  $p < 0.05$ ). Only 12% vs 6% ( $p > 0.05$ ) used penicillin as first choice.

**Table 2. Comparison of reasons for the 100 GPs prescribing antibiotics in the 1998 and 2002–3 studies (N=100)**

Reason for prescribing	1998	2002–3	p value
Productive cough all day	78%	76%	0.93944
Planning overseas trips in near future	74%	78%	0.50087
Patient young, had had recurrent otitis media	68%	59%	0.186
Symptoms of sinusitis	65%	94%	0.000001
Green-coloured sputum	64%	81%	0.00710
Patient sick and febrile	64%	62%	0.699
Cough at night	6%	10%	0.31686
Patient expected and asked for antibiotics	55%	57%	0.83727
Productive cough in morning	49%	45%	0.48117
Purulent nasal discharge	47%	65%	0.01839
Patient tried over-the-counter medications (OTCs) first	47%	46%	0.88726
Patient older	42%	68%	0.00022
Patient requested it	37%	54%	0.018
Patient a smoker	30%	55%	0.00043
Patient will go to another doctor if antibiotics not given	27%	29%	0.82093
Patient expected	25%	51%	0.00023
Persisting dry cough	19%	18%	0.80146
Patient was young	14%	14%	0.97
White productive sputum	9%	6%	0.42060
Rhinitis clear	0%	1%	0.31610

## Discussion

It is encouraging to find that 77% of the original 65 GPs were less likely to prescribe antibiotics after 5 years. A similar percentage felt there was a reduction in patients wanting antibiotics. This might indicate that patients and GPs were more correctly informed about the effectiveness of antibiotics.

It is difficult to ascertain how much the *Wise Use of Antibiotics* campaign contributed to this reduction. However the national figures suggest a one-third reduction in antibiotic prescribing during the course of the campaign. National figures show a reduction in amoxicillin clavulanate and an increase in amoxicillin use consistent with our data. The higher response to patient expectations may be a response to the “patient-centred medicine” approach which has received more attention in recent years.<sup>10</sup>

There is no new literature suggesting that coloured sputum may be responsive to antibiotic therapy although there is some for acute purulent rhinitis.<sup>11</sup> Ironically, for sinusitis, new guidelines suggest not treating mild cases, hence the increase in giving antibiotics to these patients is difficult to explain.<sup>12</sup> Two systematic reviews conclude that antibiotic use does not significantly affect the resolution of acute cough nor change the course of illness and any modest benefits may be outweighed by the side effects.<sup>13,14</sup>

Reduction in antibiotic use for acute otitis media is consistent with studies indicating that delayed prescribing is an effective means of reducing antibiotic use in children over the age of 6 months.<sup>15</sup> Apparent contradictions may result from GPs seeing patients with more severe symptoms (those with minor symptoms now being less likely to visit their doctor) and hence more likely to prescribe antibiotics.

International literature suggests other antibiotic campaigns have been effective in lowering the use of antibiotics for URTIs and subsequently leading to reduction in resistance to commonly used antibiotics. For instance, a nationwide Finnish programme involved recommendations in response to concern about increasing resistance to group A streptococci. In that programme, a relative risk reduction of 42% was found in daily doses of erythromycin which translated to a 7.9% reduction in the frequency of antibiotic resistance among group A streptococci.<sup>16</sup>

In response to penicillin-resistant pneumococci increasing from 2.3% in 1989 to 20% in 1993, an Iceland initiative used radio, television, and newspaper articles as well as targeting the medical community using infectious disease experts in a publicity campaign regarding antibiotic overuse.<sup>17</sup> Penicillin-resistant pneumococci subsequently dropped to 16.9%.

Moreover, in 1994, a Swedish programme responded to concern over increasing antibiotic resistance by producing a guideline on how to deal with penicillin-non-susceptible pneumococci.<sup>18</sup> This led to a relative risk reduction of 39%. National programmes in USA, Canada, Belgium and Australia aimed at controlling antibiotic use and resistance have also reported success.<sup>19</sup> The Canadian programme increased use of “appropriate” first-line antibiotics for URTIs and the Belgium programme resulted in significant but transient reduction in retail antibiotics from 17% to 9%. This is a similar order of magnitude to that achieved in New Zealand.

A Dutch randomised trial of GP peer-group education with monitoring and feedback as well as pharmacist and patient education found that this multiple intervention reduced prescribing rates of antibiotics for URTIs without decreasing patient satisfaction.<sup>20</sup> A Spanish quasi-experimental intervention study of the effects of GP education and feedback had similar results.<sup>21</sup>

The strength of our study is that it reports on a random selection of the GPs comparing two time periods between which there was a campaign to reduce antibiotic use. Two-thirds of the participants were involved in both time periods, thus allowing paired statistical analysis. We are not aware of any other such study in the international literature. The response rate was 69% for the additional GPs, which is acceptable for this type of study.

A limitation of the study is that it relies on asking doctors what they do, rather than measuring what they do. However this study is a step towards explaining the changes in antibiotic use over the duration of the *Wise Use of Antibiotics* campaign. What the doctors report they do is consistent with actual national data. Given a 61% response rate from the GPs initially studied in 1998, a selection bias is possible. A causal relationship between decreased GP prescribing and the educational campaign cannot be proved.

In conclusion, the global response of GPs stating that they are less likely to prescribe antibiotics is consistent with the reduction in antibiotic use nationally. This may be

related to the national campaign. The reduction may be a combination of combined GP and patient change. There was a significant reduction in the use of amoxicillin clavulanate. The apparent increase in antibiotic use for specific conditions may relate to patients presenting with more serious conditions/symptoms.

There are no conflicts of interest in this study.

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## Public views and use of antibiotics for the common cold before and after an education campaign in New Zealand

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### Abstract

**Aims** To assess changes in public knowledge, attitudes, and reported behaviour of antibiotic use in the management of the common cold and to compare with results of a 1998 study. The context is a nationwide project to reduce the consumption of antibiotics.

**Method** Cross-section survey: telephone interviews of random sample of consenting Auckland telephone subscribers aged over 15 years comparing 1998 and 2003 responses.

**Results** A 55% response rate of eligible participants was recorded. No change was noted between 1998 and 2003 in public awareness that antibiotics are not helpful in treating viral infections (38%). However there was a significant reduction in those attending doctor for the common cold (24% to 15%). In 2003, patients were less likely to receive antibiotic prescription and more likely to receive a delayed prescription.

**Conclusions** The majority of general public still do not understand that the common cold does not need antibiotic treatment. The advertising campaign may have reduced doctor prescribing hence the reduction in antibiotic use from 1998 to 2003.

The common cold is the most prevalent disease in humans and is generally caused by a rhinovirus.<sup>1</sup> In most cases, antimicrobial agents are not needed. Indeed, there is no role for antibiotics in managing uncomplicated colds<sup>2-4</sup> nor preventing secondary bacterial infection.<sup>5</sup>

The common cold is associated with considerable costs in terms of decreased productivity; time lost from work or school; visits to healthcare providers; and the volume and cost of drugs prescribed.<sup>6</sup> Despite the lack of effectiveness of antibiotics for treating common cold symptoms (rhinorrhoea, stuffiness, acute cough, sore throat, pharyngitis, and laryngitis), general practitioners (GPs) frequently prescribe antibiotics for patients with such symptoms in response to patients' expectation or doctors' perceptions of these expectations.<sup>7,8</sup>

However, overuse and misuse of antibiotics for conditions where there is no proven benefit of such therapy contributes to a number of adverse events, as well as to the development of antimicrobial resistance and unnecessary expense to patients and to the healthcare system as a whole.

The New Zealand (NZ) organisation PHARMAC (Pharmaceutical Management Agency responsible for nationwide funding of pharmaceuticals) launched the *Wise Use of Antibiotics* campaign in 1999. This annual campaign aims to reduce antibiotic use by educating the public that antibiotics are ineffective against viruses. The

campaign involves posters in family practice waiting-rooms and pharmacies and leaflets given to patients in pharmacies and primary health care surgeries as well as GP education.<sup>9</sup>

Between 1996 and 2003, PHARMAC reported a reduction in the national antibiotic drug bill from \$NZ36 million to 14.5 million. This resulted from a combination of both decreased volume and price of the antibiotics prescribed. From 1995 to 2002 there also was a national reduction in penicillin resistance among pneumococci from 7% to 3.5% ( $p < 0.05$ ).<sup>10</sup>

The aim of our study was to assess change in public attitudes, knowledge, and reported behaviour from 1998 to 2003 regarding antibiotic use as a treatment for common colds and flu.

## Methods

The sample were adults aged 16 or over contacted by telephone with their phone numbers randomly selected from the 1998 and subsequently from the 2002 Auckland telephone book. A random sample of telephone numbers was obtained from the telephone directory by randomising the page number, the column number, and the number of private individuals represented per column.

The University of Auckland Ethics Committee gave ethical approval for both phases of the study. Participants were excluded if they had a chronic condition such as chronic obstructive airways disease which necessitated them having antibiotics on hand.

On contacting prospective participants, the telephone-interviewers introduced themselves and asked respondents to participate in 'research into the use of antibiotics for the cold or 'flu (influenza)'. The confidentiality of all information gathered was assured. No identifying details were retained other than the phone numbers in case it was necessary to clarify any matter. To reduce bias, two call-backs were made to respondents not initially available at varying times of the day and week before replacement.

The interview consisted of a pre-prepared questionnaire which covered the areas of personal management of colds/flu, utilisation of health services, knowledge, attitudes, and reported behaviour regarding antibiotic use in the management of the common cold. Respondents also were asked about awareness of the *Wise Use of Antibiotics* campaign. Results from the 1998 and 2003 interviews were compared. Data were entered into a Microsoft Excel spreadsheet and analysed using Stat-Sak and SPSS version 11 with Chi-squared statistical analysis.

## Results

In 1998, 282 members of the public were approached of whom 206 agreed to participate. Six were excluded because they had chronic respiratory disease, giving a 72% response rate. 387 members of the public were approached in 2003 and 208 agreed to participate. Of these, 8 were ineligible (2 had chronic respiratory disease, 2 were terminally ill, and 4 had other chronic illness that required them to have antibiotics readily available at all times). The response rate was therefore 55% of eligible participants in 2003.

Table 1 shows the demographics of the members of the public in both 1998 and 2003 surveys. There are no significant differences in the demographic data between 1998 and 2003.

Table 2 shows the attitudes and behaviours reported by patients regarding treatment of the common cold in the 1998 and 2003 surveys. Significantly fewer people reported ever attending a doctor for a common cold in 2003 than in 1998 (45% vs 62%;  $p = 0.0006$ ). The number of people who would usually see a doctor for a common cold decreased from 24% to 15% ( $p = 0.026$ ). However the number who went to a doctor the last time they had a cold remained the same at 20% ( $p = 0.86$ ).

**Table 1. Demographics of participants**

Variables		1998 N=200	2003 N=200	P value*
Age in years	Range	16–94	17–85	0.97
	Mean	46	49	
	Median	44	47	
Gender	Female	117 (59%)	131 (65.5%)	0.15
	Male	83 (41%)	69( 34.5%)	
Ethnicity	European	165 (83%)	163 (81.5%)	
	Māori	9 (4%)	15 (7.5%)	
	Pacific Island	5 (2%)	3 (1.5%)	
	Others	21 (10%)	13 (6.5%)	
	Not stated	0 (0%)	6 (3%)	
Education	Grade 10	58 (29%)	56 (28%)	
	Grade 11	20 (10%)	27 (13.5%)	
	Grade 12	21 (10%)	4 (2%)	
	Apprenticeship	6 (3%)	3 (1.5%)	
	Technical institution	34 (17%)	46 (23%)	
	College	60 (30%)	64 (32%)	
Smokers		33 (17%)	34 (17%)	1.0
Had medical insurance		117 (58%)	111 (55.5%)	0.61

\*Chi-squared and T-tests

Of those patients who had ever been to the doctor for a common cold, the proportion who went specifically seeking antibiotics had risen to 60% from 47% but this did not reach statistical significance ( $p=0.064$ ). Those who had ever visited a doctor for an upper respiratory tract infection (URTI) were less likely to be prescribed antibiotics in 2003 (86% versus 74%;  $p=0.049$ ). There was also a significant increase in the reported giving of “as-needed” prescriptions. An as-needed/delayed prescription is one given at the time of consultation with instructions not to fill it unless symptoms have not improved within a few days.

To evaluate people’s understanding of the function of antibiotics, participants were first asked whether they thought antibiotics cured bacterial infections, and then whether they cured viral infections. If they answered *yes* to the first question and *no* to the second question then they were counted as understanding.

Members of the public had a similar understanding about the function of antibiotics and the nature of the common cold (that it is viral, not bacterial) in 2003 as in 1998 (38% versus 41%;  $p=0.9$ ). However, they were significantly less likely to feel positive about antibiotics in 2003 for the treatment of a cold (16% versus 33%,  $p=0.00001$ ). The perception (that antibiotics were beneficial for fever, dry cough, coloured phlegm/nasal discharge, runny nose, and to prevent complications) significantly reduced from 1998 to 2003. The perceived benefit of antibiotics for tonsillitis increased from 83% to 91% in 2003 ( $p=0.014$ ).

Only 30% of respondents were aware of the national *Wise Use of Antibiotics* campaign; of those who did recall it, 75% were unsure as to where, and in what format, they had seen the information. Posters at the doctors had the highest recall (21% of those who recalled the campaign).

**Table 2. Patients' reported behaviour and attitudes**

Patient behaviours and attitudes	1998	2003	P value
<b>When patients have a URTI they:</b>			
try an over counter medication before seeing doctor	144/200 (72%)	136/200 (68%)	0.38
have ever consulted doctor about an URTI	122/200 (62%)	90/200 (45%)	0.0006
usually see a doctor	49/200 (24%)	31/200 (15%)	0.024
have been given an "as-needed" prescription at least once	15/200 (7%)	48/200 (24%)	<0.0001
went to doctor for last URTI	39/200 (20%)	41/200 (20%)	0.86
<b>Patients who consulted the doctor with an URTI did so:</b>			
to get an antibiotic	48/103 (46.6%)	50/83 (60%)	0.064
to clarify diagnosis	78/103 (75.7%)	63/81 (77%)	0.74
to relieve symptoms	59/103 (57.2%)	75/83 (90%)	<0.0001
to get a note for work	9/103 (8.7%)	12/83 (14%)	0.22
<b>When the patient consulted the doctor:</b>			
the doctor gave antibiotics	89/104 (86%)	60/81 (74%)	0.049
the patient collected prescription from chemist	88/89 (99%)	59/60 (98%)	0.78
the patient took some of the course	87/89 (98%)	55/59 (93%)	0.17
the patient wanted antibiotics	52/94 (55%)	41/81 (50%)	0.53
the patient expected to get antibiotics	63/97 (65%)	51/81 (63%)	0.78
the patient asked specifically for antibiotics	7/94 (7%)	7/81 (8%)	0.77
the doctor asked what patient expected to be given as treatment for URTI	4/97 (4%)	4/80 (5%)	0.78
the patient would have gone to another doctor if not given antibiotics	6/86 (7%)	9/80 (11%)	0.34
<b>Patients taking antibiotics for URTI believe that antibiotics:</b>			
help symptoms	74/84 (88%)	52/61 (85.2%)	0.62
shorten the course of URTI	61/79 (77%)	49/61 (80.3%)	0.66
<b>Patients perceive that antibiotics are beneficial for:</b>			
sinusitis	93/185 (53%)	106/182 (58.2%)	0.13
fever	80/186 (43%)	52/187 (27.8%)	0.0021
preventing complications for planned overseas trip	95/192 (49%)	26/194 (13.4%)	0.0001
dry cough	23/192 (12%)	10/192 (5.21%)	0.018
night cough	26/195 (13%)	27/192 (14.1%)	0.83
morning phlegm	80/193 (41%)	78/193 (40.4%)	0.84
all day phlegm	135/189 (71%)	128/193 (66.3%)	0.28
clear phlegm	45/180 (25%)	39/197 (19.8%)	0.23
coloured phlegm	160/185 (86%)	148/197 (75.1%)	<0.0001
sore throat	42/194 (22%)	48/196 (24.5%)	0.51
tonsillitis	149/180 (83%)	178/195 (91.3%)	0.014
runny nose	10/196 (5%)	3/197 (1.52%)	0.047
coloured nasal discharge	92/187 (49%)	71/197 (36%)	0.009
<b>Patients understand antibiotic efficacy against bacterial vs viral infection</b>	81/200 (41%)	76/200 (38%)	0.6
<b>Patients feelings about antibiotics for URTI are:</b>			
Positive	66/200 (33%)	33/199 (16%)	<0.0001
Neutral	29/200 (15%)	63/199 (31%)	0.00015
Negative	105/200 (53%)	103/199 (52%)	0.88

URTI=upper respiratory tract infection.

## Discussion

This survey found no change since 1998 in the percentage of the general public with a sound understanding that antibiotics are not effective in the treatment of viral infections. There was, however, a reduction in those wanting antibiotics for specific symptoms, and a reduction in positive feelings towards antibiotics. There was also a reduction of 12% in patients getting antibiotics. It is reassuring that doctors are using more "as-needed" prescriptions (24% versus 7%). There was also a decrease (from 62% to 45%) in the proportion of people who had ever consulted a doctor about a cold or flu.

These findings may suggest that people are aware that they should not be using antibiotics to treat the cold or flu, even if they do not know the reason. This assessment is supported by the number of respondents who feel positive about antibiotic use for common colds falling dramatically from 33% in 1998 to 16% in this study. If this assessment is correct then it may form a base from which to launch further and better education programmes into the wise use of antibiotics. However of those who had seen a GP, the proportion wanting antibiotics had increased. Some of this may be due to a residue of patients “keen” on antibiotics for common colds still consulting GPs.

Another 1998 NZ study found that the general public had poor understanding regarding the lack of benefit of antibiotic treatment for the common cold and influenza (flu).<sup>11</sup> Only 40% understood that antibiotics were unhelpful in viral infections and as such would be of no use in treatment.

A US study evaluated patient contribution in antibiotic use across nine countries (UK, France, Belgium, Turkey, Italy, Morocco, Colombia, Spain, and Thailand).<sup>12</sup> All had some degree of antibiotic misuse in the community. Some patients exaggerated symptoms to get a prescription for antibiotics, while others exerted pressure on doctors for a prescription. Keeping leftover medication for future use and illegal sale of antibiotics directly from the pharmacy was observed in all nine countries. The authors concluded that the lack of knowledge in patients regarding antibiotic use and the consequences of misuse made education a major priority in the primary care setting.

An UK study examined the effect of giving an “as needed” antibiotic prescription for sore throat management.<sup>13</sup> Three groups of patients were compared: one group was given a prescription for antibiotics, one received no prescription for antibiotics, and the third group was asked to come back to the practice in 3 days if not improved, to collect a prescription. The use of antibiotics in these three groups was 99%, 13%, and 31% respectively. Another study done by these authors found that it was more likely for patients who received antibiotics previously to return for subsequent consultations for sore throat, suggesting that giving antibiotics encourages patients to return with subsequent illness.<sup>14</sup>

The reasons for visiting a doctor for the common cold show that patients need re-education about antibiotics usage. This suggests that the majority of patients who actually attend a doctor with symptoms of a cold do want antibiotics. There was a general trend toward diminished perceived benefits of antibiotics for various symptoms. On the other hand, for conditions such as pharyngitis, tonsillitis, and sinusitis, patients had an increase in perceived antibiotic benefits. From existing literature, it is controversial whether antibiotics play a role in reducing symptoms of tonsillitis<sup>15</sup> and purulent nasal discharge.<sup>16, 17</sup>

Comparing our results to a US study,<sup>18</sup> only 54% knew that a virus is the usual cause of the common cold and 46% believed that antibiotics kill viruses while 17% were not sure whether antibiotics kill viruses. Our findings were more encouraging when compared to Swiss research of 5379 interviewees across nine countries showing that antibiotics were still perceived as strong efficient drugs against viral illness.<sup>12</sup> Interviewees believed that most respiratory infections require antibiotic treatment and 11% of them had to exaggerate their symptoms to get an antibiotic prescription from

their doctor. About one patient in four saved part of their antibiotic course for future use.

Some commentators reflect that despite the excessive amounts of antibiotics used, relatively minor attempts have been made to reduce unnecessary or even improper use.<sup>7</sup> This emphasises the importance of reinforcement of education to both the public and GPs.

A study in the Netherlands found that fewer patients than doctors endorsed the self-limiting character of cough, sore throat, and earache (mean 3.1, 3.4 and 2.9 versus 4.1, 4.1 and 3.7). In addition, far more patients than doctors rated antibiotics as necessary for cough and sore throat (mean 2.7 and 2.9 versus 1.7 and 1.7) and believed that antibiotics speed recovery (mean 3.7 versus 2.0).<sup>19</sup>

Educational material and prescribing feedback to physicians has been shown to reduce their antibiotic prescribing.<sup>20-22</sup> To a limited degree patient education has been demonstrated to limit antibiotic use for viral illness in some studies,<sup>23</sup> but many patients still seek antibiotics despite public education programmes.<sup>24</sup>

The strength of our study is that it reports on a random selection of the public and compares two time periods between which there was a campaign to reduce antibiotic use. We are not aware of any other study to do this in the international literature. The response rate was 72% in 1998 and 55% in 2003 which is acceptable for this type of study. There is no reason to indicate that non-responders introduce a bias in the results in any particular direction.

There is the possibility that the group who has seen a doctor for a respiratory illness are a residue wanting antibiotics. This may not be the case as the number of respondents who went to the doctor for their last cold and flu remained constant at 20%. A limitation of this study is that it relies on asking people what they do, rather than measuring what they do.

In conclusion, the results show that in 2003 the majority of the general public believe that antibiotics are useful in the treatment of the common cold, and that this belief has not changed since 1998. However, the *Wise Use of Antibiotics* campaign may have been successful in its goals since there appears to be a reduction in patients seeking attention for common colds and a reduction in the number of people receiving antibiotics from GPs. The campaign appears to have been less successful in increasing public knowledge. The change in GP behaviour may be the major factor in the reduction in antibiotic use from 1996 to 2003.

There are no conflicts of interest in this study.

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## How many antibiotic prescriptions are unsubsidised in New Zealand?

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### Abstract

**Aims** To determine the proportion of prescriptions for antibiotics which were unsubsidised, in one town in one year, and to use this to develop a model which could be used to estimate the number of unsubsidised prescriptions.

**Methods** Data on all prescriptions for antibiotics during 2002 were extracted from pharmacy computers in one town. Data were obtained from PharmHouse database on all subsidised prescriptions from the town pharmacies during 2002. (The PharmHouse database is a subset of the New Zealand Health Information System database and contains records of all the claims for medicines dispensed within New Zealand.) These were compared and the proportion of unsubsidised prescriptions for each antibiotic calculated. Weighted linear regression was used to develop a model of the relationship between the percentage of each drug subsidised, and patient and prescription characteristics obtainable in PharmHouse.

**Results** 64.4% of antibiotic dispensings in the study town were subsidised, and therefore captured by the PharmHouse database. The proportion varied substantially between different antibiotics. For particular drugs, the proportion of drugs unsubsidised could be predicted by the price of the drug, the number of days it was prescribed for, and the number of patients aged under six who received subsidised prescriptions.

**Conclusions** Previous studies using PharmHouse data are likely to have significantly underestimated the extent of drug use. Further research is needed on whether this model can help to estimate the extent of unsubsidised prescriptions.

Government subsidies for prescriptions are an important method of ensuring access to medicines people need. In New Zealand (NZ) the Government pays about 67% of overall pharmaceutical expenditure. While unsubsidised prescriptions do not contribute to government expenditure, pharmaceuticals and other medicaments absorb 23% of out of pocket health expenditure for NZ households.<sup>1</sup> This may lead to access problems for some people; for example those who are just above income and other thresholds. In addition, the existence of significant numbers of unsubsidised prescriptions makes any estimations of overall medicine consumption based on PharmHouse inaccurate. This means it is difficult, for example, to explore the relationship between antibiotic prescribing levels and resistance. A method of estimating the number of unsubsidised prescriptions, and correcting for these, is required.

Unsubsidised prescriptions include prescriptions for drugs which are never subsidised (e.g. Viagra, Xenical), as well as prescriptions which cost less than the relevant

patient contribution. Until recently, patients paid a co-payment based on their age (i.e. whether they are under 18 or under 6 years), income (in relation to family size and certain thresholds), recent health service use (GP visits and/or prescriptions (High Use Health Card [HUHC], Prescription Subsidy Card)). Whether patients are enrolled in a low cost Primary Health Organisation now also affects the co-payment they pay. For some drugs patients pay an additional “manufacturers surcharge”. Prescription prices are principally determined by the price per day of supply, and the number of days supplied.<sup>2</sup>

When medicines are dispensed by community pharmacies they are recorded in the pharmacy dispensing computer. If the Government is to make some financial contribution toward the cost of the prescription, an electronic record of it is also sent to HealthPAC (the organisation which pays government subsidies to pharmacies). These prescriptions are then included in PharmHouse, the data-warehousing system which is often used for drug utilisation research.<sup>3-6</sup>

When an unsubsidised drug is dispensed, or the price of a prescription is less than the patient co-payment, the patient pays the full price, the Government does not subsidise the prescription, and no record of the prescription leaves the pharmacy. The only repositories of information about these unsubsidised prescriptions are GPs and community pharmacies. GP databases cannot tell us whether any given prescription was actually dispensed, and they do not have pricing data (such as pharmacist fees), so it is difficult or impossible to determine which prescriptions are subsidised.<sup>7</sup>

The number of unsubsidised prescriptions is impossible to determine accurately, since these are not collected by any central agency. Sutton and Crampton estimated that 20% of prescriptions for adults without community service cards (i.e. people above the income threshold) were unsubsidised.<sup>8</sup> This was based on the assumption that the proportion of prescriptions costing less than the subsidy level (\$15) was the same for Community Services Card (CSC) holders (who receive discounted prescriptions upon presentation of their card) and non-CSC holders. However this may not be the case because of strategic decisions by doctors, pharmacists, and patients (for example, patients without CSCs may use stocks of medicines at home, or buy them over the counter rather than on prescription, if the prescription will not be subsidised).

While the 20% figure may be appropriate as an overall estimate, it does not allow us to look at rates of subsidisation for different drugs. In the study reported here we use data on antibiotic prescriptions from one town to develop a model which could be used to estimate the number of unsubsidised prescriptions.

The aim of our study was to determine how many antibiotic prescriptions were unsubsidised in one town during one year and to develop a method for estimating the number of unsubsidised prescriptions, using variables obtainable from PharmHouse data.

## Methods

In this study we collected all antibiotic dispensings from pharmacy computers of all pharmacies in a small town and compared them with PharmHouse data for the same pharmacies. We determined the number and proportion of unsubsidised antibiotic prescriptions, and constructed a model of how to estimate the number of unsubsidised prescriptions from data contained in the PharmHouse database.

A town was chosen that was a significant distance from other towns with pharmacies, and had a small number of pharmacies (but greater than two to protect commercial information). All pharmacy owners

consented to provide data. We downloaded all dispensings of all prescriptions from each of the pharmacies in 2002. In some computer systems this was impossible, so data from a longer period was downloaded. Using Microsoft Access software, data on dispensings of antibiotics (chemical entities and brand names identified as such in the New Ethicals Catalogue or the Pharmaceutical Schedule) for the 1 Jan–31 Dec 2002 period was extracted and combined. This produced a list of all dispensing of antibiotics in the town during the year.

We obtained data from PHARMAC on all subsidised prescriptions for antibiotics for a 5-year period 1998-2002. Each line of data represents one or more dispensings and includes the name of the drug, the date of dispensing, and a number for the pharmacy which dispenses the medicine. Data for 2002 and for the pharmacies in the town were extracted and summarised using Microsoft Excel software.

We tabulated the number of dispensings of each drug from each data source and calculated the proportion of dispensings which were missing from the PharmHouse data. Using weighted linear regression we also explored the relationship between this proportion (dependent variable) and price, length of supply, number of dispensings to CSC patients, to HUHC patients, to "J" patients (6–18 year olds), and to "Y" patients (under 6 year olds) (independent variables). Regressions were weighted by the number of dispensings from the pharmacy data. That is, more weight was put on drugs which were more frequently used. It was crucial that the independent variables were able to be determined within PharmHouse, so that a feasible and simple method of estimating unsubsidised dispensings could be developed.

To determine an appropriate price for each drug we calculated the price of one Defined Daily Dose (DDD) of the most commonly subsidised formulation of that drug. The most commonly subsidised formulation was determined from the PharmHouse data. DDDs for all drugs are determined by an expert committee and listed on the World Health Organisation Collaborating Centre for Drug Statistics Methodology website (ref: [www.whocc.no/atcddd](http://www.whocc.no/atcddd)). A DDD is the quantity of each drug likely to be used daily for its main indication. The price of one DDD of this formulation was found in the Pharmaceutical Schedule.<sup>9</sup>

The number of dispensings to CSC patients, to HUHC patients, to "J", and to "Y" patients for each drug was determined in Excel. Length of supply was calculated by dividing the number of units dispensed by dose per day (e.g. if 12 tablets were dispensed and the daily dose was 4, then length of supply = 3 days). Many records had missing data about daily doses. These records were excluded from this calculation. For two drugs with a small number of dispensings, the daily doses were obviously the result of a data-entry error, we recorded 'length of supply' as missing. For two drugs administered by injection we recorded length of supply as 1 day.

In the PharmHouse database there was a very small number of unsubsidised dispensings, which had probably been submitted by mistake, and another few dispensings where the subsidy from Government was recorded as less than zero. We ignored both of these in our analysis, since they are likely to be due to data-entry errors.

The proportion of missing (unsubsidised) dispensings was regressed on individual variables (price, length of supply, number of dispensings to CSC patients, to HUHC patients, to "J" patients (6–18 year olds), and to "Y" patients (under 6 year olds)). All the independent variables were then tested together. The least significant variable was then successively removed from the model.

The data for analysis was one record for each drug, with the proportion of unsubsidised dispensings and accompanying data. Each of these was based on a different number of dispensings so contained different amounts of information and thus could not be treated as equal. So the regression was weighted by the number of dispensings, which will be proportional to the inverse of the variance.

Regression as we have used it requires a normal distribution, however with only 25 data points it is difficult to test for normality. Simple tests such as a normal probability plot show that deviations from normality are not too severe, and would be unlikely to affect the result as regression is robust to most forms on non-normality, and there are no outliers at the ends of the distribution.

## Results

Data from the pharmacy computers in the town included 15,155 dispensings of antibiotics during 2002. Data from PharmHouse for the same period showed 9768 dispensings of antibiotics. Therefore only 64.4% of dispensings of antibiotics were subsidised.

The proportion of dispensings which were unsubsidised varied substantially between drugs (Table 1). For amoxicillin, the most commonly prescribed antibiotic, 38% of dispensings were unsubsidised. All benzylpenicillin, and no chloramphenicol was subsidised.

**Table 1. Unsubsidised prescriptions by drug**

Drug	Total number of dispensings (from pharmacy computers)	Proportion unsubsidised
Amoxicillin	4643	38%
Amoxicillin Clavulanate	2541	26%
Azithromycin	22	5%
Benzathine Penicillin	2	0%
Benzylpenicillin	6	0%
Cefaclor	549	15%
Cefuroxime	10	30%
Chloramphenicol	523	100%
Ciprofloxacin	305	10%
Clarithromycin	12	33%
Clindamycin	3	33%
Co-Trimoxazole	458	25%
Dicloxacillin	185	46%
Doxycycline	817	37%
Erythromycin	1042	36%
Flucloxacillin	1136	31%
Fusidic acid	339	100%
Hexamine hippurate	10	10%
Minocycline	264	7%
Nitrofurantoin	240	7%
Norfloxacin	650	31%
Phenoxyethylpenicillin	535	42%
Roxithromycin	200	39%
Tobramycin	4	100%
Trimethoprim	656	29%

When the proportion of missing dispensings was regressed on individual variables, only price was significant. After successively removing the least important variable only the estimated price per DDD, number of Y patients and average length of supply were included in the model and they all became significant. The equation worked out by this model allows people to put in values and determine the predicted proportion missing.

The equation is: Data missing =  $0.457 - 0.061 * \text{price} + 0.000079 * Y \text{ patients} - 0.007 * \text{length of supply}$

The adjusted R squared value is 0.46, this means that 46% of the variation in the outcome can be explained by the variables in the model. This shows how much better the model is at estimating the proportion missing for each drug, compared to a simple estimate using the average proportion of unsubsidised prescriptions.

## Discussion

Only 64.4% of antibiotic dispensings in the study town were subsidised, and therefore captured by the PharmHouse database. This varied widely by drug. For particular

drugs, the proportion of drugs unsubsidised could be predicted by the price of the drug, the number of days it was prescribed for, and the number of patients aged under six who received subsidised prescriptions.

A greater proportion of prescriptions are unsubsidised, and therefore patients are more likely to bear the whole cost, for drugs that are cheaper, and drugs that are prescribed short-term. This is presumably appropriate, since other things being equal, these would be less of a burden for patients. A greater proportion of prescriptions are unsubsidised for drugs where there are more subsidised prescriptions for children under six. This is likely to mean that drugs which are prescribed more for young children, are more likely to be sometimes unsubsidised. This is an interesting finding, which should be explored in further research.

We have not looked at drugs which are not eligible for subsidy (i.e. not listed on the Pharmaceutical Schedule). The best way to estimate the amount of these drugs used would be to approach suppliers. PharmHouse data cannot provide any information about this.

For our model, ideally estimations of price should be made for each formulation, rather than using the most commonly dispensed formulation for each drug. However the data we obtained from pharmacy computers used brand names, and there were compatibility problems between the software programmes used by the pharmacies, which made identifying formulations difficult.

This study relied on data from only one town, and only one class of drugs. Further work must be done to validate the model for other classes of drugs, in other towns. Further work is also needed to investigate the impact of reduced prescriptions charges in Access Primary Health Organisations (PHOs) on the level of unsubsidised prescriptions. The proportion of unsubsidised drugs would be different for other drugs and other towns. For example, the proportion of unsubsidised drugs is likely to be much lower for more expensive drugs which are taken for longer periods of time (e.g. statins). However, the *relationship* between price, average length of supply, patient variables, and the proportion of drugs which are unsubsidised may or may not be similar for other drugs or other towns, except where PHO funding has changed subsidy entitlements. Further research is needed into whether this model can help to estimate the extent of unsubsidised prescriptions.

Previous studies which used PharmHouse data to describe medicines use are likely to be significant underestimates. We found that only 64.4% of dispensings of antibiotics were subsidised in our study town in one year. Analysis of PHARMAC data has found there were 2,837,241 subsidised dispensings of antibiotics in NZ during 2002 (data unpublished). Simply using the average figure of 64.4% suggests that there may be another 1,568,413 unsubsidised dispensings, thus giving a total of 4,405,654.

Whether previous studies incorrectly estimate regional variation is debatable. We found that the major drivers of the extent of unsubsidised dispensings were price per day, length of supply, and number of patients aged under 6 years who received subsidised prescriptions. Price per day will not vary by region, length of supply probably does not vary very much<sup>3</sup> but the number of children under 6 years receiving prescriptions may, especially when small regions are examined.

PharmHouse remains a very valuable source of data on prescribing trends. Many overseas studies on drug utilisation (especially those looking at how social characteristics such as age, gender and socioeconomic status affect medicines) are not able to obtain national records. They may rely on records from samples of general practitioners,<sup>10-12</sup> interviews with patients<sup>13,14</sup> or samples of hospital admissions.<sup>15</sup> Those that do use national dispensing databases often have little patient information available. For example, in Ireland, Odubanjo et al use eligibility for subsidised medical services to divide the population into 'relatively affluent' or 'relatively deprived'.<sup>16</sup>

The addition of National Health Index (NHI) numbers to PharmHouse data will allow studies of the impact of patient demographics on prescribing to be carried out at a national level in New Zealand. However, the exclusion of unsubsidised prescriptions from PharmHouse is currently a major limitation of this data source. The model we developed in this study may help to overcome this, however.

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## Patients consulting outside of funded practices within primary health organisations: implications for utilisation reporting

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### Abstract

**Aim** To consider two definitions for utilisation reporting in primary care in New Zealand and to assess the affect of two reporting methods on volumes of utilisation in four primary health organisations (PHOs).

**Methods** Utilisation data was analysed for a 6-month period from 60 practices across four PHOs. Analysis was based on comparing the expected volumes from two alternative collection and reporting methods, named “matched” and “unmatched” reporting. The “unmatched” method is potentially sensitive to patients consulting outside of the practice in which they are funded. Volumes were grouped into categories based on those used for reporting.

**Results** There was up to 25% difference in volumes in some reporting groups depending on the matching method used. Several of these were for high deprivation, New Zealand Maori, Pacific Islanders, and Community Service Card (CSC) holders—all potentially target populations within PHOs. Two PHOs were more affected having a total of 7.6% and 6.4% fewer reported encounters using the “unmatched” method. Data implies that some groups of patients may not be receiving continuity of care.

**Conclusions** There were differences in reporting volumes between the two methods. The Ministry of Health (MOH), district health boards (DHBs), and PHOs should be aware of how these results may potentially apply to them, especially where they have after-hours services or target groups as minorities.

Wellington Independent Practice Association (WIPA) Limited manages five primary health organisations (PHOs) in a defined geographical area throughout the lower North Island of New Zealand. As part of a contractual obligation to PHO reporting requirements, WIPA supplies utilisation data to the Ministry of Health (MOH) and district health boards (DHBs). This reporting is important as it is reasonable to assume that the MOH and DHBs may make policy decisions that affect funding based on the data supplied.

Because of the way in which PHOs were initially set up, there are three groups of patients dealt with in this paper. Two groups are funded on a population basis, those being enrolled or registered at a particular practice in a PHO—these are collectively referred to in this paper as “funded” patients. The third group are those patients who are not enrolled or registered at any practice in the PHO which they visit, and are referred to as “non-funded” patients.

Initial analysis conducted at the start of this process indicated that there were many consultations being made by patients outside of the practice at which they were

funded but still within the same PHO. In this paper this is referred to as a “PHO Funded Encounter” and collectively as “intra-PHO flow”.

This paper aims to investigate and describe the issues and potential effects this may have on utilisation reporting. To understand how this can occur, one must consider the definition of what is being reported and the two alternative processes that may be undertaken to complete the reports. The terms used for the two processes will be “matched” and “unmatched” utilisation reporting.

Although some investigations have been made into why patients change their primary carers in New Zealand<sup>1</sup> and abroad,<sup>2,3</sup> these studies do not apply to the current PHO setting and address “real” and “permanent” movement of patients. This study looks at the artificial affect the definition and reporting methods have on volumes.

It is hoped that information presented may help the MOH and DHBs consider the definition of what should be reported and empower other PHOs making future decisions on utilisation reporting and analysis.

## **Reporting definitions and interpretations**

The contracts for the five PHOs managed by WIPA all define utilisation reporting as being for “First Level Services delivered to Enrolled Persons.”<sup>4-8</sup> Although the specific term “enrolled” is used, it has been interpreted as “funded” (as a registered patient has only a temporary status over 3 years within the PHO).

Furthermore there are two alternative ways of interpreting the requirement: counting where only patient consultations occur at the practice at which the patient is funded (“exclusive” definition) or where patient consultations occur at any practice in the PHO at which the patient is funded (“inclusive” definition).

PHOs are primarily focused on population-based health, and funding is based on patients at this level.<sup>9-11</sup> The inclusive definition potentially gives a more complete perspective on healthcare being delivered in a PHO to its funded population, thus making it a more desirable approach. However it is problematic when practices seeing patients on a “casual” basis are not aware that the patient is registered or enrolled somewhere else within the same PHO.

This problem applies to PHOs that consist of more than one practice. Of the five PHOs managed by WIPA, four consist of more than one practice. This paper mainly analyses data from these four PHOs.

## **Matched utilisation reporting**

The fundamental steps involved in matched utilisation reporting are:

- (a) Extraction of data from practice management systems.
- (b) Transport of data to PHO.
- (c) Matching of data against PHO registers.
- (d) Aggregation of data at PHO.
- (e) Reporting to MOH or DHB.

The defining step in this process is the matching of data (c). It affects the way in which all other steps are undertaken and its purpose is to determine the consults

completed in any practice for those patients that are funded in the PHO (either enrolled or registered within the last 3 years).

To match the data and identify PHO-funded patients, it is necessary to extract data at an encounter level, with patient identifiers (in this case National Health Index [NHI]). It then needs to be loaded into a database management system and matched against a PHO-funding database. Ideally this is done on NHI but where this is not available for all patients, second-level matching may be done with patient *date of birth* and *family name*. The purpose of the match is to identify all patients funded in the PHO on the day of the encounters to be included in the reporting.

Aggregation of data is then done on a basis of counting all encounters for PHO-funded patients and assigning to the appropriate reporting categories. This data is then formatted in the appropriate way ready to be sent to the MOH or DHB.

The matched process allows the application of either the inclusive or exclusive definition to utilisation reporting.

### **Unmatched utilisation reporting**

The fundamental steps involved in unmatched utilisation reporting are:

- (a) Extraction of data from practice management systems.
- (b) Transport of data to PHO.
- (c) Aggregation of data at PHO.
- (d) Reporting to MOH or DHB.

In this process, extraction of data at the practice can take two basic forms: either encounter-level extracts or aggregated extracts. Either form would include encounters for patients enrolled or registered at the practice only, which implicitly means they are funded within the PHO. The chosen method will dictate what is done to aggregate the data at the PHO.

Where encounter-level data is provided, the PHO must aggregate the data into the appropriate categories. If aggregated data is supplied, the PHO only need sum the aggregate totals from each practice in each reporting category. Alternatively if a combination is supplied, the encounter data should be aggregated and summed with the already aggregated data.

There may be advantages in extracting aggregated data, as the volume transported would potentially be less and processing is distributed among practices, rather than centrally at the PHO. By not matching it, this process potentially requires less resource at the PHO level.

The unmatched process allows reporting based only on the exclusive definition of utilisation. Where an inclusive definition is applied, this method would potentially under-report volumes.

### **Method**

In this analysis, 6 months of matched utilisation data was used from five PHOs. It was extracted from the wider set of data collected on a routine basis for utilisation reporting.

The routine collection method involves extracting data on a monthly basis from practice patient-management systems, transporting it via HealthLink to the PHO data warehouse, where it is loaded via

an automated software mechanism. The data warehouse is built as a Microsoft SQL Server 2000 database.

At present, not all practices supply utilisation data. Those that do are all using the MedTech32 patient management system (PMS). Some practices had incomplete data for several months, due to anomalies in automated collection routines.

Two quarters of data was used, being the periods 1 April 2004 to 30 June 2004 and 1 July 2004 to 30 September 2004.

Because of the way in which data is stored in, and consequently extracted from, the PMSs, duplicate entries for some encounters exist in the data. This has been accounted for by de-duplicating data at the PHO using the assumption that a patient can have only one encounter for a particular day at a particular practice with a particular healthcare provider.

Any patient that has two or more encounters in a day at the same practice by the same provider has the encounters counted only once. All matching was done using NHI, so any patient without was not matched and therefore counted as a casual encounter. Some *date of birth* and all *encounter date* fields included a time component, which was truncated in all calculations.

PHO information was matched based on the practice in which patients were funded. Data covered two complete quarter periods, and patients could potentially be registered with different practices and PHOs in each quarter. Because of this, the nature of the encounter (being for a funded or casual patient) was determined based on the registration status of the patient in the quarter of the encounter.

Data was manipulated in SQL Server and exported to Microsoft Excel software for presentation. Each category required for contractual reporting was used to group and analyse the information.

Comparisons were made of the number of encounters that occurred within practices where the patient was recorded as funded and those being part of the PHO where the patient was funded, but not the funded practice itself.

For the purpose of this paper these will be termed funded practice and funded PHO encounters respectively. The latter are those that may be potentially lost in unmatched reporting. All analysis of funded PHO patients had Otaki PHO data excluded from analysis, as it consists of only one practice and has no possibility of having intra-PHO patient flow.

Because of the relatively recent commencement of Care Plus, this category was not analysed.

## Results

**Factors affecting analysis**—The data collected from practices for each PHO showed a coverage rate of 77.5–86.7% of the total available for the period. This is considered sufficiently high for the analysis in this paper.

The completeness of NHI data was between 96.8–99.8% for the total of 527,175 encounter records analysed.

**Funded encounters**—Table 1 shows the number of encounters in each PHO broken into non-funded, and funded groups. The Practice group are those encounters where patients have been funded at the practice at which the encounter occurred. The PHO group are those encounters where the patient is funded in the PHO, but not at the practice in which the encounter occurred. The % PHO column shows the percentage of funded encounters that are made up by the PHO group, indicating those encounters that may potentially be lost in unmatched reporting and this is summarised in Figure 1.

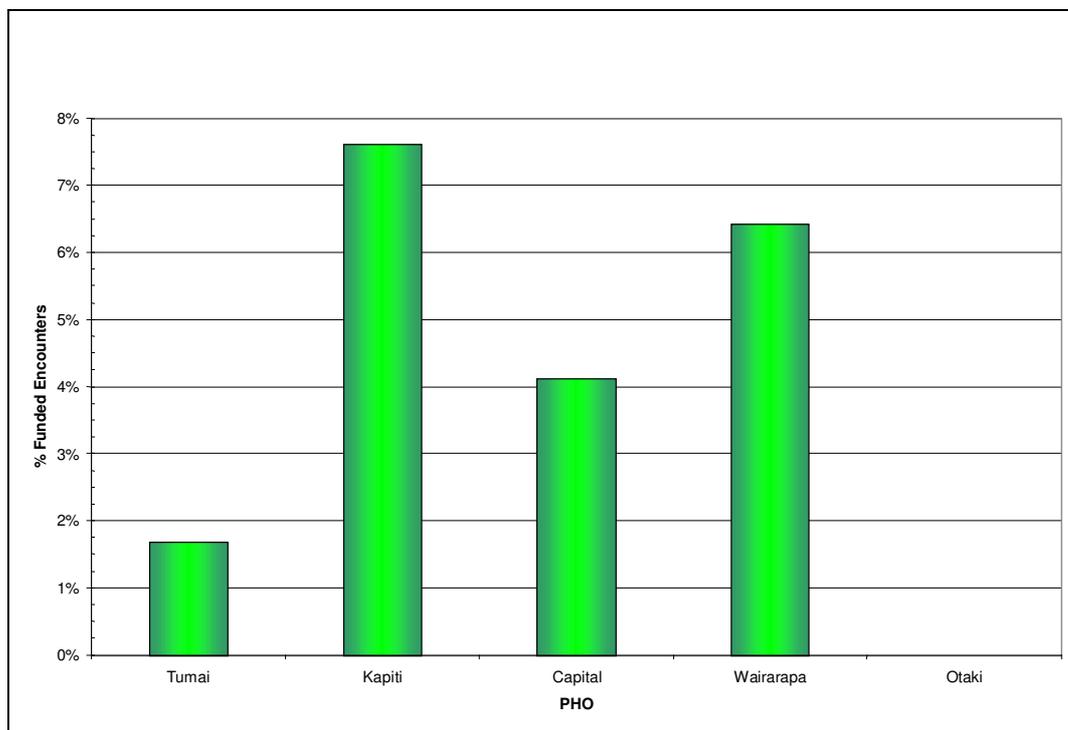
**Gender**—There was little difference in the rates of PHO funded encounters in the gender groups amongst PHOs, ranging from 0 to 0.4% differences between male and females.

**Deprivation quintile**—Figure 2 shows the funded encounters by quintile. A quintile of “0” indicates no quintile assigned for the patient.

**Table 1: Encounters (by funding)**

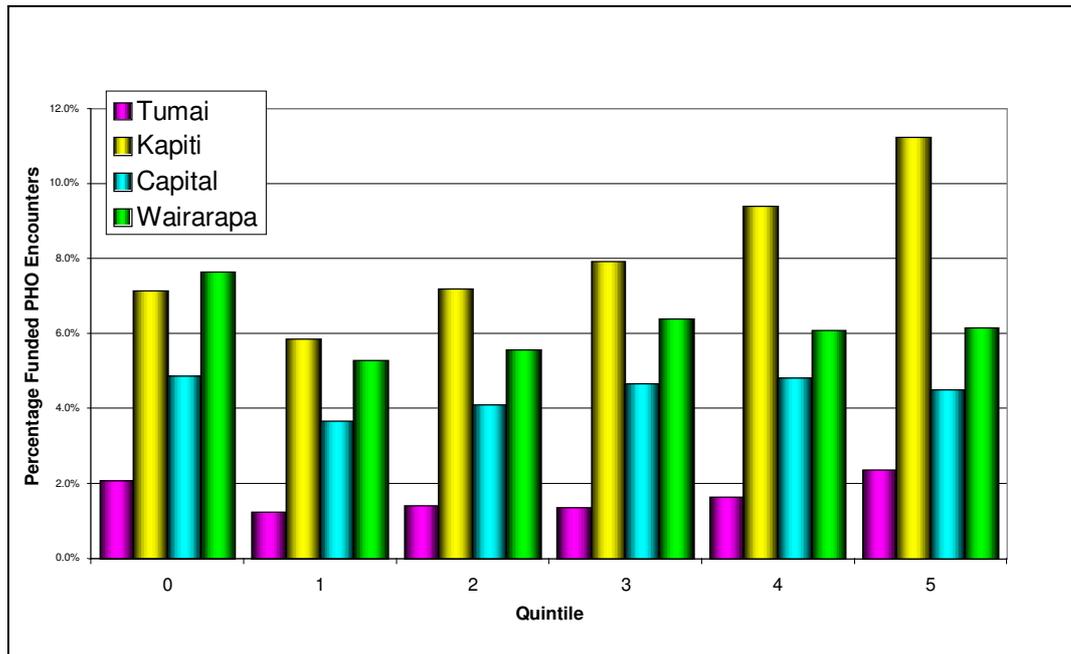
PHO	Encounters				% PHO
	Non Funded	Practice	PHO	Total	
Tumai	9,087	64,635	1,098	74,820	1.7%
Kapiti	13,919	72,609	5,973	92,501	7.6%
Capital	40,169	186,780	8,018	234,967	4.1%
Wairarapa	11,931	88,831	6,090	106,852	6.4%
Otaki	2,438	15,597		18,035	0.0%
<b>Total</b>	<b>77,544</b>	<b>428,452</b>	<b>21,179</b>	<b>527,175</b>	
<b>%</b>	<b>14.7%</b>	<b>81.3%</b>	<b>4.0%</b>		

**Figure 1. Percentage of funded encounters (by PHO)**

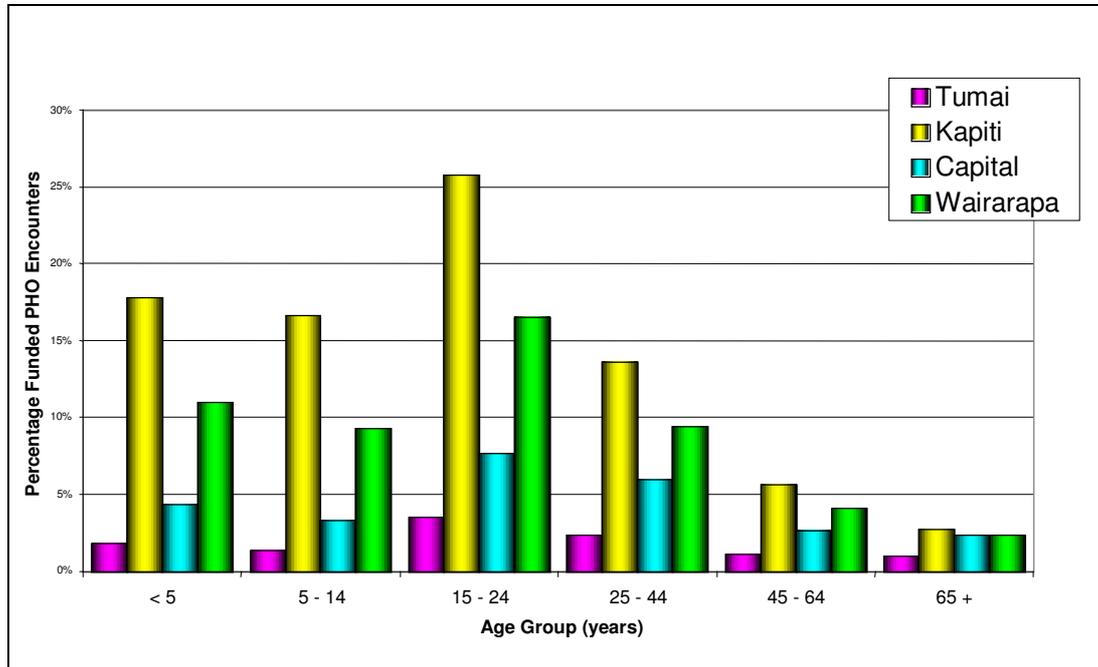


**Age group**—Figure 3 shows the funded encounters by age group. The age groups are deliberately split into uneven year intervals in order to match those used for utilisation reporting. The 15 to 24 years category has by far the largest percentage of PHO encounters, being 11.5 %. The over 65 category is the lowest on 2.3 %, with the 45 to 64 years category low on 3.2 %. The remainder of the categories are between 6.1 and 6.9%.

**Figure 2. Percentage PHO-funded and total-funded encounters (by quintile)**



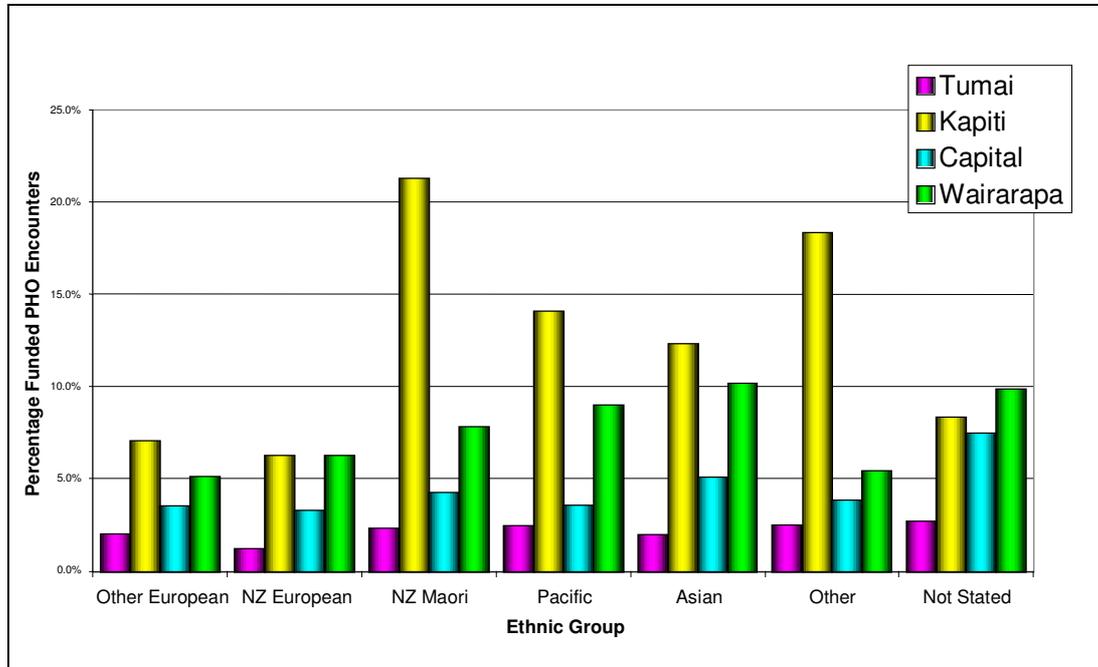
**Figure 3. Percentage PHO-funded compared with total-funded encounters (by age group)**



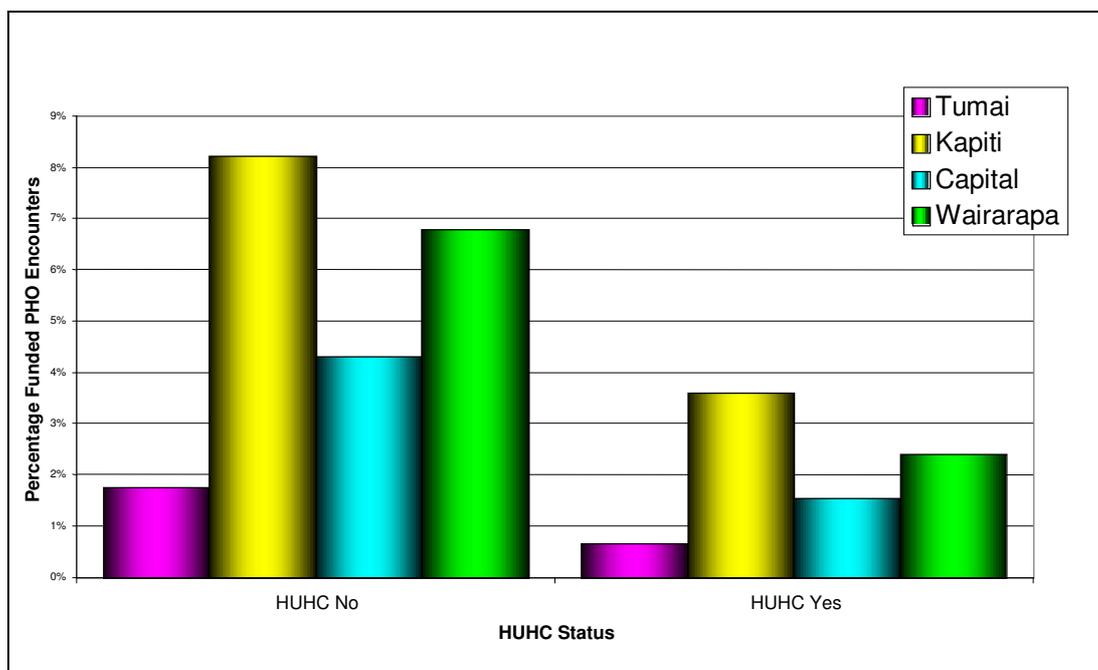
**Ethnicity**—Figure 4 shows funded encounters by ethnicity, in the groups used for utilisation reporting. Of particular note is the relatively large number of ethnicities not stated. In this case, this seems to have been caused by a large number of miscoded or

non-standard coding. This group has a high funded PHO encounter percentage, followed closely by New Zealand (NZ) Maori and South East Asians (7.8%, 6.4%, and 6.4% respectively).

**Figure 4. Funded PHO-encounter percentages by ethnic group**



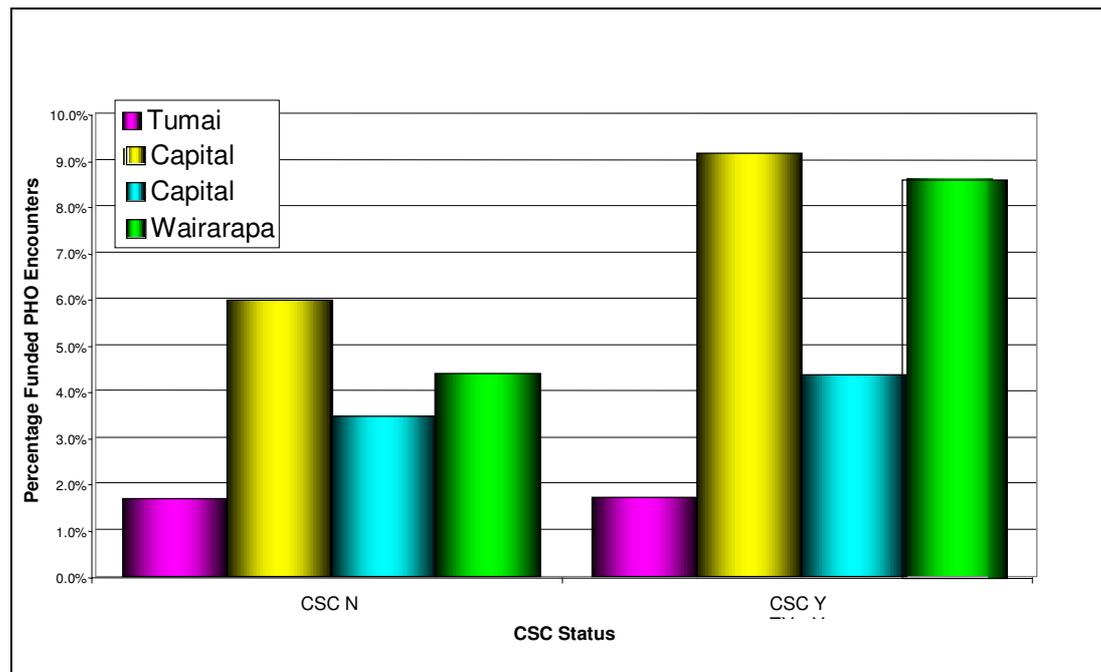
**Figure 5. Funded encounters by HUHC status**



**High User Health Cards (HUHCs)**—Figure 5 shows that holders of a HUHC have only 2.2% PHO encounters, compared with 5.1% for non-card holders.

**Community Service Cards (CSCs)**—Figure 6 shows that CSC holders have a 5.4% funded PHO encounter rate, marginally higher than non-holders.

**Figure 6. % PHO-funded and total encounters (by CSC status)**



N=No; Y=Yes

## Discussion

**Factors affecting analysis**—The range of the data analysed was from 77 to 87% complete for PHOs. Data that was not analysed was not collected at the time due mainly to errors in collection or practices not yet implemented with the automated collection software. The majority of the latter group are non-MedTech32 practices. For all PHOs, the completeness of data is acceptably high for the analysis made in this paper.

The decision to only match data based on NHI makes this analysis susceptible to error where there are low rates of its reporting. The range by PHO is from 96.8% to 99.8%. It is consistent with the registered rates of 94.1% and 94.8% respectively reported by other studies.<sup>10,12</sup>

It is likely that the majority of those patients without NHI fall into the “casual” encounter group, and given that the rates of recording are so high, analysis should not be affected.

**PHO-funded encounters**—The purpose of this paper is to analyse the impact of intra-PHO flow on unmatched utilisation reporting. Using a unmatched process, funded PHO encounters would not be reported. A matched process would detect all encounters by funded patients.

Figure 1 shows the proportion of encounters that would not be reported for each PHO under a unmatched process, ranging from 1.7 to 7.6%.

Both Kapiti and Wairarapa have after-hours services as part of their PHOs. It is possible this contributes to a higher level of funded PHO encounters, as patients cannot access their funded practice out of hours. In other PHOs (although there may be a similar rate of after-hours encounters) they would be outside of the PHO.

Tumai PHO has the lowest rate (possibly due to services in the Porirua region running to capacity, thus making it difficult to gain appointments outside of one's funded practice).

**Category analysis**—The purpose of analysing discrete categories is to determine if the intra-PHO flow affects them uniformly. If this is not the case an unmatched process has the implication that particular pockets of population may appear to be under-utilising PHO resources. It may also imply discontinuity of service which possibly would imply that the *Primary Health Care Strategy*<sup>12</sup> is not achieving its goals in some PHO populations. This has previously been theorised by Kerse and Mainous.<sup>13</sup>

All categories with the exception of gender show differences in rates, both across categories and also across PHOs. Of most interest and potential concern are the high rates in ethnic and deprivation categories.

Deprivation quintile 5 has a very high rate of PHO encounters, particularly in Kapiti but also in Wairarapa. Capital shows an increased level, but not to the same degree as the other two PHOs which may be again an indication of health-seeking behaviour in after-hours services.

Another possibility that may contribute to this pattern may be due to debts being incurred by more deprived populations, seeking treatment where they have little or no debt incurred at the time of consultation thereby avoiding confrontation or payment requests. This could also account for the high rate seen in CSC holders. Literature<sup>1-3</sup> on the topic of why patients change GPs does not support this view, but with the studies being questionnaire based and the stigma associated with debt, respondents may be disinclined to share this as a reason.

The NZ Maori, Pacific Island, and Asian ethnic groups exhibit very high rates of PHO encounters especially in Kapiti and Wairarapa. With the exception of NZ Maori in Wairarapa, these groups are in a minority in comparison with other PHOs. After-hours service use can be one possible explanation for this, where these ethnic groups may consult more often out of hours. Alternatively it may be that the PHOs are not catering for the ethnic needs of these populations and patients must actively seek specific services within the PHO that do.

15–24 and 25–44 age groups show increased levels of PHO encounters through all PHOs. In Kapiti, the <5 and 5–14 age groups are also high. This again is in fitting with trends in ethnicity where minority groups seem to have high rates. It may also be likely that these age groups tend to consult after-hours clinics more often. In all

PHOs, the 45–64 and 65+ groups have remarkably low rates, which may be a positive indicator of continuity of care for the older population.

It is also positive to see that HUHc users have a consistently low rate across all PHOs. This may indicate that they tend to move around less and are getting a higher continuity of care, in line with *Primary Health Care Strategy* goals.

Access to after-hours services may be confounding other trends in all categories, possibly due to work commitments preventing normal-hours consultations, lack of transport in rural areas in ‘one-car families’, or waiting for ailments to turn into more serious or urgent issues. Several of these issues may affect younger working populations, which could explain the high trends for the 15–24 and 25–44 age groups in Kapiti and Wairarapa.

## Conclusion

Some PHOs and some populations in the data analysed would be significantly under-reported if an unmatched process was followed. In several cases these are populations that are being “targeted”, making the issue more pertinent. Because this is different between PHOs, some may be affected more than others, thus putting them on an uneven footing when utilisation rates are compared at a regional or national level.

The implication of this is that if either an exclusive definition of what is reported or an unmatched reporting process if followed, utilisation rates may appear artificially low. If left unclear this may mislead policy decisions at MOH and DHBs.

Although the inclusion of after-hours services within the PHO is believed to be a major contributor to the trends seen in this paper, the effect is not clear or proven. Therefore, further investigation may be important in understanding the functioning of PHOs.

PHOs undertaking utilisation reporting should examine the methods by which they are collecting and reporting information and consider the potential impact some of the factors highlighted in this paper may affect them, especially those with after-hours services or that have target age, ethnic, and deprivation groups as minorities.

The MOH and DHBs should consider carefully the definition of what should be included in utilisation reporting and the effect this may have on data influencing policy and funding. Indeed, (in these early stages) PHOs would be wise to consider having the inclusive definition applied where possible using a matched reporting process to capture and illustrate a fuller picture of utilisation.

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## Inhalant abuse in New Zealand

Michael Beasley, Laura Frampton, John Fountain

**Aim** To describe patterns of inhalant abuse in New Zealand and discuss management.

**Methods** Calls to the National Poisons Centre (NPC) from January 1 2003 to December 31 2004 were analysed. In addition, deaths following inhalational abuse were identified from the Institute of Environmental Science and Research Limited (ESR) database for 2001 and 2002 and available data for 2003.

**Results** Seventy calls were classified as relating to inhalational abuse incidents. In abusers whose age was known, 83% were between 11 and 20 years, and 61% were male. Over half (44/70) of the calls involved abuse of propane or butane, either alone or in combination with a synthetic pyrethroid. ESR coronial data identified 11 inhalant abuse related deaths, most commonly attributed to cardiac effects. 73% of deaths were in teenagers and all but one fatality involved propane and/or butane.

**Conclusions** Inhalant abuse is a persisting problem in New Zealand. NPC and ESR data demonstrate that teenagers are more likely to abuse inhalants than other age groups and butane and propane are the inhalants of choice. Acute management can be difficult, with significant mortality and morbidity. Continued education and other preventive measures are essential to help curb an extremely dangerous practice.

Inhalation of volatile compounds (including adhesives, solvents, fuels, and propellant or flammable gases) is a recognised cause of sudden death among those abusing these substances for “recreational” purposes.<sup>1</sup> Recent Coroners’ inquests into eight deaths related to these substances have been reported by the media, along with an estimate that “...hundreds if not thousands...” may abuse these substances daily.<sup>2</sup>

This study aims to better characterise the inhalant abuse problem in New Zealand, by both reviewing the Coronial Services Office findings to identify deaths, and evaluating records maintained by the New Zealand National Poisons Centre (NZNPC) of enquiries relating to these substances. A review of the toxic mechanisms, health impacts, and management of those affected by inhalant abuse is also undertaken.

## Methods

Calls to the NZNPC over the 2-year period from January 1 2003 to December 31 2004 were analysed. The NZNPC is the sole Poison Control Centre for New Zealand and serves a mixed population of urban and rural areas, covering a population of approximately 4 million people. The data were retrieved from the NZNPC calls collection database. Inclusion criteria were all inhalation exposures where the reason was recorded as intentional abuse. For the purposes of this study, carbon monoxide and nitrous oxide calls were excluded. Data included were the age and sex of the user, date and time of exposure (if acute), its location, substance involved, details of the incident, our assessment, caller background, and regional area where it occurred.

Deaths following intentional inhalational abuse were also sought. Eleven fatalities (see Table 3) were identified from the Institute of Environmental Science and Research Limited (ESR) Chemical Injury Surveillance System database (CISS), which includes data from the national Coronial Services Office.<sup>3</sup> While all Coronial findings for 2001 and 2002 are considered available, findings for 2003 are not, as a full accounting of deaths assessed by Coroners and retrieved by ESR will typically take up to 3 years.

## Results

The NZNPC received 27,020 and 28,357 calls in 2003 and 2004 respectively as shown in Table 1. Of total calls, 4.6% (2003) and 4.4% (2004) were inhalational exposures. Intentional inhalational exposures (excluding nitrous oxide and carbon monoxide) accounted for 70 cases in total over the 2-year period.

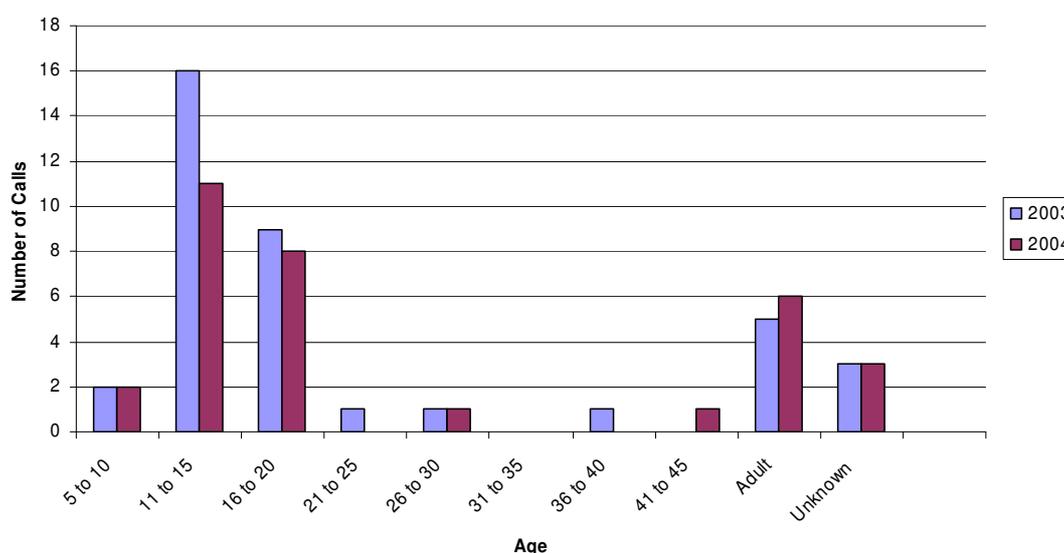
**Table 1. Total calls and inhalational exposure calls to the New Zealand National Poisons Centre (NZNPC)**

Variable	2003	2004
Total calls received by NZNPC	27,020	28,357
Inhalational exposures	1249	1241
Intentional inhalational exposures	77	72
Intentional inhalational exposures (excluding nitrous oxide and CO):	38	32
- Male	24	18
- Female	14	14

CO=carbon monoxide.

The age of users ranged from 7 to 45 years. The age distribution of inhalant abuse calls is shown in Figure 1. The patient was classified as “adult” when the age was not known other than that they were 11 years of age or over. Where age was known, 83% percent of abusers were between the ages of 11 and 20. Forty-three (61%) were male.

**Figure 1. Age of inhalant abusers**



The substance(s) the NZNPC received the most calls about was propane or butane, propellants found in common household products such as air-freshener, body sprays, and fuels in gas heaters (LPG) (as shown in Table 2). Over the 2-year period (2003

and 2004) we received a total of 30 calls in regards to their abuse. In addition, there were 14 calls regarding the abuse of synthetic pyrethroids with butane (fly spray) and 8 calls about the intentional inhalation of petrol. Calls regarding toluene, kerosene, and other hydrocarbons were less frequent.

**Table 2. Substance involved in inhalant abuse calls**

Inhalant	Household product	2003	2004
Propane/butane	Air-freshener, LPG, body sprays	15	15
Synthetic pyrethroid + butane	Fly sprays	10	4
Gasoline	Petrol	5	3
Hydrocarbons (various)	Paint	2	3
Toluene	Adhesives	2	2
Kerosene	Lighter fluid, kerosene	1	2
Trichloroethylene	Correction fluid	1	0
Mineral turpentine		1	0
Methylene chloride	Spray paint	0	1
Not specified		1	2

Deaths from inhalant abuse (as shown in Table 3), as determined by the Coroner, were most often due to cardiac dysrhythmia. In all but one case of death, propane, butane, either alone or in combination with a synthetic pyrethroid was the inhalant involved. In 73% (8/11) of cases, the deceased was a teenager. The majority involved males.

**Table 3. Substance, age of abuser, cause, and year of death due to inhalant abuse**

Inhalant	Age of deceased	Sex	Mode of death	Year
Butane and fly spray	24	M	Cardiac dysrhythmia	2001
Fly spray	18	F	Cardiac dysrhythmia	2001
Butane	16	F	Cardiac dysrhythmia	2001
Toluene	36	M	Not stated	2001
Butane and Propane	14	M	Cerebral anoxia	2002
Butane	19	M	Acute cardiac failure	2002
Liquefied Petroleum Gas	18		Asphyxia	2003
Butane	15	M	Not stated	2003
Butane	28	M	Pulmonary aspiration	2003
Aerosol propellants	16		Not stated	2003
Butane	18		Not stated	2003

## Discussion

Inhalant abuse is a persisting problem in New Zealand. Coronial data suggests it may account for at least 10% of all poisoning deaths (excluding carbon monoxide), with many of these deaths occurring in teenagers. Analysis of calls received by the NZNPC supports this finding, with a large majority of calls relating to 10 to 20 year olds. Inhalant abuse in teenagers is a common phenomenon worldwide as the household products commonly abused (including air freshener and fly spray) are inexpensive to obtain, simple to hide, and provide an easy way to get 'high'.

Our data could not provide detailed information on morbidity and outcome as we do not routinely follow up incoming enquiries (due to various reasons, including the 1993 Privacy Act). However in one prospective series in the US, ~38% of enquiries related to cases with significant effects, including loss of consciousness, seizures, metabolic acidosis, and occasionally death.<sup>4</sup> In another review, ~ 20% of cases had either moderate effects, usually requiring treatment, or were major effects or fatalities.<sup>5</sup>

Our data indicate that some abusers can be very young, as noted elsewhere.<sup>5</sup> They may be initially drawn by curiosity and the desire to imitate. The practice appeals because of the feelings of euphoria with loss of inhibitions. There may also be a sense of heightened powers, illusions, and hallucinations, along with mood swings and impulsive actions. However oral frothing, nausea, vomiting, light headedness, dizziness, slurred speech, ataxia, and cough with upper airway irritation can also develop. Heavier exposures can produce progressive nervous system depression. Nevertheless many subjects even with depressed levels of consciousness can have resolution of acute symptoms within one to two hours of cessation. This generally rapid recovery often means that abuse is not recognised by parents.<sup>4</sup>

Coronial data was insufficiently comprehensive to elucidate whether the apparent higher case fatality rate for males (reported elsewhere)<sup>4</sup> applies in New Zealand. Also unclear (internationally) is the fatality risk per abuse episode. While evidence is often circumstantial, most deaths are presumed to have a primary cardiac aetiology. A significant fraction occur in association with intense sympathetic stimulation as with running,<sup>6</sup> other exertion, auto-erotic behaviour, or agitation or startling of the abuser.

Running may be intentional (as in avoiding apprehenders) or seem coincidental, but often appears to be caused by the inhalation, and may be due in part to vivid hallucinations, at least in cases exhibiting fearful reactions.<sup>7</sup> The cardiac sensitising potency of inhaled hydrocarbons is greatly increased in the presence of high circulating catecholamine levels such as occurs with exercise or excitement<sup>6</sup> (the ability of injected adrenaline to markedly increase arrhythmia risk during solvent inhalation is well demonstrated in animal studies).<sup>8</sup>

While hypoxia and hypercapnia can also enhance cardiac sensitisation,<sup>9</sup> experimentally these do not seem such powerful influences.<sup>10</sup> Any acidosis, hypokalaemia or hypocalcaemia can also predispose to arrhythmias.

Experimentally there is evidence that solvents can inhibit cardiac inward sodium currents,<sup>11</sup> with risk of prolonged membrane depolarisation and slowed impulse propagation. (They “stabilise” myocardial cell membranes in ways that increase their resistance to normal trans-membrane ion currents.) Sinus bradycardia is typically the first rhythm abnormality seen in animal studies,<sup>12</sup> followed most commonly by AV dissociation with progressively lower escape rhythms, and finally electrical asystole or ventricular fibrillation. Bradycardia and ultimately asystole may partly arise from a direct effect on the sinoatrial node.<sup>11,12</sup> Myocardial infarction has occasionally occurred,<sup>13</sup> the postulated mechanism being coronary artery spasm.<sup>9,14</sup>

While sudden sniffing death syndrome may occur on the 1st, 10<sup>th</sup>, or 100th time a person abuses inhalants, it appears to occur most often in naïve, first-time users. (One factor may be the difficulty in regulation or “titration” of a dose with many of the delivery methods. There is also likely substantial individual variation in susceptibility,

though specific risk factors are not fully characterised.) Furthermore, the risk does not vanish immediately on cessation of inhalation, instead persisting for several hours. This is not surprising, given the high lipid solubility of solvents, which enables access into (and some persistence within) myocardial cell membranes.

Other causes of death include respiratory depression and anoxia from suffocation during the practice of inhaling substances from a plastic bag. Fatalities have also occurred due to aspiration of vomitus<sup>15</sup> and mishaps (such as drowning or motor vehicle accidents)<sup>1</sup> that can arise while functioning is still significantly impaired by the inhalant.

Butane and propane appear the most commonly abused inhalants which is not surprising, given they are found as propellants in a wide variety of household sprays. Both are recognised internationally as major causes of inhalant abuse fatalities.<sup>16</sup> Indeed, one study suggested that (especially in the context of air fresheners) they may carry a disproportionately high fatality rate.<sup>5</sup> However the data from the study, based on the toxic exposure surveillance system (TESS) database of the American Association of Poison Control Centers (AAPCC), only involved cases reported to individual PCCs, which likely represents a small proportion overall, with a potential for reporting bias.

While they are considered less narcotic and less potent cardiac sensitisers than some other propellants and solvents,<sup>17</sup> their high volatility and rapid evaporation from compressed liquid forms can result in very high exposures during abuse, increasing the risks.<sup>8</sup> Long term neurological sequelae may develop in surviving cases.<sup>13</sup>

Some methods of inhaling these compounds present additional hazards. Vagal inhibition may occur from a sudden freezing effect on the larynx and surrounding structures, due to the rapid expansion and cooling of gas produced from compressed liquid forms or even aerosols when sprayed directly into the mouth. For example, butane inhalation via cigarette lighter refills may involve releasing a jet of fluid cooled to  $\leq 20^{\circ}\text{C}$ . This can result in reflex inhibition of the heart, with bradycardia or in extreme cases, cardiac arrest.<sup>1</sup> There is also a risk of profuse mucosal oedema, burns to the throat and airways,<sup>18</sup> and laryngospasm with severe respiratory tract obstruction. Inhalation of burning (accidentally ignited) gas can cause adverse lung effects, including pulmonary oedema.

The increasing abuse of fly sprays is also concerning due to the presence of synthetic pyrethroids as the active constituent. Comparatively little is known about the effects of pyrethroids on the heart (as opposed to neurons). However, some experimental evidence suggests “type II” pyrethroids possess considerable mammalian cardiac arrhythmogenic potential.<sup>19</sup> Pyrethroids can also produce marked adrenal stimulation, with increased circulating catecholamines.<sup>20</sup> While severe allergic respiratory reactions are described with natural pyrethrum, and even its purified pyrethrin extracts,<sup>21</sup> they appear less of a risk with synthetic pyrethroids. In one case of a fly-spray abuse related death discussed with the NZNPC, lack of sputum eosinophils argued against an allergic basis. However allergic asthma has been attributed to tetramethrin.<sup>22</sup> While the role of pyrethroids as opposed to propane/butane in fly spray abuse-related deaths remains uncertain, they could be expected to increase the risk.

Acute management of abusers can be difficult, as there may be rapid onset of life-threatening effects, yet limited opportunity for early intervention, as abuse may take place in unobserved and/or remote situations. Most deaths occur outside hospital.<sup>23</sup>

All cases of acute abuse should be observed (even if without initially obvious clinical abnormalities), as a risk of sudden arrhythmia may remain for some hours after inhalation.<sup>24</sup> It is important to calm conscious victims to reduce further release of endogenous catecholamines.<sup>7</sup> Symptomatic cases should be medically observed until 8 to 12 hours post-exposure, while asymptomatic cases remaining so and without ECG abnormalities can probably be discharged safely after four hours.

Oxygen should be administered to all symptomatic patients. Severe respiratory depression requires assisted ventilation, and early airway protection has been recommended, particularly in unconscious patients, as vomiting is common.<sup>23</sup> However, intubation in the presence of laryngospasm (or for agents known to cause it) must be cautious, as this may cause excessive vagal stimulation, exacerbating bradycardia, and is not advised in patients with impending cardiac arrest.<sup>9</sup> Instead Ambu bag ventilation using an oropharyngeal airway has been successful in this situation.<sup>7,9</sup> With improvement in cardiac rhythm, endotracheal intubation, assisted by neuromuscular paralysis if necessary, can be instituted. Bronchoscopy may be required to remove aspirated material. In the event of bronchospasm, use of inhaled beta 2 adrenergic receptor agonists must be cautious, to minimise any additional risk of arrhythmia.

Resuscitation from cardiac arrhythmias has not often been successful, partly due to their rapidity of onset. It is generally not advised to administer catecholamines, as they can increase the risk of arrhythmias including ventricular fibrillation.<sup>9</sup> Standard electrical methods and early use of antiarrhythmic agents should be considered, particularly with recurrent ventricular arrhythmias.<sup>25</sup> Agents used in association with occasional successful outcomes have included amiodarone, lignocaine, and mexiletine.<sup>9,14</sup> Amiodarone has the advantage of causing little or no myocardial depression; initial doses of 300 mg IV have been used,<sup>25</sup> the same as recommended for ventricular fibrillation in other contexts.

Hypotension is largely secondary to cardiac arrhythmia or impaired contractility. It may respond to fluid replacement or management of any underlying cardiac rhythm disturbance. Careful use of an agent with inotropic (and/or chronotropic) properties may be required. Noradrenaline<sup>25</sup> and dopamine<sup>26</sup> (with additional vasopressor effects) have sometimes been used with success, despite concerns regarding arrhythmia risks. While a non-catecholamine might be theoretically preferable, there appears no reported experience with other inotropes such as glucagon. Myocardial infarction can occasionally be a factor in severe hypotension or arrhythmia, including recurrence of ventricular fibrillation.<sup>25</sup> In some cases it appears as a complication,<sup>26</sup> but might also occur as a primary event. Treatment with catecholamines may require extra caution in this situation.

The effectiveness of atropine for persistent, haemodynamically significant bradycardia appears unclear. Glucagon might be useful, and would be theoretically preferable to catecholamines in terms of safety. It directly increases automaticity at the sinoatrial and atrioventricular nodes,<sup>27</sup> and is known to have potent chronotropic

as well as inotropic actions. However there is no guidance on doses. It can also stimulate release of endogenous catecholamines.<sup>28</sup>

Beta-adrenergic blockers have been recommended to protect the catecholamine sensitised heart,<sup>9</sup> but should be used with care given their negative inotropic and chronotropic effects,<sup>25</sup> with risk of hypotension,<sup>26</sup> particularly in the presence of bradycardia. There are few reports of their use, (though a short acting compound appeared beneficial for junctional rhythm in one case).<sup>29</sup>

Seizures should be treated aggressively with benzodiazepines as their contribution to hypoxia, acidosis, and catecholamine stimulation can increase risk of arrhythmias. Rhabdomyolysis may develop, especially in cases involving seizures, prolonged immobilisation, or severe hypokalaemia. It may be a factor in cases of renal failure unexplained by circulatory impairment. Acidosis if severe requires treatment (an added advantage being this reduces risk of myoglobinuria induced renal tubular damage). Electrolyte disturbances may require correction, under close monitoring. Haemodialysis has occasionally been required for renal failure.

Chronic symptoms of inhalant abuse may include a chemical smell on the breath, poor attention to hygiene, obvious intoxication where alcohol is not a factor, personality changes, alterations in sleeping and eating behaviour and a persistently runny nose or eye irritations. A rash or acne around the nose/mouth may also be present but could be easily confused for what is a common complaint in many teenagers.

Toluene has been widely abused in the past and carries significant acute cardiac risk.<sup>30</sup> However in chronic abusers, neuropsychiatric disorders, gastro-intestinal complaints, and muscle weakness often feature.<sup>31</sup> Effects on short term memory, concentration, visuo-spatial and other executive or abstract thinking functions can be marked. Psychotic episodes may be precipitated or even initiated by high exposures.<sup>32</sup> Temporal lobe epilepsy, cranial nerve dysfunction, and peripheral neuropathy are reported (though co-exposure to other solvents can also be a factor).<sup>33</sup> Neurological effects are not always reversible. Imaging techniques have demonstrated decreased perfusion and atrophy of cerebral, cerebellar, thalamic and brainstem structures.<sup>34</sup> Jaundice is reported and abnormal liver function tests may take up to six months to normalise.<sup>35</sup> Chronic myocardial<sup>36</sup> effects have been reported, and adverse pulmonary effects may also occur.<sup>37</sup>

It can also produce renal tubular acidosis (RTA), with impaired ability to acidify the urine and thus increased risk of acidosis. Distal or less commonly proximal tubular acidosis or a mixed form can occur.<sup>38</sup> The tubular dysfunction can also result in electrolyte disturbances, including hypokalaemia, hypocalcaemia, hypophosphataemia, and hyperchloraemia.<sup>31</sup> Hypokalaemia (a risk factor for rhabdomyolysis) is more common than hyperkalaemia, especially in acute-on-chronic abuse, but the latter can occur acutely, generally as a result of rhabdomyolysis, which itself may result in acute tubular damage.<sup>39</sup> However renal insufficiency is often rapidly reversible, with reduced urine output for two or three days only after sniffing episodes.<sup>35</sup> Metabolic acidosis can be marked; when present as an acute effect<sup>38</sup> there is often an elevated anion gap component due to accumulation of toluene metabolites,<sup>40</sup> while with regular abusers, RTA is a common contributor. Maternal abuse has been associated with a foetal solvent syndrome,<sup>41</sup> postnatal persistence of growth deficiency, and electrolyte abnormalities in the newborn.<sup>42</sup>

Given the difficulties in acute management and the significant chronic morbidity, preventive measures are critical. Following acute treatment, all patients should be referred to an appropriate substance abuse program. Youthful users motivated primarily by curiosity and peer pressure may be responsive to educational campaigns,<sup>43</sup> however the best approach may be to also provide family and community counselling, residential care, and alternative recreational activities.<sup>44,45</sup> Fortunately it appears that most users ultimately abandon the practice, often before they develop physical complications, such as neurological or renal damage. However, it appears to be a gateway phenomenon among younger adolescents where children who abuse inhalants early in life are more likely later to use other illicit drugs.<sup>46</sup> Continued efforts to optimise prevention are required, while recognising that complete control of supply of all inhalants with abuse potential is not possible.

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## **Ayurvedic medicine: patients in peril from plumbism**

Johan van Schalkwyk, James Davidson, Barry Palmer, Virginia Hope

### **Abstract**

Heavy metals are commonly incorporated into Ayurvedic preparations as ashes or 'bhasmas'. A widely disseminated belief within Ayurvedic medicine is that these heavy metals can be valuable therapeutic components. Western toxicology refutes this contention. We report eight cases of lead poisoning occurring in or near the Auckland region of New Zealand. In all cases, poisoning was attributable to consumption of Ayurvedic 'herbal medicines'. Whole blood lead levels ranged from 1.5 to 6.9 micromol/L. Six patients had symptomatic lead poisoning, requiring treatment with chelation therapy. A high index of suspicion is required to detect lead poisoning, which should be suspected in people taking Ayurvedic remedies, especially if they have associated anaemia or abdominal symptoms.

There is a common belief among the public that use of 'herbal medicine' is harmless while some medical professionals seem to regard use of such 'medicines' as a fad, like bottled water. Such assumptions are far from the truth. Various 'herbal medicines' present some risk, as is shown by the contamination of preparations with digitalis,<sup>1</sup> and introduction of agents such as corticosteroids,<sup>2</sup> ephedrine, testosterone, and heavy metals.<sup>3</sup>

We wish to alert the medical community to a substantial threat to wellbeing posed by a particular form of herbal remedy, namely Ayurvedic medicine. A recent analysis<sup>4</sup> demonstrated the presence of substantial amounts of heavy metals, predominantly lead, in 20% of Ayurvedic preparations purchased in the Boston area in the United States. We report eight New Zealand cases of poisoning due to similar preparations.

### **Methods and case descriptions**

We examined hospital clinical records, laboratory records, and records of the Auckland Regional Public Health Service for cases of lead poisoning associated with ingestion of Ayurvedic 'herbal' remedies. All clinical cases known to the authors were included. We report lead content of samples of Ayurvedic remedies, where these were obtainable, based on analysis by an accredited laboratory (Environmental Laboratory Services Ltd, Lower Hutt, arranged by ESR, Environmental Science and Research Ltd), unless otherwise specified.

We identified seven cases of lead poisoning associated with the ingestion of Ayurvedic 'herbal' remedies occurring within the Auckland region of New Zealand between May 1999 and May 2005. We include a further case from the adjacent Waikato region (Case 7). The cases are reported in chronological order.

**Case 1**—A 28-year-old Indian woman presented to Auckland Hospital with epigastric pain and vomiting. She had been taking a mixture of brown Ayurvedic powders and black tablets from India to aid her fertility. She had a normocytic anaemia (Hb 87 g/L) and stippled cells were noted on the film. Liver enzymes were slightly elevated and

faecal occult blood was negative. Her whole blood lead concentration was 4.5  $\mu\text{mol/L}$  (notifiable level  $>0.72 \mu\text{mol/L}$ ), necessitating chelation therapy.

One of the unidentified brown powder preparations, taken at a dose of one teaspoon per day, contained 20% lead by weight (200,000 parts per million, ppm) and another 13% (130,000 ppm). The tablets contained lead at much lower levels (20–70 ppm).

**Case 2**—A physician at Auckland Hospital notified the Public Health Unit of a case of lead poisoning in a 38-year-old Indian man who had been taking tablets and using creamy snuff imported from India as a toothpaste. The patient's whole blood lead level was 6.9  $\mu\text{mol/L}$ , an indication for urgent treatment.

The patient received ethylenediaminetetraacetic acid (EDTA) and dimercaprol. Liver enzymes were slightly elevated. As the patient was reluctant to take part in any further investigations, no other sources of lead exposure were identified. Lead content of the tablets (7.8 mg per tablet or 4800 ppm) probably accounted for the poisoning, as lead levels in the *Ipcos Creamy Snuff* and *Dentobac Creamy Snuff* were low (both  $<100$  ppm)

**Case 3**—A 48-year-old Indian woman presented to her general practitioner with concerns about her lead levels following the admission to Auckland Hospital of a friend taking the same Ayurvedic herbal medicine (a brown tablet) as her. The lead content of each of these tablets was 7.8 mg. She was taking four tablets daily, and had done so for 3 months. Her whole blood lead level had been 2.2  $\mu\text{mol/L}$ , requiring no treatment. There were no other sources of lead exposure.

**Case 4**—A 66-year-old female family friend of Case 3 presented to her general practitioner with concerns about having a raised lead level. She had been taking unidentified Ayurvedic herbal medicines given to her by the friend and had a blood lead level of 1.5  $\mu\text{mol/L}$ , with no treatment indicated. There were no other sources of lead exposure.

**Case 5**—A 30-year-old Indian man who had lived in New Zealand for 2 years presented to Auckland Hospital with a 5-day history of right upper quadrant colicky abdominal pain, without any associated diarrhoea or vomiting. Examination revealed mild right upper quadrant tenderness, no organomegaly, and no signs of neuropathy or encephalopathy. Blood count showed a normocytic anaemia (Hb 107 g/L) with basophilic stippling. Liver function tests were abnormal with negative hepatitis serology. The whole blood lead level was 3.8  $\mu\text{mol/L}$  and urine lead 1.2  $\mu\text{mol}/24 \text{ h}$  (normal:  $<0.25 \mu\text{mol}/24 \text{ h}$ ).

He had a past history of infertility and azoospermia and had been taking two to three Ayurvedic fertility pills for a month preceding his symptoms. No occupational or other source of lead could be identified. He underwent chelation therapy and required repeated courses of EDTA infusions. No tablets were available for analysis.

**Case 6**—A 51-year-old Indian man presented to Auckland Hospital with a 2-week history of colicky abdominal pain associated with diarrhoea. There was a background history of type 2 diabetes for which he had been taking metformin and Ayurvedic *Jambrulin* tablets. He had a normocytic anaemia (Hb 100 g/L) and stippled cells were seen on the film. The whole blood lead level was 6.7  $\mu\text{mol/L}$  and urine lead was 16.5  $\mu\text{mol}/\text{day}$ . Blood cadmium, urine mercury, and arsenic were all normal. He was

treated with oral dimercaptosuccinic acid (DMSA) chelation therapy resulting in a stable reduction of levels to 1.5 µmol/L. Analysis of his Ayurvedic tablets showed that each contained approximately 10 mg of lead (16,000 ppm, unaccredited laboratory). The recommended dose on the bottle was four tablets daily.

**Case 7**—A 31-year-old Indian woman who had lived in New Zealand for 10 years presented several times to her general practitioner with complaints of fatigue, nausea, weight loss, abdominal pains, and diarrhoea. She was referred for an upper gastrointestinal (GI) endoscopy, which was normal. Several months later she again presented with abdominal pain and diarrhoea. A positive faecal occult blood test led to a lower GI endoscopy, which was normal.

Three months later, she again presented to the Emergency Department with abdominal pain associated with colic, nausea, vomiting, and no bowel movement for 6 days. On examination, she had abdominal distension with tenderness and guarding in right iliac fossa. She had been taking paroxetine, paracetamol/dextropropoxyphene, and tramadol, as well as Ayurvedic medicinal powders. There was no exposure to heavy metals apart from Ayurvedic medicines.

She was anaemic (Hb 105 g/L) and the blood film showed basophilic stippling, Cabot rings, nucleated red blood cells, occasional red cell fragments, and target cells. She was hyponatraemic (Na 113 mmol/L) and had elevated liver enzymes.

An abdominal X-ray suggested small bowel obstruction with no bowel gas beyond the sigmoid colon. Computerised tomography of the abdomen showed dilated large and small bowel to the level of the distal sigmoid. Possible diagnoses considered were atypical sigmoid volvulus and stricture, and laparotomy was planned but held off as her pain improved.

The patient's pain settled after sigmoidoscopy, and no mechanical obstruction was found. The whole blood lead level was 3.5 µmol/L. The abnormal sodium and liver function tests improved spontaneously and she subsequently underwent EDTA chelation therapy.

**Case 8**—A 53-year-old woman pharmacist of Indian origin presented with lower leg oedema for 2 months, followed by a 3-week history of mainly left-sided abdominal pain of a constant character, accompanied by nausea. She had also been feeling very tired but attributed this to stress. Examination revealed pallor, and a definite lead line on the gums. No motor weakness or other neurological deficits were present.

She had been taking six black *Chandraprabhavati* ('Chandrapradhavate') tablets per day for several months. These had been prescribed for her in India. A normocytic anaemia (Hb 72 g/L) was present and basophilic stippling was noted. The whole blood lead was 5.3 µmol/L. She was treated with a blood transfusion and oral DMSA chelation therapy. The *Chandraprabhavati* tablets each contained 11 mg of lead (12,400 ppm).

## Discussion

By way of the Internet, there is universal public exposure to the Ayurvedic contention that, administered correctly, 'bhasmas' (carefully extracted ashes) containing lead or mercury have beneficial therapeutic effects. Indeed, recent webpages still assert the safety of such bhasmas.<sup>5,6</sup> This belief is irreconcilable with Western toxicology. From

the point of view of Western science, even minuscule quantities of lead have potential for harm, including irreversible brain damage, and are of absolutely no therapeutic benefit.<sup>7</sup>

Substantial scientific literature documents these harmful effects in adults and in particular, in the developing human. Severe congenital lead poisoning has been reported in an infant born to a woman who had taken Ayurvedic preparations during pregnancy.<sup>8</sup>

All medical practitioners should be aware of lead poisoning caused by Ayurvedic preparations, now a common cause of lead poisoning in the Auckland region. A single case has recently been reported from Christchurch, New Zealand.<sup>9</sup> Use of complementary medicines is common and reports of celebrities taking Ayurvedic remedies may increase their use.<sup>10</sup> Symptomatic lead poisoning may be difficult to identify without a high index of suspicion. Medical histories for all age groups should now include a specific enquiry about the use of complementary, herbal, or traditional medicines.

The lead content of Ayurvedic medications used by the patients described is clearly such that consumption of even small quantities would result in intake exceeding the 'provisional tolerable *weekly* intake' (PTWI) of the Joint FAO/WHO Expert Committee on Food Additives, set in 1999 at 25 micrograms/kg body weight.<sup>11</sup> For example, consumption by a 70 kg adult of a *single* tablet containing 8 mg of lead exceeds the PTWI by a factor of over four! Moreover, in view of the consumption of Ayurvedic medication with therapeutic intent, as well as the toxicity described, it is debatable whether such remedies should be regarded solely as 'food additives'.

The cases we report are likely to be just the tip of the iceberg—individuals who have taken Ayurvedic preparations and present with abdominal pain, anaemia, or other features of lead poisoning should have appropriate determination of blood lead levels to exclude such poisoning. This is especially important because symptomatic lead poisoning can be effectively treated, with a substantial scientific rationale for such treatment.<sup>12</sup> Where possible, samples of the Ayurvedic remedy should be obtained, and the name and origin clearly documented (This was not possible in several of the cases reported here.)

Lead poisoning is a notifiable disease and the local public health unit should be notified immediately so that a thorough investigation of potential risk factors can be undertaken and preparations can be sent to an accredited laboratory for confirmation of the presence of lead or other contaminants. Ayurvedic or other herbal preparations may not be the sole sources of exposure to lead and other sources, such as storage containers, lead paint dust, and occupational exposures must also be investigated.

Many authorities would not treat asymptomatic lead poisoning with a whole blood lead level under approximately 2.5 micromol/L, but where there are any concerns, the case should be discussed with a toxicologist or physician with experience in the management of lead poisoning. Therapy should be tailored to the individual patient, but in many cases (such as Case 6 and Case 8 here) oral therapy with dimercaptosuccinic acid (DMSA) is an efficacious, cost-effective, and convenient option.

Discontinuation of Ayurvedic preparations is advised in all cases of suspected lead poisoning until the absence of lead in those preparations can be demonstrated. In one of the cases reported, the patient was not advised to discontinue her Ayurvedic medication following discharge from hospital, and poisoning did not cease until the public health officer investigated the raised lead level and advised her as follows:

Lead poisoning is often deceptive, and poisoning following the consumption of Ayurvedic preparations may go undetected for some time. We recommend extreme caution in the use of preparations of unknown quality or origin especially in children, pregnant women, women of child-bearing age, and those with chronic diseases such as diabetes.

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## **Nephrotoxicity of BZP-based herbal party pills: a New Zealand case report**

Mohammed Alansari, David Hamilton

Several serious side effects of the so-called 'party pills' have been documented, including severe agitation, seizures, paranoia, hyperthermia, abdominal pain, and cardiac arrhythmias.

Nephrotoxicity has been reported usually in association with rhabdomyolysis.<sup>1</sup> This paper describes a 17-year-old New Zealand man who developed acute renal failure requiring haemodialysis in the absence of rhabdomyolysis.

### **Case report**

A 17-year-old man who was partying one weekend in Tauranga consumed a small amount of alcohol and five BZP-based herbal party pills (he had never previously taken such pills).

After a few hours he started to have bilateral loin pain, which gradually increased the next day. The pain was radiating to the umbilical and suprapubic area, aggravated by movement. He had mild, short-lived relief with one tablet of 400 mg ibuprofen. He had no other symptoms.

He was admitted to a peripheral hospital after 36 hours because of the severity of the abdominal pain, which required analgesia with morphine. On examination he was euvolaemic and normotensive. Abdominal examination showed mild tenderness in the umbilical area and in both loins. Oral fluids were withheld due to the abdominal pain, and he was given intravenous fluids.

He was found to have renal impairment with a serum creatinine 220  $\mu\text{mol/L}$  on admission, which rose the following day to 320  $\mu\text{mol/L}$ . The patient was then transferred to the Renal Unit at Waikato Hospital, Hamilton with signs of volume overload (jugular venous pressure [JVP] elevated, puffy face, and bilateral leg oedema).

Further investigations revealed serum creatinine 440  $\mu\text{mol/L}$ , urea 10.6 mmol/L, sodium 140 mmol/L, potassium 4.5 mmol/L, corrected calcium 2.29 mmol/L, haemoglobin 150 g/L, and white cell count  $12.0 \times 10^9/\text{L}$ . His liver function tests were normal, creatine kinase 83  $\mu\text{L}$ , C-reactive protein (CRP) 94 mg/L, and erythrocyte sedimentation rate (ESR) 35 mm/hr.

A mid-stream urine (MSU) sample revealed no cells but protein +++ and urinary protein excretion of 1.77 gram/24 hours. Hepatitis B and C serology and HIV tests were negative, as were antineutrophil cytoplasmic antibody and antiglomerular basement membrane antibody levels; serum protein electrophoresis and complement were normal. On ultrasound he had mildly enlarged kidneys with high echogenicity.

His abdominal/renal pain persisted for several days, and his serum creatinine rose to a peak of 778  $\mu\text{mol/L}$ . He was dialysed once. Three weeks from admission his serum creatinine had returned to 92  $\mu\text{mol/L}$ .

## Discussion

The temporal relationship to consumption of 'party pills' and acute renal failure in a previously healthy young man strongly supports a causal association.

Party pills have many names in the market: *Charge, Rupture, Jump, ESP, the GoodStuff, Euphoria, Frenzy, Jax, Exodus, Bolt, Herbal Ecstasy, Pepper Plant, and Nemi*. Most contain benzylpiperazine (BZP).

BZP was first synthesised in 1944 as an antiparasitic, but because of its lack of efficacy and significant side effects it was withdrawn. However, a few studies in the 1970s and 1980s showed that it had a stimulant, amphetamine-like effect. In the 1990s, the drug began to be used recreationally in USA, soon after in Europe, then worldwide. However, in 2002 it was made illegal in USA, and banned in Europe soon afterwards. It was also banned in some states in Australia including Queensland and NSW. It is legal in New Zealand.

BZP is often marketed as a dietary supplement although it has no dietary value. It is included in some weight-reduction pills. BZP has been called natural or herbal because it can be derived from pepper plant but in fact it is entirely synthetic and does not occur naturally in any plant.

The effects of BZP are similar to those created by amphetamine and are a result of stimulation of the central nervous system. Their action is mainly on the serotonergic and noradrenergic systems.<sup>1</sup>

BZP use produces euphoria and keeps the user awake. Therefore it is commonly used in the dancing scene so that the individual can dance all night. BZP usually produce tachycardia and hypertension, which are usually asymptomatic—although in excess they may result in cardiac toxicity, hyperthermia, dehydration, hallucination, and seizure. The effects of long-term use are still unknown.

The drug was first reported in New Zealand in 2004 in Dunedin, when five students presented to Dunedin Hospital's Emergency Department with toxic effects.<sup>2</sup> Soon after, Waikato Hospital's Emergency Department (as well as other New Zealand hospitals) started to receive patients with toxic effects.<sup>3,4</sup>

In April 2004, the New Zealand Expert Advisory Committee on Drugs assessed the party pills under the Misuse of Drugs Act and concluded that there was insufficient objective evidence showing that BZP was harmful; thus they recommended that party pills should remain legal in New Zealand. Thereafter, Social Tonics Association New Zealand (STANZ) issued a code of practice which advised that sale be limited to those over 18 year of age with adherence purely on a voluntary basis.<sup>6</sup>

For stimulants in general, the aetiology of acute renal failure is believed to be either due to circulatory collapse or rhabdomyolysis rather than due to a direct toxic effect. Circulatory collapse can be secondary to hyperthermia (secondary to hypothalamic dysfunction), excessive sweating, and consequent dehydration, with or without tachyarrhythmia.

Rhabdomyolysis can be due to hyperthermia, severe agitation, and excessive muscular activity. Accelerated hypertension has been implicated in one case of acute renal failure secondary to amphetamine,<sup>7</sup> and angitis in another.<sup>8</sup>

Whilst nonsteroidal anti-inflammatory drugs (NSAIDs) have been implicated in acute renal failure, our case's symptoms preceded the ingestion of one tablet of the NSAID ibuprofen. Moreover, he had no comorbidity which may be associated with NSAID use—induced acute renal failure, notably use of high doses, prolonged courses, diabetes, heart failure, hypertension and concomitant use of diuretics, and calcium channel blockers.<sup>9</sup>

We postulate that the acute renal failure observed here may be related to a direct toxic effect of the party pills on the kidneys, in the absence of rhabdomyolysis or circulatory disturbance. His vasculitis screen was negative and apart from the one dose of ibuprofen 1 day before admission, there was no other medication or herbal medicine intake before or after the party pills ingestion.

Spontaneous resolution of acute renal failure ensued.

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## **Anaphylaxis management: the essential role of adrenaline (epinephrine) auto-injectors. Should PHARMAC fund them in New Zealand?**

Penny Fitzharris, Marianne Empson, Rohan Ameratunga, Jan Sinclair,  
Vincent Crump, Richard Steele, Brian Broom

### **Abstract**

Anaphylaxis is an important life-threatening medical emergency. There is extensive evidence supporting the early use of intramuscular adrenaline for first medical responders and for self-initiated treatment, in at-risk individuals. Major patient groups identified as at ongoing risk are children and adults with severe food allergy, patients with venom allergy who have not been desensitised, and those with idiopathic anaphylaxis. Individual anaphylactic events are largely unpredictable. The most effective and safe route of administration for adrenaline is intramuscular, but it is difficult for patients and carers to achieve accurate and timely self-administration using an ampoule, needle, and syringe. The adrenaline auto-injector device which is available in New Zealand (the EpiPen) is not funded by PHARMAC, and thus only available to patients and families who are able to afford the purchase cost. It is difficult to understand the continued unwillingness of PHARMAC to fund an adrenaline auto-injector device to at-risk individuals, given the large body of information supporting its efficacy and use. The Australian model, where authorisation from a relevant specialist is required, could be used.

### **Background**

Anaphylaxis is a sudden, severe, and potentially life-threatening allergic reaction that can affect all ages. The sinister effects are on the respiratory tract and/or cardiovascular system but the skin and gut are also frequently involved. Mediator release from mast cells and basophils results in smooth muscle contraction, vasodilatation, and increased vascular permeability, leading to the classic features of anaphylaxis, including hypotension, bronchospasm, angioedema, and urticaria.<sup>1,2</sup> Anaphylaxis is increasingly common<sup>3</sup> and is considered to be under-recognised and under-reported. The prevalence of food allergy is increasing, thus suggesting that this increase in anaphylaxis is likely to continue.

Signs and symptoms vary from person to person, with onset of symptoms usually occurring within minutes of exposure, rarely commencing after more than 60 minutes. There may be rapid progression of symptoms after onset or, after initial improvement with treatment, there may be delayed deterioration one or more hours later, producing a “biphasic” reaction. In some patients, anaphylaxis will run a protracted course. The severity of an initial reaction does not necessarily predict the severity of future reactions, and the rapidity with which life-threatening reactions may develop necessitates the availability of, and early administration of, effective therapy.

Many cases of anaphylaxis are unpredictable. Data from the UK fatal anaphylaxis register shows that over two-thirds of those dying from insect sting reactions and over four-fifths of those with drug-induced anaphylaxis had no previous indication of their allergy.<sup>4</sup> However the majority of those dying from food allergy had usually had previous reactions, although these had typically not been severe. Many episodes occur in the community, in the absence of a health care professional. In the UK, foods and insect stings each make up about one-quarter of deaths, the majority of the remainder being drug-related, typically anaesthetic agents and antibiotics, or idiopathic in origin. The pattern is likely to be similar in New Zealand, although detailed studies are lacking. Epidemiological studies for non-fatal anaphylaxis identify similar precipitants, but vary in relation to the prevalence of individual causes. Patients who survive anaphylaxis may be left with significant long-term disability, related to anoxic cerebral injury.

## **Clinical features**

Symptoms occurring in fatal anaphylaxis are generally related to either shock/cardiovascular collapse, which is typically seen in reactions to intravenous drugs and insect stings, or respiratory arrest caused by intractable asthma, upper airway angioedema or both.<sup>5</sup> Severe bronchospasm is a more common mode of death in food allergy than cardiovascular collapse. Additionally, death from food-induced anaphylaxis has been strongly linked with a history of asthma, though this may be only mild and infrequent.<sup>6,7</sup> With foods, fatal outcome has typically occurred in patients who are aware of their food allergy and who have made reasonable efforts to avoid eating those foods.

Given the shortage of specialists in the management of allergic disease, relatively few patients receive expert advice about avoidance. Commercial catering is a particular risk for those with nut allergy. It is patients with known food or venom allergy, and those who have experienced idiopathic anaphylaxis, for whom the availability of effective self-initiated management is particularly important.

Anaphylaxis should be considered a condition where the threat of recurrence is chronic, but the event unpredictable.<sup>8</sup> Appropriate management includes accurate identification of the cause, education regarding effective avoidance strategies, and appropriate medical management. This should include not only effective training and provision of self treatment, but also the effective treatment of asthma in those with food allergy and immunotherapy for those with venom allergy.<sup>8</sup> Excellent results have been obtained when an appropriate management plan is put in place by a regional allergy clinic.<sup>9</sup>

## **Treatment of anaphylaxis**

Injected adrenaline is widely accepted as the first-line therapy for anaphylaxis, based on its physiological effects, anecdotal evidence of efficacy, and the morbidity and mortality associated with absent or delayed administration, as documented in many studies.<sup>6,7,10,11</sup> Gold and Sainsbury, for example, showed that when adrenaline was given in an outpatient setting, only 2 of 13 cases needed additional treatment in hospital, compared to 15 of 32 when it had not been used.<sup>10</sup>

It is estimated that no more than 30–40% of individuals who require adrenaline receive it. Because of lack of controlled trials, formal estimation of risk-to-benefit

ratio for the use of adrenaline is impossible—but for all major causes of anaphylaxis there is clear evidence that delays in the use of (or failure to use) adrenaline has contributed to fatal outcome and increased morbidity. For instance, in the 32 deaths from food allergy reported by Bock and colleagues, 12 did not receive adrenaline at all, 10 received it late, while 4 received it in a timely fashion.<sup>6</sup> In Pumphrey's series of deaths from the UK only 14% received adrenaline prior to cardiac arrest.<sup>5</sup>

Although there have been concerns regarding the safety of adrenaline use, current opinion is that the benefit of appropriate doses of intramuscular (IM) adrenaline far outweighs the risk and that this is the appropriate management for first medical responders and for patient self-administration.<sup>12,13</sup>

Most adverse reactions to adrenaline occur when it is given in overdose, or intravenously, as a bolus.<sup>5,13,14</sup> Patients with known ischaemic heart disease are at particular risk, but appropriate use of adrenaline is not contraindicated in these patients.<sup>15</sup> Bolus IV adrenaline is not recommended for the treatment of anaphylaxis, although adrenaline infusions may be appropriate in severe anaphylaxis in a monitored patient, for example an anaesthetic-induced reaction.<sup>13</sup> Alternative treatments, such as antihistamines, corticosteroids without the use of adrenaline, or nebulised adrenaline have failed to prevent or relieve severe anaphylactic reactions.

## **Route of administration**

A randomised, blind study in children showed the time to peak plasma adrenaline concentration was  $8 \pm 2$  minutes after IM administration (using the EpiPen®—a self-injecting adrenaline device; DEY L.P., Napa, California; distributed in New Zealand by CSL (New Zealand) Ltd, Auckland), significantly shorter than the  $34 \pm 14$  minutes (range 5–120) after subcutaneous injection.<sup>16</sup> In young adults, injection in the vastus lateralis muscle in the lateral thigh gave higher plasma levels than IM injection in the deltoid region, or subcutaneous injection in the deltoid region, and thus it is the recommended site for injection.<sup>17</sup>

Adrenaline auto-injector devices provide the ability to deliver IM adrenaline at fixed doses (currently 0.3 mg, 0.15 mg). At present, it is not possible to use this device for young babies under 10 kg, as there is no fixed-dose product with less than 0.15 mg content.

The use of an adrenaline ampoule, syringe, and needle may lead to delayed dose, overdose, underdose, or no dose at all. In one study, parents (after training) took substantially longer than nurses or physicians to draw up a dose into a syringe, and the content of the parents' doses ranged 40-fold.<sup>18</sup> For adolescents and adults to self-administer IM adrenaline using an appropriate needle and syringe is also technically difficult and has significant psychological barriers.

Reasons for delays in the use of, or lack of availability of adrenaline may be the responsibility of the physician or paramedic, the patient/caregiver or both. Failure to use adrenaline when appropriate is well documented, as is failure to prescribe for the at risk patient. If an auto-injector is prescribed and the device obtained, education in when and how to use the device is frequently lacking. A recent UK study, for example, showed that fewer than a third of patients and parents of affected children had adequate knowledge of the indications and how to use the device.<sup>19</sup> None of the general practitioners who had prescribed for these patients personally showed the

patient how or when to use the device although the majority asked their practice nurse to do so.

The psychological and social aspects of anaphylaxis are complex, with a heavy psychological burden in patients and families of those with food allergy, with effects on quality of life shown to be greater than for children with insulin-dependent diabetes mellitus.<sup>20</sup> Both denial and risk taking play a role in risk of recurrence of anaphylaxis, with teenagers and young adults being particularly at risk.

Anaphylaxis should be considered a chronic disease, and patients ideally would be discharged from the emergency department with a prescription for an adrenaline auto-injector device, an anaphylaxis management plan, such as that available on-line from the Australasian Society for Clinical Immunology and Allergy (ASCIA website: [www.allergy.org.au](http://www.allergy.org.au)), education in its appropriate use and a referral to a specialist in allergy for evaluation and treatment. This applies as much to patients who are found to be at risk of anaphylaxis, as to those who have experienced anaphylaxis.

### **Critical role of self-injecting devices**

It is unrealistic to expect any patient who is experiencing anaphylaxis to draw up and self-administer IM adrenaline in a timely and accurate way, or for family and/or caregivers to do this for a child, although this is the only option available at present for those who do not purchase an EpiPen, at the minimum cost of NZ\$120 (when ordered by the GP), or \$150–190 when obtained at a pharmacy. Many patients in New Zealand are unable to afford to buy an auto-injector, and some patients who have purchased one admit that they have been reluctant to use it because of the cost and have preferred to travel to a GP or hospital.

Compounding this situation is the inability of many patients in New Zealand to access specialist care for allergic disease because there are so few specialists in clinical immunology and allergy in New Zealand, with only one hospital-based paediatric immunologist for the entire country. Deaths from anaphylaxis are, however, relatively rare, and the provision of adrenaline auto-injectors for all at-risk individuals will be relatively costly. Risks and values are variable and uncertain, and the ethics of provision (or non-provision) of adrenaline auto-injectors complex.<sup>21,22</sup>

New Zealand (like many countries in Asia, South America, and Africa) has fallen behind the UK, North America, and Australia in the provision of this treatment for individuals at risk of anaphylaxis.<sup>23</sup> Adrenaline auto-injectors are available under National Health Service prescription in the UK, and were made available on the Pharmaceutical Benefits Schedule in Australia from November 2003, albeit with a limit of one injector for adults and two for children, and requiring specialist recommendation. This funding followed the anaphylactic deaths of several Australian children in recent years—it will be a great sadness if such a tragedy is needed to initiate funding for EpiPens or similar devices in New Zealand.

The small community of allergy and clinical immunology specialists in New Zealand as well as Allergy New Zealand (the not-for-profit organisation which supports individuals and families affected by severe allergy disease) have campaigned on this need for New Zealanders for many years.

**Disclosures:** None.

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**Interim response from PHARMAC:** PHARMAC advises that it has not had enough time to draft a response this instance, but will do so in coming issues of the *Journal*.



## **Odds and ends of a year's surgery. An unusually large ovarian cyst**

*This case report was written by Philip James, F.R.C.S., Wellington and published in the New Zealand Medical Journal 1906, Volume 5 (19), p39–47*

During the past year I have met with several cases in the course of my surgical work which for one reason or another deserve to be placed on record. I have therefore grouped them under the above title, for the want of a better.

### *Case 1. An Unusually Large Ovarian Cyst.*

This was a young woman (unmarried) whom I saw in consultation with Drs. Isabel Watson and Cameron. The abdomen was enormously enlarged and had been rapidly increasing in size during the preceding six months. I am not able definitely to state the duration, but was informed by the patient that about seven or eight years previously she had been examined by Dr. Anson for some pelvic trouble, but so far as I know nothing definite was found. It is, however, fair to assume that the trouble began at or about this time.

Suspensions had been entertained that the enlargement might be due to malignant disease. However, the absence of the large veins which one usually sees in rapidly growing sarcomata and the presence of a typical "facies ovariana" (which I have the misfortune to be old enough to have often seen) enabled me to hazard the diagnosis of an ovarian cyst.

The cyst was multilocular and contained more than 40 pints of a fluid having a high specific gravity, of a rich golden-bronze colour, and literally glistening with cholesterine. There was no difficulty about the operation. Adhesions there were of course, but not such as to cause serious trouble.

The abdominal cavity after the removal of the cyst presented an appearance which reminded one very much of the appearance presented by an abdomen in the dissecting-room after its contents have been removed. The intestines remained compressed against the diaphragm, the thinned and distended parieties were closely applied to the posterior abdominal wall, and the whole of the abdominal aorta and its branches could be seen pulsating, and, in fact, stood out in relief as clearly as the injected, arteries in a dissected abdomen.

It was not until six weeks later that the intestines had returned to their proper position. She made an uneventful recovery, except that she had thrombosis of the left saphena vein, which retarded her convalescence. Including the fluid (40 pints) withdrawn by aspiration, what was lost in extracting the cyst, and the weight of the cyst itself (about 5 lb.), I do not think the tumour could have weighed less than 60 lb.



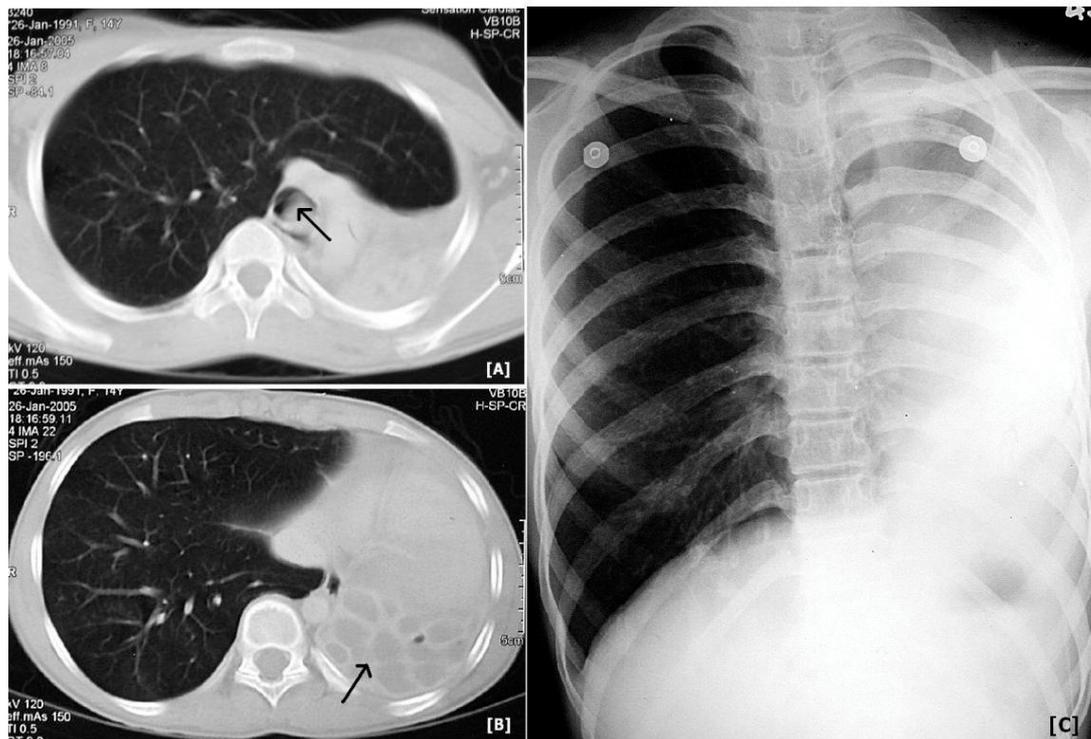
## Tussigenic trachea

Dipesh Duttaroy, Jitendra Jagtap, Ujjwal Bansal, Braja Sunder Patra

A 14-year-old Asian Indian female presented with cough with mucopurulent expectoration, low grade fever, dyspnoea, and anorexia which had lasted for 5 months. On auscultation of the left chest she had diminished breath sounds with coarse crepitations.

A chest radiograph (Figure 1C) and a multislice contrast spiral CT scan were performed (Figures 1A and 1B).

**Figures 1A: Axial CT scan chest showing the left intrabronchial mass (arrow);**  
**1B: Axial CT scan chest showing collapsed left lung with multiple cystic spaces (arrow);**  
**1C: Chest radiograph showing consolidation of left lung**



### Question:

*What is the diagnosis?*

## Answer

The chest radiograph shows atelectasis of the left lung. The CT scan with oblique coronal multiplanar reconstructions (Figure 2) revealed collapse of the left lung with multiple large thin-walled tubular cystic spaces consistent with obstructive bronchiectasis and a large elongated solid tubular mass arising from the left main bronchus projecting into the trachea.

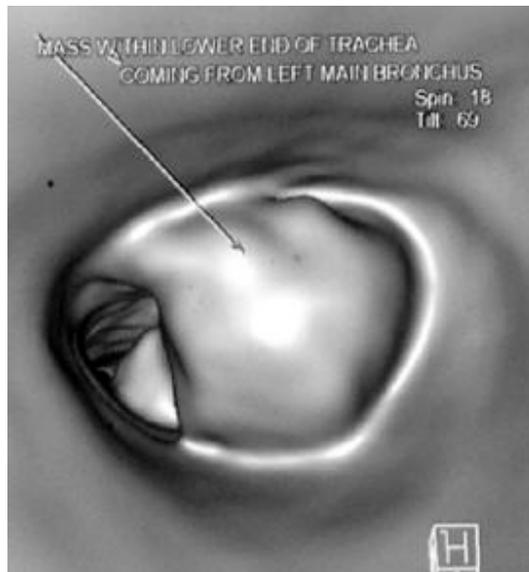
A CT scan with coronal three-dimensional reformats and virtual endoscopy (Figure-3) confirmed the presence of the mass. Bronchoscopic biopsy of the mass showed leiomyoma.

The patient underwent left pneumonectomy with excision of left main bronchus. A pathological specimen (Figure 4) showed a smooth lobulated, pedunculated tumour. Histopathology confirmed the diagnosis of endobronchial leiomyoma.

**Figure 2. Spiral CT scan chest with IV contrast (oblique coronal multi planer reconstruction) showing: vascular reconstruction; intraluminal projection (grey arrow) into the trachea (black arrow) from the left main bronchus**



**Figure 3. CT Bronchoscopy image showing a well-defined intraluminal projectile mass within the lower end of the trachea coming out of the left main bronchus**



**Figure 4. Postoperative specimen of the left lung split open showing pedunculated tumour (black arrow), and left main bronchus (white arrow) with extensive bronchiectatic changes**



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## Use it or lose it

Many people regard Alzheimer disease as one of the most dreaded consequences of aging. Most of my colleagues share this view. How can we prevent or delay it? Keep busy? Exercise?

If regular physical exercise were shown to be effective in reducing the risk or delaying the onset of dementing illness, it would be a compelling reason to promote physical exercise. Researchers in Seattle studied 1740 persons older than 65 years without cognitive impairment over 6 years. They found the incidence rate of dementia was 13.0 per 1000 person-years for participants who exercised 3 or more times per week compared with 19.7 per 1000 person-years for those who exercised fewer than 3 times per week ( $p=0.004$ ).

Better get the running (or walking shoes) out—if you can remember where you put them!

Ann Intern Med 2006;144:73–81

## Venous thrombosis and its management

Another high quality review of this topic appears in a recent *BMJ*. It reinforces the view that the use of low molecular weight heparin in deep vein thrombosis and pulmonary embolism is now firmly established. Many trials and meta-analyses have confirmed their superior efficacy, safer profile, and cost effectiveness over unfractionated heparin. It also discusses the merits of fondaparinux which is apparently at least as effective as heparin in the treatment of venous thrombosis. Apparently fondaparinux is a precisely engineered pentasaccharide, which binds antithrombin and enhances its activity toward factor Xa but is devoid of activity against thrombin.

An interesting point is raised in the ensuing correspondence. It seems that heparins are of porcine (pig) origin and this might be an important issue in some religions, for example, Islam and Judaism. Many doctors and nurses are unaware of this and therefore cannot fully inform patients when giving advice about prophylaxis or treatment with heparin (unfractionated or low molecular weight).

Another can of worms?

BMJ 2006;332:215–9 & 364

## **Transient ischaemic attacks (TIAs) are an important warning sign of stroke**

A TIA is defined as a sudden neurological event of vascular cause, lasting not more than 24 h. This is a sad misuse of the language as transient implies minutes not hours or days. Furthermore, most TIAs are over within 15 min and few last longer than 1 h.

Does this matter? It does as TIA lasting longer than 1 hour have a worse prognosis. Other bad prognostic features are age 60 years or over, hypertension and unilateral weakness and dysphasia. Estimates of subsequent stroke incidence range up to 17.3% at 3 months. So TIA need to be taken seriously. The author of this interesting editorial speculates about what can be done to reduce this high risk of early stroke after TIA? Beyond aspirin, and warfarin in atrial fibrillation and surgery for carotid stenosis, few acute interventions have the support of level I evidence.

In spite of lack of level I evidence most of us would add statin treatment and optimise management of diabetes and hypertension.

Int Med J 2006;36:214–5

## **International teleradiology**

Several hundred U.S. hospitals use overseas teleradiology services. CT head in Maine, reported in Bangalore, India—fax or phone the results!

Indian radiologists read films while U.S. radiologists are sleeping. What a great idea—but is it so great? The American College of Radiology has, unsurprisingly, stated that it is “very concerned” about overseas teleradiology, though its concern is tempered by a recognition that the practice fills a vacuum left by its own members, who would like to sleep at night.

Quality assurance is their main concern but the possibility that low-wage foreign radiologists will take work from its members must also be considered. As one U.S. radiologist wrote on a popular professional Web log, “Who needs to pay us \$350,000 a year if they can get a cheap Indian radiologist for \$25,000 a year?”

N Engl J Med 2006;354:662–3

## **Transplant tourism**

Apparently Britons and other foreigners have been paying tens of thousands of dollars for life-saving operations in China, where livers, kidneys, hearts and lungs are harvested from executed prisoners. But accusations that the practice is unethical have prompted the government to tighten the law. This “service” has been running since 2001 and it appears that the going rates are at least US\$110,000 for a liver or heart transplant and \$60,000 for a kidney transplant. This rather grisly tourism may prevent the recipients queuing up for years for a transplant at home.

But soon it will end as Chinese Health Ministry guidelines that come into effect on July 1 forbid the buying and selling of organs.

Guardian Weekly 7–13 April 2006, p7



## **Hazardous and beneficial nutritional messages in 858 televised food advertisements during children's viewing hours**

There is growing concern about the obesity epidemic in New Zealand. We recently published a study on television food advertising in this country that provided further evidence that the majority of such advertising is counter to nutritional guidelines.<sup>1</sup> In this letter we aim to describe additional qualitative findings that were not detailed in the former publication due to space limitations.

The detailed methods of this study are explained elsewhere.<sup>1</sup> In summary however, the study involved a content analysis of two free-to-air New Zealand television channels (TV2 and TV3), covering a total of 155 hours of time during children's viewing times (n=858 food advertisement screenings in 2005). The initial observer (SN) identified any health and nutrition related messages in all the advertisements and another observer (NW) also viewed the relevant advertisements and checked their classification in the database.

### **Results**

**Messages around fats**—A few advertisements (shown n=8 times) provided health promoting information around the hazard of animal fats or saturated fat (e.g. “has half the saturated fat of butter”, “free of animal fat”, “low in saturated fats”). These were for butter-type spreads, chips/crisps, and soymilk. Plant oils were also sometimes promoted “cooked in canola oil” or “cooked in 100% vegetable oil”. Various products were noted to be largely fat-free (e.g. crackers/crisps/chips, soup, pasta, and popcorn) but some of these also had added sugar (e.g. muesli bars). “Low-fat milk” was also specifically advertised (shown n=3 times).

An advertisement in the “What's on your plate” (WOYP) series covered fat in food (shown n=4 times). This series is part of a New Zealand food industry initiative featuring a cartoon-style character “Willy Munchright” that has been used in other countries. This particular advertisement identified snack food products with too much fat and suggested alternative everyday snack foods (i.e. oranges, crackers, and frozen yoghurt). It also suggested cutting fat from meat. But the advertisement still said that children can sometimes have the high fat snack foods after plenty of the everyday foods. Another theme was “fat isn't bad if you just have a tad”.

**Messages around carbohydrates**—A WOYP series advertisement focused on “wheat” as an “everyday food” and stated that kids should eat at least six servings a day (n=3). However, the foods actually shown in this advertisement all appeared to be refined cereal products (e.g. white rice) rather than unrefined products higher in fibre. Another WOYP advertisement described sugar as an “extra” that should be eaten after everyday foods such as fruit and milk (n=3). A different WOYP advertisement also described cake as being a “sometimes food” that is sometimes allowed after everyday foods such as fruit, milk and meats (n=3).

In contrast, an advertisement for a confectionary brand showed a woman arriving home with shopping bags full of confectionary which were then eaten by the family around a table (n=18).

An advertisement for a nut spread stated that it was low “GI” (glycaemic index). However, it did not mention that the product was over 50% sugar by *weight*—and hence likely to have a high glycaemic load and total energy.

**Messages around protein**—A WOYP advertisement described protein foods (turkey, fish, beans, peanut butter, and eggs) and showed a plateful of food with meat, vegetables, and milk (n=4). An advertisement for a high sugar (>20% by weight) cereal also mentioned protein for muscle development. No advertisements specifically identified any protein foods that were also described as being low in fat or saturated fat.

**Messages around micronutrients**—Calcium was mentioned in some advertisements: “goodness of calcium”, “skim milk for calcium”, “calcium is good for bones and teeth” with the recommendation to drink two to three glasses of milk per day (the latter being a WOYP advertisement, n=3). Iron was the only other micronutrient that was specifically mentioned in the advertisements (and only in sports drinks and cereals). Advertisements around the sponsorship of “iron man” sports events may also have been to associate this idea with the iron content of the advertised cereal brand (and perhaps the impact of iron on performance).

Another type of WOYP advertisement linked vitamins to vegetables and described the benefits of vitamins (e.g. “good for cuts”) (n=3). An advertised sugared drink was described as having a “shot of vitamins” and another one claimed to have “four times the vitamins of orange juice”.

**Messages around energy**—The word “energy” was included within the brand name of some advertised sugary drinks and in the advertising around a breakfast cereal and a high sugar spread. There were no advertisements that described or implied that excessive energy or “high energy” or “energy dense” foods posed any risks to health or of becoming overweight.

## Discussion

A small proportion of the food advertisements in this study provided health promoting information about fat content, saturated fat, animal fats, low-fat snack foods, protein sources, vitamins, and even the glycaemic index—but all relatively infrequently. Also some of these messages were in advertisements promoting foods that were still high in fat and sometimes in sugar (e.g. vitamins were often promoted in the context of sugary drinks).

Some advertisements also implied that once basic foods were consumed it was still acceptable to eat various treat foods (high in sugar or fat)—which is probably inappropriate for the considerable proportion of New Zealand children who are already overweight<sup>2</sup> or who are otherwise at risk of obesity through physical inactivity. Also the advertised image of shopping bags full of confectionary being poured onto the table in front of the family is suggestive that some companies may wish to normalise their products as part of family meals.

The “forbidden pleasure” theme for some products is also suggested in some advertisements by such words as “naughty” and “double decadence”. But perhaps the major problem with the thematic content of the observed food advertisements was that energy was always portrayed in a positive light. Similarly, there was no mention of the benefit of low-energy-density-foods that provide nutrients and satiety while minimising overall energy intake.

These qualitative observations need to be considered in the light of the various limitations of our study (as detailed elsewhere<sup>1</sup>). However, they do add to the existing concerns around current food advertising practices and the need for further research. They also suggest the need to explore regulatory action to minimise the contribution of food industry marketing to the obesity epidemic and poor childhood nutrition.

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## Wait and be seen

Considering the huge cost of the public health system, now running at over NZ10 billion dollars a year, and tipped to rise rapidly, it would be a pity if the article by Richardson, Ardagh, and Hider did not attract comment: *New Zealand health professionals do not agree about what defines appropriate attendance at an emergency department*; <http://www.nzma.org.nz/journal/119-1232/1933>. They looked at emergency departments (EDs), and came to the conclusion that health professionals do not agree about what defines appropriate attendance at an emergency department.

I am not surprised. The term "inappropriate" is hopelessly vague, and consequently we cannot allow the answers to influence policy. In a scientific journal, one might expect to see the word "inappropriate" used in connection with a harmful or inefficacious treatment or procedure or line of research, but not about the motives of the patients themselves.

The authors begin their Abstract by noting that EDs worldwide are "facing a crisis from overcrowding", and conclude it by saying that the lack of a clear consensus on what constitutes appropriateness "has implications for any interventions aimed at addressing ED 'overcrowding' that assume the presence of a consensus understanding of this concept." It took them a lot of sifting and asking and analysis, set out in nine densely-written pages, to get to that mysterious point.

In attempting to unravel this woolly verbiage, I have decided that what the authors were trying to say was that EDs need to know which patients shouldn't be there before they grow any bigger. If I have misunderstood what they mean by "implications for interventions," they can let me know.

Why did these authors confine their enquiries to the caregivers? They failed to ask the patients why they went to the ED, and I think we can put this omission down to a curious blend of arrogance and diffidence. If they had put the question "do you think it is appropriate for you to be here?" to 100 consecutive patients, a large number would have informed them that they had paid their taxes, or that they found the question offensive, or that they go, and will continue to go, wherever they choose.

A familiar problem in EDs is the length of the wait, but patients know this and they tough it out. The canny ones will, of course, summon an ambulance, and that will usually place them higher in the queue.

EDs clear the way to a complete range of inpatient and outpatient and specialist services, all offered free of charge. A prolonged wait is a small premium to pay. General practice is in decline, and in spite of huge increases in funding, it cannot compete with a free service for acute illness, which is being continually upgraded.

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## The Finsbury Dispensary

Thomas Wakley (1795–1832) was born in Somerset. He came to London, where he founded and edited the eminent medical journal, *The Lancet*, in 1827. On his death, the business remained in the family.

Wakley was a fiery and aggressive man, associated with many reforms, both within the medical profession, and on the broader political stage. Early targets were the teaching schedules in the hospitals, the Royal College of Surgeons, and restrictive practices in the profession. He was Member of Parliament for Finsbury, a London borough, from 1835 to 1852, and it may be that, as MP for the area, he took an interest in medical practice in his constituency.

Something of what went on in Dr Wakley's electorate can be gleaned from *The History of Clerkenwell*, published by J and HS Storer in the year 1828.

On page 119, we learn that the Finsbury Dispensary occupied "a large and handsome house" in St John's Street, Clerkenwell. It was a privately owned and run charity.

The district was "of greater extent, and comprised a population of labouring and necessitous poor more numerous than that of any other establishment of a similar nature in the metropolis. It was first projected in the year 1780. The want of gratuitous advice and medicines for the labouring poor had long been felt in this extensive and populous district, and at length induced a few benevolent gentlemen to consider establishing an Institution to supply it. Their first meeting was on 29 April 1780; on the 12 August following they were enabled to open this Dispensary."

The Dispensary had a resident Apothecary, and visiting physicians and surgeons, who were willing to do house calls. A patient had to apply at the Dispensary with a recommendation from one of the Governors, and there were 40 of them, the Patron being Prince Leopold of Saxe-Coberg. The Governors met frequently, and it was they who found the money.

"From the increased population of the district, the number of patients has progressively advanced. Since its establishment, nearly 150,000 persons have been the subjects of the Institutions attention. During each year, upwards of 4000 are admitted; and the average number under cure rarely falls short of 600."

"The advantages that result from such institutions as these must be apparent to all who consider that the expense attending medical advice is not to be afforded, is not to be afforded, perhaps, by one-third of the inhabitants of this extensive metropolis.

"Though hospitals are excellent establishments, they are difficult to access, patients are admitted to them only on one day of the week, fees are required, the patient is taken from the bosom of his family, and the nurses are strangers.

“The blessings to the poor themselves are many and important. Application for medical aid, on the first feelings of indisposition, prevents the spreading of many contagious disorders, and pestilence...is strangled in it birth.”

More dispensaries started up in London in the nineteenth century. One of them specialised in the fitting and supply of trusses for people with hernias.

The following points emerge from this glimpse of medical practice in the constituency of Thomas Wakley, editor of *The Lancet*, and Member of Parliament for Finsbury.

The scene is a complete inversion of what we see in New Zealand. In Wakley’s day, almost the whole of the funding of health care was a charitable exercise. Rich men, taking a direct and personal philanthropic interest, and frequently engaged in drives to raise extra funds, managed it all. Government intervention was nil.

In Finsbury, it was the GP care that cost nothing. The hospitals maintained charitable beds, but they could charge fees if they wanted to. Contrast the situation here, where hospitals are clogged with patients seeking and demanding free attention, and GPs are perpetually putting up their fees to deal with inflation and rising costs.

Poverty in Finsbury was poverty indeed. The Dispensary did not have much to offer, and, by some accounts, up to half of the prescriptions provided in London were for opium in some form or another. It is hard to believe that either the doctor or the treatment cost much in 1780, but inability to pay established a tradition for mendicity that has persisted to the present day.

Everyone, it appears, believes in primary medical care, but nobody wants to restore the Finsbury of 200 years ago, where GP attention was free to the indigent, and the hospital charged whatever the Governors thought they needed to keep the doors open.

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## Richard Arthur Cartwright

Richard was born on 1 March 1931 in Leeston, Canterbury. His father was the headmaster of the local primary school. The family were strong presbyterians and Richard acquired a faith that was to serve him well throughout his life. His secondary schooling was at St Andrews College, Christchurch as a boarder. He excelled at mathematics.



After school, Richard attended Canterbury University College where he gained a BSc in Chemistry. He then moved to Dunedin to the Otago University Medical School. He lived at Knox during his studies which saw him graduate MB ChB in 1955.

The many friendships he made in his Dunedin years were strong: the class of '55 always seemed close-knit and Richard was instrumental in maintaining links with classmates.

His house surgeon years were spent in Christchurch in 1956–7. He then had a year as a registrar in Gore. He returned to Leeston in 1959 to join Dr Bill Volckman in rural general practice.

In 1960 he married Caroline Curtis who was working in the Pathology Department of Christchurch Hospital. Their four children were born while they lived in Leeston.

The Cartwright family moved to Christchurch in 1969. Richard purchased a solo general practice in the east-end of Cashel Street. After a few years with the loss of some neighbouring general practitioners, Richard was instrumental in setting up the Linwood Avenue Medical Centre where he remained working conscientiously for the rest of his professional life. He took the role of senior partner and was the moderator and adjudicator in the practice. His influence was most recognised when he left.

Richard had a busy obstetric practice in the days when general practitioners still attended the majority of deliveries. He was a dedicated police surgeon for many years, never complaining at the out-of-hours calls to often difficult prisoners. He attended many Pacific regional conferences about medicine and the police. He was also an advisor to Health Benefits Ltd, plus a member of the Medical Disciplinary Committee of the New Zealand Medical Association and subsequently of the Medical Disciplinary Tribunal of the New Zealand Medical Council. He was noted for his fairness and humour and the accurate detail of his written reports.

But his major interest was in the College of General Practitioners. In 1961, he joined the Canterbury Faculty of the English College as it was in the early days. In 1974, the New Zealand College of General Practitioners was formed as the links with the English College were severed. Richard worked tirelessly as the National Honorary Secretary to the Colleges from 1974 to 1976, that is before and during the time of the formation of our independent College.

He would devote every Sunday morning to his College secretarial work, meticulously ensuring that the College functioned as well as humanly possible. Together with John Musgrove as President and John Puddle as General Secretary, the transition was smooth and painless. Richard was Honorary Treasurer to the College from 1980 to 1984 and he was elected President of the Royal New Zealand College of General Practitioners in 1985.

Richard was a Member of the College Board of Censors from 1978 to 1981. He received a bronze medal from the College in 1983 in recognition of his services and he was also elected a distinguished Fellow of Royal New Zealand College of General Practitioners in 2000, a particular honour. Indeed, all New Zealand general practitioners owe Richard a great debt for his work for the College and general practice over many years.

In 1986, he was awarded a Fellowship by the English Royal College of General Practitioners and he was in London to receive the tribute. A weekly lunchtime meeting at Rotary was fitted into his busy schedule, a community commitment in which he took a range of leadership roles.

Richard was an elder of the St Paul's Trinity Pacific Church in Christchurch and his work among the Samoan community and parishioners was little known outside the church. They held him in such high regard that six fellow elders carried his casket into the church for his funeral.

Eight years ago Richard suffered a major cerebrovascular accident which left him with a right hemiplegia and near total aphasia. As he confirmed, all the information and thoughts continued to go round in his head but it was painfully difficult to get his ideas out. For a man who had such an excellent memory and paid so much attention to detail, it must have been a terrible eight years. Yet, over this time he remained calm and usually quietly accepting of his condition. He had always been a gentleman and he remained so.

Last year he developed a cancer of the bowel which was not curable. Again he accepted his illness with a quiet acceptance, a philosophical tranquillity, and an inner strength that amazed us all.

In November 2005, a 50<sup>th</sup> Jubilee reunion of the medical class of 1955 was held in Dunedin. In spite of failing health, Richard went and enjoyed a last contact with his old friends. It was a very special time for him.

Richard died quietly on 27 April 2006. His funeral was held at the St Andrew's College Chapel where he was farewell by a church full of his family, friends, and colleagues.

He is survived by his wife, Caroline, as well as their four children and seven grandsons.

Dr Lanktree Davies (Retired GP, Christchurch) wrote this obituary.

# THE NEW ZEALAND MEDICAL JOURNAL

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## Understanding Doctors' Performance

Jim Cox, Jennifer King, Allen Hutchinson, and Pauline McAvoy, eds. Published by [Radcliffe Publishing Ltd](#), 2006. ISBN 1857757661. Contains 184 pages. Price £27.95

This relatively short paperback is an interesting and provocative overview of the literature surrounding doctors' clinical performance. In an environment where increasing focus and attention is being placed upon understanding why and how medical error occurs and the interaction between the individual and the system, this book is a useful reference resource.

It comprehensively and coherently reviews the literature looking at a range of factors affecting doctors' performance, and places these very much within a clinical context. Whilst this is not a formulaic manual for carrying out competence and performance assessment, it provides a very useful range of background information for those involved in the field of selection, promotion, and performance assessment.

Whilst this small book is unlikely to find its way onto the shelves of many individual doctors, I think it would perform a useful addition to the library of Chief Medical Officers and Clinical Directors involved in this area.

Although written very much from the perspective of the United Kingdom's National Health Service, the majority of the literature cited within the book would be easily transferable to the New Zealand healthcare environment.

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# THE NEW ZEALAND MEDICAL JOURNAL

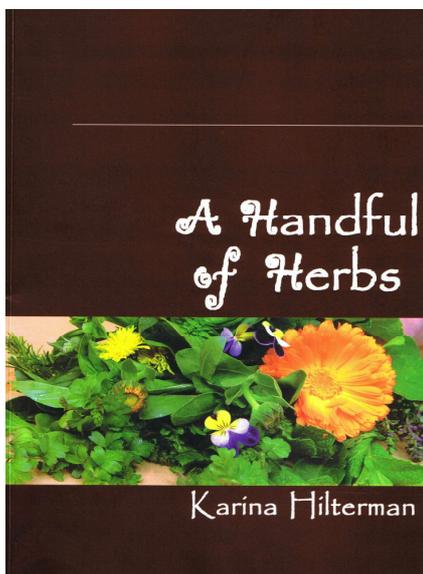
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## A Handful of Herbs

Karina Hilterman. Published by Karina@Lavender Hill, 2004  
(<http://www.lavenderhillherbals.com>) and distributed by Southern Publishers Group  
([hub@spg.co.nz](mailto:hub@spg.co.nz)). ISBN 097516130X. Contains 64 pages. Price \$24.95

This charming New Zealand book was easy to read and I really enjoyed it, especially when I found some pages on lemon balm which is growing like wildfire in my garden. According to the book, “a strong infusion of lemon balm can be used as a compress on insect bites, and as an infused oil it can be used as an insect repellent.” I must try it against sandflies the next time I go to the West Coast!



The book is suitable for anyone interested in herbal alternative/complementary medicine, aromatherapy, gardening, or cooking. If you are interested in some or all of those things, then you will probably love it.

The author, Karina Hilterman, sounds interesting too—she claims to have healed herself of SLE simply by using garlic and *Echinacea*. Then, wanting to share her enthusiasm and knowledge, she became a qualified Medical Herbalist (Diploma in Herbal Medicine from Waikato Centre for Herbal Studies) and has conducted local workshops throughout New Zealand plus founded the annual *New Zealand Herb Awareness Week*.

Despite some initial doubts about the book’s unusual “flowery” font in brown, I got used to it. And, as an editor, I should also point out that there are a few typos. But, more seriously, whether some of the efficacies are as good as claimed is debatable (and perhaps not scientifically proven), although that is not really in the scope of this review. I cannot fault the stylish cover and pages—both are sturdy and the oversized cover feels like it would repel a spill, a useful consideration as it may live in the kitchen.

Two pages are dedicated to each of the 29 herbs (such as garlic, chamomile, and ginger) featured. Included amongst them are some weeds (e.g. chickweed and burdock) as well as plain old apple and cabbage. The book ends with useful Glossary, Preparations (very briefly telling you how to make an infusion, decoction, syrup, tincture, herb vinegar, herb wine, infused oil, compress, and poultice respectively), Australian and New Zealand Herb Societies, and Recommended Further Reading sections.

A strong feature of this book is its consistent use of headings throughout: Identification; Cultivation and Harvesting; Constituents (including active components); Therapeutic Actions; Medicinal Uses; Dosage (with cautions or

contraindications if applicable); Culinary Use (sometimes a recipe is listed); and Folklore, Mysticism, or Superstitions attached to the herb. Each herb is drawn, and short snappy sentences filled with facts and interesting side notes also enhance the book's readability.

In summary I think it is a good value book that introduces and summarises common herbs well while not bogging readers down with too much detail and jargon. Recommended.

Brennan Edwardes  
Production Editor, NZMJ