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This Issue in the Journal

Evaluation of the national ‘Push Play’ campaign in New Zealand – creating population awareness of physical activity
A Bauman, G McLean, D Hurdle, S Walker, J Boyd, I van Aalst, H Carr

Physical inactivity is widely recognised as a key determinant of poor health. In 1999 the Hillary Commission (now SPARC) implemented the national ‘Push Play’ campaign to increase awareness of the importance of physical activity among New Zealand adults. Push Play was evaluated over four years and resulted in substantial increases in physical-activity message recognition, and intention to be more active. If sustained, this type of campaign could have a long-term impact on patterns of physical activity in adults, resulting in improved health outcomes.

Efficacy of an oral, 10-day course of high-dose calciferol in correcting vitamin D deficiency

Vitamin D deficiency is common in the elderly, and contributes to the development of osteoporosis. The commonly used low-dose vitamin D supplements require long-term use to be effective. This study assesses the value of a 10-day course of high-dose vitamin D tablets in treating deficiency of this vitamin, and finds it to be safe and effective.

The new rural health curriculum at Dunedin School of Medicine: how has it influenced the attitudes of medical students to a career in rural general practice?
M Williamson, A Gormley, J Bills, P Farry

Students at Dunedin Medical School learn about rural health and work in a rural setting during their fifth year. A survey has shown that this experience (introduced in 2000) results in an increased likelihood of students choosing to work in a rural setting. This finding, more pronounced in students who identify as being of rural origin, has important implications for government and medical school policies on student selection, and educational programmes, with regard to rural workforce issues in New Zealand.

Insertion of intrauterine devices: a comparison of experience with Mirena and Multiload Cu 375 during post-marketing monitoring in New Zealand
M Harrison-Woolrych, L Zhou, D Coulter

Information from the national Intensive Medicines Monitoring Programme (IMMP) was used to study the safety of two intrauterine devices in common use in New Zealand. The results show that the hormone-releasing device Mirena was significantly
more difficult to insert than the copper device Multiload Cu 375. Adverse reactions to insertion – for example, pain or fainting – were also more common with insertion of Mirena, although rates of problems were low at around 1%. 
Push Play: what’s under the umbrella?

Grant Schofield

We must continue

The social marketing and branding of Push Play is fun, clear and distinctive. The message of regular, moderate physical activity, 30 minutes on most days, has a sound theoretical base. Push Play resulted in an increased awareness of physical activity messages and increased intention to be active. Over the short term, it has been at least as effective as similar overseas campaigns, and probably more effective than several others. This is a satisfactory outcome. As Bauman et al point out in this issue, successful campaigns in other countries, at least in terms of brand recognition, have sometimes run for decades. This has also been the case in road-safety and tobacco-control campaigns in New Zealand, where the public health messages have been relatively clear for some time. As long as physical inactivity remains a significant economic and health burden a national campaign must continue.

A message too broad?

The Push Play campaign used a generic and culturally inclusive message. Whilst there are advantages to a generic message, especially in being relevant to all New Zealanders, there is a good chance that the message provides little specific direction for being active. The Push Play campaign, like the Active Australia and Canadian Participaction campaigns, may suffer for this. The utility of more specific media campaigns is not well understood in physical activity health promotion. However, the 10 000 steps message used in the 10 000 Steps Rockhampton (Queensland, Australia) physical activity campaign has been a successful social marketing exercise. Pedometers were promoted to monitor accumulated physical activity with an eventual daily goal of 10 000 steps for mobile adults. After one year awareness had moved from 10.9% (baseline) to 92.0%. Significant increases in health-related physical activity, at least for females, were observed. This two-year project goes well beyond simple branding and is looking carefully at policy and environmental change. The 10 000 Steps social marketing has achieved excellent brand recognition, well beyond that of Push Play.

Public health: more than social marketing

The important thing to understand about a media campaign for public health is that it must not stand in isolation. Media alone have little chance of doing anything but raising awareness of messages. Social marketing is simply an umbrella under which a framework for sustainable behaviour change can sit. We should not expect media campaigns to influence behaviour directly or immediately. We should expect that a national campaign of this size be backed up with appropriate policy, environmental, and individual behaviour-change infrastructure. In my opinion, the missing link in New Zealand has been environmental change. A salient example of a pathological environment for an active lifestyle is our largest city, Auckland. Active commuting is
still difficult. In fact, commuting at all is difficult, leaving less time for active living. While urban designers and politicians debate where new roads might go, little attention has been paid to the potential benefits of active commuting solutions. Simple solutions such as pedestrian and cycle access to the Auckland Harbour Bridge are not on the agenda.

Where to for New Zealand?

While people of all ages can benefit from regular, moderate physical activity, the group who arguably needs the most attention is our youth. Active young people will hopefully become active adults. Starting early and maintaining an active lifestyle through life must be a priority. Unfortunately, we have paid little attention to our youth. Surveillance has been an area of concern to me for sometime. Despite claims that New Zealand youth are active, few data other than proxy report exist for youth. Without reliable and accurate physical activity data we have little to work with. For our children (under 12 years), objective measurement of physical activity is a necessity. I advocate the use of motion detectors, such as accelerometers or pedometers, wherever possible. The problem is, of course, that these methods are expensive. Less costly solutions are available for adolescents. Self-report methods may be appropriate.

We must also understand the determinants of physical inactivity in these and other New Zealand groups. The influence of family, psychosocial, and environmental factors likely differs amongst New Zealand’s range of European, Maori, Pacific Island, Asian, and other ethnic groups, and amongst different ages and genders. Understanding of these differences with the aid of quality population data will inform successful intervention.

Overweight/obesity and physical activity

Increasing population physical activity is implicit in solving the obesity epidemic. With rising adult obesity in New Zealand and youth obesity now reaching epidemic proportions overseas, we need to understand the determinants of positive energy balance in New Zealand. We do not yet know the prevalence of obesity in our youth. Nor do we understand whether population increases in weight are due to changes in caloric intake, decreased activity, or both. Some British and US data indicate that inactivity rather than overeating may be the cause. Calls for burger bans and fast-food taxes need to be based on evidence rather than emotion. At present, we have little evidence either way in New Zealand.

The $3 million Push Play campaign potentially represents value for the health dollar. Promoting physical activity is a public health smart buy. This campaign must continue. However, if real and sustained behaviour change is to be achieved, Push Play must be backed up with policy and environmental change, and interagency cooperation. With burgeoning sedentary recreation and increasing use of technological time- and energy-saving devices, the physical and social environment of New Zealanders could now be regarded as pathological. Environmental change must be a priority. One of our priority groups, youth, first needs regular and quality surveillance work. Such work must consider the role of both physical activity and nutrition in population energy balance.
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References:


Evaluation of the national ‘Push Play’ campaign in New Zealand – creating population awareness of physical activity

Adrian Bauman, Grant McLean, Deb Hurdle, Sue Walker, John Boyd, Ingrid van Aalst and Harriette Carr

Abstract

Aims Physical inactivity is considered to be as detrimental to public health as hypertension or tobacco use, but there is limited evidence on the impact of community-wide interventions in this area. This paper describes the impact of an initiative to increase physical activity at a population level in New Zealand.

Methods A media-led, community-wide intervention campaign was initiated by the Hillary Commission (now SPARC, Sport and Recreation New Zealand). The ‘Push Play’ campaign recommended 30 minutes of daily, moderate-intensity physical activity as fun, part of community life, and easy to achieve for New Zealand adults. In addition, there were community-level and primary care supporting programmes and events. Annual cross-sectional population surveys (1999–2002) monitored the impact of the campaign on message awareness, recognition of the Push Play logo, intention to be active, and recent activity.

Results There were substantial increases in awareness of the Push Play message (30% in 1999 to 57% in 2002, p <0.001), and of the Push Play logo (14% to 52%, p <0.001). There were significant increases in the numbers of adults who intended to be more active (1.8% in 1999 to 9.4% in 2002). No sustained changes in physical activity levels were seen in these Push Play serial evaluation surveys, with 38.6% of the 1999 sample reporting 5+ days activity per week, increasing to 44.5% in 2000, but declining to 38.0% in 2002. The only significant difference in physical activity levels occurred from 1999 to 2000 (difference 5.8%, 95% CI 0.1%–11.6%). In an unrelated, much larger population survey, a 3% increase in physical activity participation was noted among adults between 1997 and 2001.

Conclusions The national Push Play campaign resulted in increases in message recognition and in intention to become more active. If sustained, efforts like this may have a long-term impact on adult activity patterns, leading to improved health outcomes and reduced health costs.

Efforts to increase rates of physical activity are now seen to be just as important to population health as those to reduce blood pressure or control tobacco use. A recent report suggested that the population risk attributable to inactivity ranked second to smoking among all preventable factors for New Zealanders, and was associated with 8% of deaths. The most recent epidemiological data suggest that it is regular, moderate-intensity physical activity, not only vigorous activity, that confers most of the health benefits for coronary heart disease and diabetes prevention, and for hypertension control. Efforts to increase energy expenditure (as well as reduce energy intake) are also required to stem the increasing population rates of obesity seen in New Zealand and elsewhere.
In New Zealand, efforts to address population levels of inactivity have begun, with the establishment in 1998 of a national Physical Activity Taskforce. The key population recommendation was for adults to ‘accumulate at least 30 minutes of physical activity on most, if not all, days of the week’. The Taskforce recommended multi-sectoral strategies to increase physical activity, one of which was to conduct a national media campaign to raise awareness of these new guidelines. The Hillary Commission (now SPARC, Sport and Recreation New Zealand) adopted this recommendation, and implemented the ‘Push Play’ campaign. This paper describes the impact of the first four years of this initiative on proximal outcomes including campaign recognition, understanding, and attitudes. Effort has also been made to examine the more distal outcomes of contemplating and trialling the behaviour of being more physically active.

Methods

Campaign development

The campaign was developed and focus tested in 1999 through consultation with numerous population groups. The aim was to model incidental and everyday forms of physical activity, through the portrayal of ordinary New Zealanders. The main objective was to increase awareness of the benefits of physical activity and to encourage people to think about becoming more physically active. The messages used humour and illustrated people having fun and enjoying various forms of activity, including playing with their families, using the stairs, mowing the lawn and walking the dog. The campaign targeted all adults, particularly the middle aged, and males (30–54 years) across New Zealand.

The campaign

The ‘Push Play’ campaign was launched in 1999 with two fifteen-second silent commercials that showed a person in sedentary pose with signal distortion lines across the screen and a written message ‘Do not adjust your set, adjust your life’ (Phase 1a). These were followed by a longer message showing a variety of New Zealanders making choices to include physical activity in their lives (Phase 1b). One image that gained particular attention was a large man walking a pig on a leash. The consistent campaign logo was ‘Push Play’ with the green play button logo modelled on a ‘play’ button of a video recorder, suggesting people make a start to become more active. Each activity reflected a part of daily life, but showed an exercise title that could be associated with it, such as ‘aerobics’ for a group of Tongan women dancing and ‘weightlifting’ for a man picking up his children. In 2001, the campaign featured new commercials that built on previous ones (for instance, the man was now rowing a boat with the pig in the back of the boat) and had the message ‘Push Play 30 minutes a day’. ‘Push Play’ is a social marketing ‘brand’, designed to reflect positive values of being upbeat, fresh and clean, fun, Kiwi, and family based, and recommending lifestyle physical activity. The overall campaign design, development and implementation had an approximate total budget of $3 million over the four years 1999 to 2002.

The Hillary Commission and, more recently, SPARC coordinated the campaign, which comprised major media, as well as specific resources and merchandising supporting the campaign. In major cities there were Push Play billboards, and, nationally, there were radio elements, magazine promotions, and a national Push Play Day celebrated 9 November 2001 and 2002.

Other national programmes were implemented under the umbrella of Push Play. These included the Green Prescription Scheme (since 1999) and He Oranga Poutama, a programme encouraging healthy, active lifestyles for Maori (since 1997). The Green Prescription Scheme involves general practitioners with the support of practice nurses, and encourages GPs to use a green prescription (written/verbal advice) to motivate patients to be more physically active. Patients are offered motivational support and access to programmes through regional sports trusts (RSTs). The geographically diverse RSTs worked with local public health agencies and non-government providers around local events, including Push Play Day. The Maori-specific programme, He Oranga Poutama, is delivered by kaiwhakahaere (coordinators) usually based within RSTs, and comprises sport and physical activities, including many traditional and culturally relevant Maori activities centred around the marae.

Evaluation design, measurement and analysis

Serial cross-sectional, population-based household surveys were used to assess the impact of Push Play. These are summarised in Table 1, which shows the specific Push Play messages used, the survey samples and the timing of surveys. The household surveys employed population sampling techniques, covering the 26 main urban areas, with 55 random
start points being selected with a pre-set cluster of 9 to 10 interviews to be completed at each. An adult aged 18 years or above within each household was chosen (using the ‘adult with the last birthday’ to sample an individual within a household). The first survey was nested within the New Zealand Sport and Physical Activity Survey conducted by the Hillary Commission, and subsequent surveys were stand-alone household interviews. Response rates ranged from 64% to 70% across surveys. In addition, process evaluation data are shown in Table 1, which indicate the approximate media penetration, based on media marketing estimates of the number of times people are likely to have seen a particular message. For each phase, there were sufficient media purchased to reach almost all adults at least once, and for them to have seen a Push Play message approximately five to eight times. This suggests sufficient implementation of the mass media element of the campaign.

Table 1. Phases of the Push Play (PP) campaign and their evaluation

<table>
<thead>
<tr>
<th>Year/phase</th>
<th>Main media elements (month, year)</th>
<th>Supportive activities</th>
<th>Percentage who saw at least one message and mean number seen</th>
<th>Population surveys sample size and timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Phase 1a   | Teaser ads Mar–Apr 99; Main PPI messages May 99 and Sep–Nov 99 | Minimal               | 1a: 87% of target audience reached at least once, mean 7.8 times  
1b: 78% reached at least once, mean 7.4 times | n = 665 randomly sampled adults  
18+ years Survey in two halves May and June 1999 |
| Phase 1b   |                                   |                       |                                                             |                                          |
| 2000       | PPI ad ‘dog walking/pig walking’ message Jan–Feb, Apr, Sep–Nov 00 | Ancillary events and additional components throughout year | 88% of target audience reached at least once | n = 506 adults  
18+ years May 2000 |
| 2001       | PPII message with Pacific aerobics/pig in boat Jan–Apr, Sep–Nov 01 | Ancillary events Jan–Feb, Nov–Dec 01 Push Play Day 9 Nov | 61% reached at least once, mean 4.9 times | n = 504 adults  
18+ years February 2001 |
| 2002       | PPII ad repeated Jan–Apr, Nov 02 | Ancillary events Jan–Feb 02 Push Play Day 9 Nov | 84% reached at least once, mean 6.8 times | n = 507 adults  
18+ years March 2002 |

In measuring the impact of media campaigns, the most important initial elements are to establish community awareness of the campaign, understanding of the message, and specific ‘tagline’ or logo recognition. These are proximal or immediate effects specifically of the advertising elements of the campaign. These were measured using standard questions for media campaign evaluations, including whether respondents had seen ‘any message on TV about getting more active’, whether they specifically recalled the Push Play advertisement (prompted recall), whether they recalled the Push Play logo, the green ‘play’ button, and whether they liked the media messages they had seen (scored on a five-point Likert scale, from ‘love it’ to ‘hate it’). Open-ended questions were asked to clarify exactly what had been seen or recalled. A summary ‘positive exposure’ measure was constructed from the responses of those who had seen a message, had seen Push Play, recognised the logo, and liked the message.

The next levels of measurement included what respondents had thought or done in response to the campaign. These were divided into two categories: (1) responses that related to intending to or preparing to get more active (thought about, talked about or started getting more active in response to the messages); and (2) responses that involved contacting an organisation (phoned 0800 number, contacted an RST, contacted another organisation or visited web site). Finally, respondents were asked the number of days in the previous week that they were physically active for at least 30 minutes; responses were categorised into those reporting less than or at least 5 days in the past week.
Analyses were performed of sample data weighted to the New Zealand adult population, and then reduced to effective sample sizes of 665, 506, 504 and 507 in each year (Tables 1 and 2). Analyses used SPSS 10.0, and included contingency and multi-way table analysis, and forced entry logistic regression to calculate adjusted odds ratios. Chi-square analyses and z-tests were used to measure the difference between independent proportions.

Table 2. Demographic data (unweighted) from each evaluation survey

<table>
<thead>
<tr>
<th>Demographic variables</th>
<th>1999 % (n = 665)</th>
<th>2000 % (n = 506)</th>
<th>2001 % (n = 504)</th>
<th>2002 % (n = 507)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>45.9</td>
<td>50.2</td>
<td>50.0</td>
<td>49.3</td>
</tr>
<tr>
<td>Aged 34 years and younger</td>
<td>31.2</td>
<td>33.0</td>
<td>33.7</td>
<td>33.5</td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European</td>
<td>76.8</td>
<td>83.8</td>
<td>77.0</td>
<td>77.1</td>
</tr>
<tr>
<td>Maori/Pacific Island</td>
<td>19.5</td>
<td>10.7</td>
<td>15.7</td>
<td>18.2</td>
</tr>
<tr>
<td>Other</td>
<td>3.6</td>
<td>5.5</td>
<td>7.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Active 5 or more days per week (%)</td>
<td>37.6</td>
<td>44.2</td>
<td>39.7</td>
<td>37.9</td>
</tr>
</tbody>
</table>

Results

The demographic data in the unweighted survey samples are shown in Table 2. There were slightly fewer males in the 1999 survey (not significant). There were some ethnic-group differences in the samples, with more European respondents in 2000, and more Maori in the 1999 sample (p <0.001).

Table 3. Impact of Push Play (PP) on proximal outcomes*

<table>
<thead>
<tr>
<th>Proximal outcome</th>
<th>1999 %</th>
<th>2000 %</th>
<th>2001 %</th>
<th>2002 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seen any advertisement about PP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)†</td>
<td>49.5</td>
<td>65.4</td>
<td>65.2</td>
<td>59.6</td>
</tr>
<tr>
<td>See specific PP message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)†</td>
<td>29.8</td>
<td>55.2</td>
<td>66.0</td>
<td>57.2</td>
</tr>
<tr>
<td>Recognised PP logo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)†</td>
<td>13.5</td>
<td>37.6</td>
<td>47.2</td>
<td>52.0</td>
</tr>
<tr>
<td>Liked PP message (of those who saw it)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)†</td>
<td>56.0</td>
<td>72.5</td>
<td>75.0</td>
<td>63.0</td>
</tr>
<tr>
<td>Summary 'maximal positive exposure'‡</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)†</td>
<td>2.4</td>
<td>18.6</td>
<td>24.0</td>
<td>21.7</td>
</tr>
</tbody>
</table>

proximal outcomes are those influenced early by mass communications and messages, and are: awareness of the generic and specific message, campaign recognition, and perceptions of the campaign; †adjusted for age, sex, cultural group (European versus others); ‡percentage of the total who saw any message, recognised specific Push Play messages and the logo and liked them. NB samples were smaller than the totals in Table 2; 1–2% of data were missing for combined variables in these adjusted models.
Table 3 shows the impact of the campaign on proximal variables. There was a significant increase in awareness of any advertisement or message about physical activity after adjustment for the influence of confounding demographic differences, with between a 1.5 and twofold increase in awareness in 2000 onwards, compared with 1999. Specifically, Push Play recognition was three to four times as likely from 2000 onwards compared with 1999 levels. Overall, rates of recall of any physical activity message were similar for Maori and European New Zealanders, and similar by gender. For the Push Play logo, recognition increased from 13.5% in 1999 to 52% in 2002, with a consistent increment in recognition each year. Between half and three quarters of those who had seen the message reported that they liked it (‘liked it’ or ‘loved it’ responses), with only slight differences between 1999 and subsequent years, reaching significance only for the comparison between 2001 and 1999. A summary of the maximal positive exposure to all facets of the communication is shown in the far right-hand column of Table 3; it demonstrates a nine- to fourteen-fold increase in ‘exposure’ to the campaign in all years compared with 1999.

The more distal outcomes were categorised in two ways, by ‘intention to be more active’ (thought about it, talked about it and trialled activity), and organised sport responses (including contacting an RST, other organisation, web site or calling the 0800 phone number), Table 4. Combining all four survey samples, intention to be more active consisted of the 4% who thought about being more active; 1.2% talked about it, and 2.0% started to increase their activity levels. Comparing across the four survey years, the proportion of adult New Zealanders who ‘thought about being more active’ increased significantly (1.1%, 6.1%, 6.0%, 3.9% p <0.001), as did those who started being more active (0.5%, 2.0%, 3.1%, 3.2%, p <0.01), with no significant increase in those talking about it (0.5%, 1.6%, 1.2%, 2.0% respectively). Overall, only 0.1% of survey responders called an 0800 telephone number, 0.1% contacted a sports trust, and less than 0.1% of those sampled reported they had contacted another organisation or accessed the web site. Data were pooled into the two categories, ‘intention’ and ‘accessed an organisation (organised sport)’, and are shown in Table 4. There was a significant increase from 1.8% to 9.0% of ‘any intention to be more active’ between 1999 and 2000, with levels remaining at around 10% of New Zealanders thereafter (Table 4). There were much lower rates of respondents who contacted an organisation, and adjusted odds ratios were not estimated (as the reference year, 1999, had zero responses). Physical activity levels, as measured by 5+ active days in the past week, showed a slight and significant increase only between 1999 and 2000 (Table 4).
Table 4. Impact of Push Play on distal outcomes*

<table>
<thead>
<tr>
<th>Distal outcome</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intend to be more active†</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)‡</td>
<td>1.8</td>
<td>9.0</td>
<td>10.8</td>
<td>9.4</td>
</tr>
<tr>
<td>Organised sport response§</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)‡</td>
<td>0</td>
<td>0.2</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Days active: 5+/ week§</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adjusted OR (95% CI)‡</td>
<td>38.6</td>
<td>44.5</td>
<td>40.8</td>
<td>8.0</td>
</tr>
</tbody>
</table>

those in the later stages of a population change process – intention to be more active and actual physical activity behaviour
† talked about being more active, thought about it, tried to be more active
‡ adjusted for age, sex, cultural group (European versus others)
§ called 0800 number or contacted RST or other sports organisation

Data were stratified by generic message recall (any advertisement recalled) and specific Push Play logo recall, and examined in relation to any intention and physical activity days per week (Figures 1 and 2). There was a significant increase in intention among those who recalled any message, or the Push Play logo specifically, for data from 2000 to 2002. Overall, adjusting for year, age, gender and ethnicity, those who had seen any message were over four times as likely (adjusted OR 4.27, 95% CI 2.59–7.02), and those who recognised the Push Play logo nearly three times as likely (adjusted OR 2.71, 95% CI 1.89–3.86), to think about being/intend to be/start to be more active (Figure 1). Further, those who were in the maximal campaign exposure group were much more likely to intend to be more active than those with lesser degrees of Push Play exposure (24.5% compared with 4.2%, adjusted OR 5.53, 95% CI 3.87–7.93).

Figure 1. Intention to be more active stratified by message exposure

![Figure 1. Intention to be more active stratified by message exposure](image-url)
An exploration of those who had maximal campaign exposure and physical activity on at least five days per week is shown in Figure 2, confined to the 2000 to 2002 surveys. Although there were consistent slightly greater proportions in the exposed categories, these were not significant. For 2000 data, these proportions were 46.8% active in the exposed group, compared with 43.6% in the unexposed; this difference (3.2%) was not significant (95% CI -7.6% to 14.3%). The power of the sample size available here was 0.4, and a threefold increase in sample size would be required to detect this as statistically different.

Figure 2. Active 5+ days stratified by maximal campaign ‘exposure’*** across each survey year†

Discussion

The Push Play initiative increased awareness of physical activity and intention to be active among adults in New Zealand. This innovative campaign used culturally salient messaging, and, through the use of social marketing principles, packaged the messages, events and programmes under the ‘Push Play’ brand. There was consistent and increasing recognition of this ‘brand’ of physical activity, which represented the 30-minute physical activity message that physical activity is fun, and had a clear ‘Kiwi’ orientation. The impact of this intervention was at least as great as recent campaigns in Australia and Scotland9,10 and greater than efforts elsewhere.11,12

The campaign provided a generic message to all adults to consider enjoyable, lifestyle-related forms of physical activity as contributing to fun, a sense of community, and to their health. The campaign had an impact on non-organised activity and recreation (as measured through the intention variable) rather than...
directly increasing population access to organised services. In recent years, rates of sporting club membership and organised team participation have fallen. These changes reinforce the ongoing public health importance of the concepts of active living and active recreation, which are central emphases of Push Play.

Social marketing campaigns need to develop a clear ‘brand’ of behaviour or attitude of interest, and need to be sustained over many years to achieve culture change. This is important in efforts to change sedentary lifestyles. The required behaviour change is multi-faceted, and the reinforcement of sedentary modern living poses an additional challenge. Many Canadian physical activity and recreation campaigns were conducted under the brand of ‘Participaction’ between 1971 and 1999, and are still recalled by almost 90% of all Canadians. It will take much longer than the brief public education campaigns in Australia and the United Kingdom to achieve long-term influence on community understanding, message awareness and ‘brand’ recognition. Push Play fostered this awareness, and even influenced the proportion of adults who thought about, talked about or started getting more active.

The Push Play initiative reached most population groups for the outcomes assessed. Another study examined a small, selected sample of 69 New Zealand adults, and showed that those already meeting the physical activity and nutrition guidelines did not always recognise public health messages and guidelines, and obtained health information from other sources. Nonetheless, for hard-to-reach sedentary and socially disadvantaged groups, physical-activity-related mass media campaigns appear effective in message dissemination. Despite a clear impact upon the antecedent variables, the campaign evaluation did not detect sustained shifts in physical activity behaviour (although this was not a key goal given that it was an awareness campaign), as measured by the proportion achieving five days per week of 30 minutes of moderate-intensity physical activity. This was not surprising for a number of reasons. First, the measure of physical activity was a single question, rather than a developed set of questions to reflect behaviour. Second, media campaigns may not influence behaviour directly and immediately, and acute increases at the population level are unusual for complex behaviours. Nonetheless, serial epidemiological surveys, using detailed questions, and including large samples (n = 12 000) carried out by the Hillary Commission and SPARC between 1997 and 2001 have shown a 3% increase in the proportion of adults who are active for at least 150 minutes per week (approximate 95% CI 1.7–4.2%), which does suggest that adult New Zealanders are becoming significantly more active. This trend in New Zealand is contrary to recent trend data from Australia and the United Kingdom, which have shown declines in adult physical activity participation, and United States and Canadian data, which have shown no change in activity prevalence in recent years. The link between the Push Play campaign and these trends is not definitively causal, although the evidence for impact upon proximal variables and intention is reasonably strong. It is recognised that media elements need to be sustained and to be combined with health-professional training, and with community events and resources in order to achieve population behaviour change. The overall initiative in New Zealand met these criteria for an integrated campaign, and was noteworthy in that it was mostly sustained by the Hillary Commission/SPARC, which are outside the mainstream health sector.
There were some methodological limitations in the evaluation of this initiative. First, the sampling in 1999 was not a true pre-campaign measure, and reflected awareness of some of the initial Push Play messaging. Subsequent increases in awareness and recall suggested that there was continued building on these 1999 levels, so actual campaign effects, had there been a true pre-campaign survey, are likely to have been even greater. Second, the survey sampling methods were slightly different for 2000 and subsequent surveys, but these demographic differences were controlled for in analysis. Third, all surveys were only of around 500 to 600 respondents, which may have led to reduced power to detect some changes. Finally, the measures used were standard for media campaign evaluation, but the physical activity question was only a single item; trends in physical activity rates were better demonstrated in the larger, representative epidemiological surveys conducted by SPARC.\textsuperscript{13} The single question, as an imperfect measure, may underestimate true effects (in relation to associations with campaign exposure, or in terms of change), and this measurement error may have led to an underestimation of the extent of the effect of the campaign on activity outcomes.\textsuperscript{26}

The Push Play initiative had been developed with an initial private-sector partnership with funding from an electricity company, and recognition in the media messages of that funding. Sponsor logo recall rates were low in 1999 and 2000 (10–14\%)\textsuperscript{22} and the private-sector sponsorship was not maintained beyond 2000. The initiative was more strongly linked to the New Zealand Government, Hillary Commission/SPARC or to health agencies. Another social advertising initiative (conducted by Roche Pharmaceuticals in 2001 and 2002, to promote a weight-loss agent, XENICAL) also developed a media campaign (also using humour), and was confused with Push Play by some responders to our surveys, who referred to the content of the XENICAL ads. Consistent increases specifically in the Push Play ‘brand recognition’ suggest that these extraneous campaigns and other factors did not substantially influence the consistent increase in Push Play awareness.

The total cost of the media campaign over the four years amounts to approximately $3 million. This includes development of the messages, filming, management of the campaign by the advertising company, placement of the messages in the media, and other supportive events. Substantial in-kind support was provided by the RSTs and other collaborating agencies. The Push Play campaign had a relatively modest budget when compared with other New Zealand social marketing campaigns such as tobacco control and road safety, which have budgets approximately three and ten times as large per annum respectively. Further, both these campaigns in New Zealand have a 20-year history of concerted intervention, campaigning, and environmental change, eventually resulting in noteworthy public health gains.\textsuperscript{23} Compared with that level of investment and public health effort, attempts to reduce obesity and increase physical activity are at an early stage.

In conclusion, Push Play is an example of effective use of the mass media in setting the agenda for community change.\textsuperscript{24} A key element of its success has been the supportive role played by community programmes, GP education, and regional events. The World Health Organization suggests that effective campaigns need to be sustained over many years and to reinforce messages many times to the community, as well as target specific populations.\textsuperscript{25} Ongoing efforts, under the established umbrella of Push Play, are likely to further increase rates of physical activity among
adult New Zealanders and reduce the population morbidity and mortality attributable to sedentary lifestyles.

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**Acknowledgements:** We thank the National Research Bureau (NRB) for conducting the four surveys evaluating the Push Play campaign and Saatchi & Saatchi for their work in designing the Push Play campaign.

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**References:**


Efficacy of an oral, 10-day course of high-dose calciferol in correcting vitamin D deficiency

Fiona Wu, Toni Staykova, Anne Horne, Judy Clearwater, Ruth Ames, Barbara Mason, Brandon Orr-Walker, Gregory Gamble, Marilyn Scott and Ian Reid

Abstract

**Aim** Treatment of vitamin D deficiency is an important aspect of the management of osteoporosis, particularly in the elderly. Most well-described regimens in current use involve daily dosing and thus require long-term compliance to be effective. In New Zealand, no preparation containing only low-dose vitamin D suitable for daily use is available. We describe a high-dose regimen for rapid correction of vitamin D deficiency, which makes use of the calciferol 50 000 international unit (IU) tablets available in this country.

**Methods** Thirty two women (mean age 76 ± 4 years; range 67–84 years) with serum 25-hydroxyvitamin D concentrations ≤10 µg/l were treated with oral calciferol 50 000 IU daily for 10 days.

**Results** At an average time after treatment of four months, serum 25-hydroxyvitamin D increased from 8 ± 1 µg/l to 21 ± 5 µg/l, bringing all but one patient within the reference range (14–76 µg/l). Serum parathyroid hormone level decreased after treatment by 0.7 ± 1.7 pmol/l (p <0.05), and alkaline phosphatase activity decreased by 5 ± 11 u/l (p <0.05). Serum calcium increased by 0.06 ± 0.08 mmol/l (p <0.001), but all values were within the reference range. Data collected from a separate cohort of elderly inpatients showed that similar increases could be achieved with a single 300 000 IU dose, and suggested that serum 25-hydroxyvitamin D levels decline with a half-life of 90 days.

**Conclusions** This regimen provides a simple, safe and effective way of managing vitamin D deficiency. Its short-term nature may result in higher compliance than daily dosing regimens.

Vitamin D deficiency leads to secondary hyperparathyroidism, increased bone turnover and bone loss, predisposing to osteoporosis and osteoporotic fractures.¹ Overt rickets and osteomalacia are now uncommon in Western populations, but subclinical vitamin D deficiency is widespread amongst older individuals, especially those in nursing homes or who are housebound. It is also common in healthy older individuals living independently.²,³ Correction of vitamin D deficiency is associated with rapid improvement in bone density,² and may reduce fracture risk.⁴,⁵ Hence, treating vitamin D deficiency is important in the prevention and treatment of osteoporosis.

Vitamin D is usually administered daily in low doses, but because of its sequestration in adipose tissue and long half-life such regimens are slow to replenish vitamin D stores and require long-term compliance. Also, in some countries including New Zealand there are no satisfactory vitamin D preparations available for daily use. In
in this study we have examined the only preparation containing vitamin D alone available in this country, a 50 000 international unit (IU) tablet. Its efficacy in correcting vitamin D deficiency when given as a single course or dose is reported.

**Methods**

Thirty two asymptomatic, postmenopausal women (mean age 76 ± 4 years; range 67–84 years), with serum 25-hydroxyvitamin D ≤10 µg/l were given a daily calciferol 50 000 IU tablet (PSM Healthcare, Auckland) for 10 days. These women were all independently mobile, free living, and had no diseases nor were taking medications that influenced vitamin D or calcium metabolism. They are referred to as the ‘outpatient’ cohort. Serum calcium, phosphate, alkaline phosphatase, 25-hydroxyvitamin D (Diasorin radioimmunoassay, Stillwater, MN, USA), and intact parathyroid hormone (Nichols Institute radioimmunometric assay, San Juan Capistrano, CA, USA) were measured before and after treatment. The prospectively collected data were complemented by data collated from hospital records of six men and 43 women (mean age 84 ± 5 years; range 69–94 years) admitted to the geriatrics service of Auckland Hospital (‘inpatient’ cohort). They received a single dose of 300 000 IU and had re-measurement of serum 25-hydroxyvitamin D at variable intervals thereafter. Thus, it was possible to study the decline in serum 25-hydroxyvitamin D levels following use of this regimen. Variables were assessed using Student’s paired t tests (two tailed), and data are presented as mean ± SD.

**Results**

**Outpatient cohort** Figure 1 shows the pre- and post-treatment levels of serum hormonal and biochemical analyses. The post-treatment levels were measured at 17 ± 7 weeks (range 5–31 weeks). The mean pre- and post-treatment 25-hydroxyvitamin D levels were 8 ± 1 µg/l and 21 ± 5 µg/l respectively (range 9–32 µg/l, post-treatment). All patients, except one, had post-treatment levels within the reference range (14–76 µg/l). The average increase following treatment was 13 ± 6 µg/l. There was no difference in the 25-hydroxyvitamin D increase after treatment between those treated during either summer or winter.

The mean serum parathyroid hormone level decreased after treatment by 0.7 ± 1.7 pmol/l (p < 0.05). The mean serum calcium increased after treatment by 0.06 ± 0.08 mmol/l (p < 0.001), but no post-treatment calcium concentration exceeded the reference range. Serum alkaline phosphatase activity decreased by 5 ± 11 u/l (p < 0.05), indicating reduced bone turnover. Serum phosphate concentrations were unchanged.

**Inpatient cohort** At baseline, serum 25-hydroxyvitamin D was 7 ± 4 µg/l (range 2–16 µg/l). Following vitamin D dosing, levels of 25-hydroxyvitamin D increased to 25 ± 11 µg/l at an average interval of 17 weeks. The maximum value recorded was 51 µg/l. The change in serum 25-hydroxyvitamin D according to the time since dosing is shown in Figure 2. It can be seen that the levels peaked between 13 and 21 days, then declined with a half-life of 90 days.
Figure 1. Serum hormonal and biochemical indices before and after treatment of vitamin-D-deficient women with calciferol 50 000 units daily for 10 days (mean values are shown with a horizontal line, and p values are for the change from baseline)

- Serum 25-hydroxyvitamin D
  - p < 0.001

- Serum calcium mmol/L
  - p < 0.001

- Serum parathyroid hormone pmol/L
  - p < 0.05
Discussion

We have shown that a 10-day course of high-dose oral calciferol is both safe and effective in correcting vitamin D deficiency. It is a simple, cheap, well-tolerated method of replacement that is convenient for both in- and outpatient settings. There were no significant side effects, and no patients had post-treatment serum 25-hydroxyvitamin D or calcium levels exceeding the reference range. These results are complemented by the finding that a single dose of 300 000 IU produces comparable results, in terms of both safety and efficacy. In fact, we have now treated many patients giving 500 000 IU at one time, without loss of efficacy or safety.

The increase in 25-hydroxyvitamin D was modest. Some patients still had borderline deficiency, as reflected by the persistent elevation of parathyroid hormone levels and marginal concentrations of 25-hydroxyvitamin D. Trials of higher dosing regimens are needed, aiming to restore 25-hydroxyvitamin D levels to the 20–40 µg/l range or higher, which is increasingly regarded as the optimal range.

This study represents observations derived from patients coming through a clinical service, and is not a formal randomised trial with a comparator group. Despite this, we believe that the data are a valid description of the effects of this vitamin-D dosing regimen. All the assays used are well established, both internationally and in routine clinical use in our laboratory, so it is most unlikely that the results obtained are the product of assay drift or other laboratory artefact. The fact that the patients’ samples were assessed over a period of months in a number of different assays makes the potential for these confounders to skew the results even more unlikely. The results are
biologically consistent, in that there is an increase in serum 25-hydroxyvitamin D and calcium on the one hand, and a fall in parathyroid hormone and alkaline phosphatase on the other. These results are also typical of what we have seen clinically with many hundreds of patients managed with this regimen, though the full biochemical evaluation presented here is not available in all those.

The results from the inpatient cohort make clear that some ongoing vitamin D supplementation is necessary to maintain normal levels. This has not been explored in the present study, but it could consist of repetitions of one of the present dosing regimens, or of more frequent smaller doses. We have found, over a number of years, that one 50 000 IU tablet per month is adequate to maintain normal 25-hydroxyvitamin D concentrations in most patients.

In conclusion, doses of 300 000–500 000 IU of calciferol represent a safe and effective regimen that can be initiated while the patient is in hospital, ensuring that the major problem of vitamin D deficiency has been adequately addressed.

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**References:**

The new rural health curriculum at Dunedin School of Medicine: how has it influenced the attitudes of medical students to a career in rural general practice?

Martyn Williamson, Andrew Gormley, Janne Bills and Pat Farry

Abstract

Aim To evaluate the effect of the new fifth-year rural health curriculum developed at Dunedin School of Medicine on the attitudes of students to a career in rural general practice.

Methods A structured questionnaire was administered to all fifth-year medical students immediately before and after participation in the rural health curriculum at DSM during 2000 and 2001.

Results There were statistically significant positive changes in the students’ responses to each question regarding their attitudes towards rural general practice. Students identifying as being of rural origin were more likely to give positive answers both before and after the course. The numbers indicating that they will or probably will enter rural general practice increased from 1.1% (0% (n = 0) of urban and 6% (n = 1) of rural students) to 13% (10% (n = 6) of urban and 22% (n = 4) of rural), pre- to post-course.

Conclusions Students who identify their origins as rural are more likely to have a positive attitude towards rural general practice as a career choice. However, a rural curriculum can produce attitude changes in students, irrespective of origin. If medical schools wish to assist in addressing the needs of their rural communities they should consider selection of students from rural origin and ensure that rural health plays a significant part in the school curriculum.

The challenge of attracting and retaining general practitioners (GPs) in rural areas is a problem that is shared by many countries, such as New Zealand, Australia, Canada and the USA. A report by the World Organisation of Family Doctors (WONCA) recognised the importance of the role of rural GPs in the provision of healthcare to rural communities and the role medical schools should play in supporting rural healthcare. The development of effective methods of increasing the numbers of students adopting rural general practice as their career choice has received considerable attention, with many studies suggesting either one or other of two strategies.

The first strategy is related to admission policy. Students from a rural background are more likely to enter a career in rural health than their urban-based counterparts, but it is widely believed that many current medical-school admission policies unwittingly bias selection towards students from urban backgrounds. A change of admission policy in order to recruit more rural students could lead to more graduates interested in a career in rural health. Similarly, it is believed that admitting more ‘general interest’ students will lead to more GPs and therefore more rural GPs. A criticism of
this approach is that the proportion of rural students would still be small and so the shortage of rural GPs may not be significantly affected.

The second strategy is to place students into rural areas for a period of their study.\textsuperscript{10,11} It is believed that many students, especially those from urban backgrounds, are not interested in living and working in a rural area. One purpose of a rural attachment, therefore, is to expose students to general practice in a rural community, letting them experience aspects of rural life and work, and hopefully dispelling any misconceptions they might have. Studies have shown students to regard rural placements more highly than urban placements in terms of educational benefit, due to the number of patients they see and the wider range of experiences gained.\textsuperscript{12,13} A number of schools have recently set up rural attachment programmes to provide this exposure for students.\textsuperscript{14–16}

The most effective means of increasing the likelihood of students entering rural general practice may be a combination of both of these strategies.\textsuperscript{7,17} Other factors have also been identified as possibly important, such as the composition of the teaching faculty.\textsuperscript{7,17,18} Rural GP faculty members who are good role models are likely to have a positive influence on students’ career choices.

The Department of General Practice at Dunedin School of Medicine (DSM) established a rural attachment in 2000 through Te Waipounamu Rural Health Unit as part of its undergraduate programme. Students are placed in rural centres during their fifth year for a period of seven weeks as part of their training. During this time they are exposed to patient care in a variety of settings, including rural general practice and rural hospital work.

This paper presents the results of a questionnaire-based survey of fifth-year DSM medical students in 2000 and 2001. This study was undertaken to see whether the fifth-year rural attachment had an effect on students’ attitudes towards a career in rural general practice.

**Methods**

Two cohorts of students from DSM were surveyed both before and after their rural general practice attachment during their fifth year of study. The first cohort was surveyed during 2000 and the second during 2001. Participation in the study was voluntary and participants were permitted to complete the questionnaire anonymously. The first questionnaire was administered before the students embarked on their rural attachment and contained questions pertaining to students’ views on rural health. The students completed the second questionnaire at the finish of the rural attachment. This contained the same questions as the first, as well as asking respondents to provide demographic information such as sex, age, and ethnicity, and to identify whether they considered themselves to be from an urban or a rural background.

A preliminary analysis could not find any difference between the 2000 and 2001 cohorts in any of the factors of interest and, as a result, it was decided to pool the cohorts as one group. Some questions required respondents to indicate their preference on a five-point Likert scale. Two questions asked respondents to indicate their likelihood of entering general practice and rural general practice respectively, on a scale ranging from ‘definitely will not’ to ‘definitely will’. Due to the small number of responses in either extreme, the five-point scale was converted to a three-point Likert scale. On the new scale, the category ‘will not’ consisted of the responses ‘definitely will not’ and ‘probably not’, and the category ‘will’ consisted of the responses ‘definitely will’ and ‘probably will’. Data were analysed using SPSS 11.0 for Windows. Analysis of cross-tabulation tables is based on modifications of the chi-square coefficient statistic. For nominal data (ie, where respondents answered Yes/No or Rural/Urban etc), Cramer’s V measure was used.\textsuperscript{19} For ordinal data (where answers are given on a scale), Kendall’s Tau-c measure was used.\textsuperscript{20} A non-parametric sign test was used in one
case where the significance was borderline and the sample size was small. This test confirms whether the direction of any overall change is significant. For both Tau-c and Cramer’s V, the absolute coefficient is between 0 and 1, where 0 indicates no relationship between the variables and 1 indicates a perfect relationship. Actual values of Tau-c can be either positive or negative, with negative values indicating a negative relationship.

**Results**

There were a total of 167 returned questionnaires, comprising 87 pre-course and 80 post-course questionnaires. One of the post-course questionnaires was discarded due to most of the responses being invalid. This equates to a response rate of 88% (n = 87) for the pre-course questionnaire and 81% (n = 79) for the post-course questionnaire.

Respondents were asked to supply demographic information, including identifying whether they considered themselves to be of rural or urban origin, in the post-course questionnaire only. Determination of origin was prevented in 15 pre-course questionnaires due to respondents choosing to remain anonymous or completing the pre-course questionnaire only. The proportion of urban and rural students in the pre-course questionnaire (73.6% and 23.6%, n = 53 and 17) was similar to those in the post-course questionnaire (74.7% and 22.8%, n = 58 and 18).

Respondents were asked whether they had ever considered entering both general practice and rural general practice. In addition, they were asked to indicate the likelihood of actually entering into these professions.

Figure 1 shows the increase from 81.6% (n = 71) to 88.6% (n = 77) of respondents having considered general practice pre-course to post-course, although this increase is not statistically significant (Cramer’s V = 0.098, p = 0.208). There was, however, a significant increase in respondents having considered rural general practice (Figure 1), rising from 43.9% (n = 38) to 70.9% (n = 56) (Cramer’s V = 0.274, p < 0.0005).

These questions were kept independent of one another to avoid the assumption that all students would consider rural general practice as a subset of general practice. This allows for students who might be attracted only to rural general practice and not general practice as a whole. The number of these was small, with approximately 4% (n = 3) of students falling into this category.

**Figure 1.** Percentage of respondents indicating that they have considered general practice (GP) and rural general practice both pre-course and post-course
Table 1 shows that there was a significant increase in the indicated likelihood of entering rural general practice after the rural attachment (Tau-c = 0.164, p = 0.038) with 12.7% (n = 10) of respondents indicating that they ‘will’ enter rural general practice.

Table 1. Indicated likelihood of entering rural general practice before and after the rural attachment

<table>
<thead>
<tr>
<th>Response</th>
<th>Pre-course</th>
<th>Post-course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Will</td>
<td>1.1 (1)</td>
<td>12.7 (10)</td>
</tr>
<tr>
<td>Maybe</td>
<td>46.0 (40)</td>
<td>45.6 (36)</td>
</tr>
<tr>
<td>Will not</td>
<td>52.9 (46)</td>
<td>41.8 (33)</td>
</tr>
</tbody>
</table>

Table 2 shows the respondents separated by origin and compares pre-course to post-course responses. When comparing post-course responses it is apparent that rural respondents have a much greater indicated likelihood of entering rural general practice (Cramer’s V = 0.233, p = 0.043) with only 22.2% (n = 4) of rural students responding that they ‘will not’ enter (‘definitely will not’ or ‘probably will not’ on the original scale) compared with approximately 48% (n = 28) of urban students.

Table 2. Indicated likelihood of entering rural general practice for urban and rural respondents

<table>
<thead>
<tr>
<th>Response</th>
<th>Urban Pre-course</th>
<th>Urban Post-course</th>
<th>Rural Pre-course</th>
<th>Rural Post-course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Will</td>
<td>0 (0)</td>
<td>10.3 (6)</td>
<td>5.9 (1)</td>
<td>22.2 (4)</td>
</tr>
<tr>
<td>Maybe</td>
<td>41.5 (22)</td>
<td>41.4 (24)</td>
<td>58.8 (10)</td>
<td>55.6 (10)</td>
</tr>
<tr>
<td>Will not</td>
<td>58.5 (31)</td>
<td>48.3 (28)</td>
<td>35.3 (6)</td>
<td>22.2 (4)</td>
</tr>
</tbody>
</table>

From Table 2 it is apparent that the percentage shift for each origin is similar to the overall shift shown in Table 1. However, this shift was not statistically significant, which may be due to the small sample size. A non-parametric sign test confirmed that the direction of the shift was significant. There were 50 urban and 16 rural respondents matched across pre-course and post-course questionnaires. A significant positive shift was found in both the urban (p = 0.009, 22 positive, 7 negative, and 21 ties), and the rural respondents (p = 0.031, 6 positive, 0 negative and 10 ties).

A similar overall analysis was performed on the indicated likelihood of entering general practice. Table 3 shows a slight increase from pre-course to post-course, although this was not statistically significant (Tau-c = 0.069, p = 0.403).
Table 3. Indicated likelihood of entering general practice before and after the rural attachment

<table>
<thead>
<tr>
<th>Response</th>
<th>Pre-course % (n)</th>
<th>Post-course % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will</td>
<td>29.9 (26)</td>
<td>35.4 (28)</td>
</tr>
<tr>
<td>Maybe</td>
<td>46.0 (40)</td>
<td>44.3 (35)</td>
</tr>
<tr>
<td>Will not</td>
<td>24.1 (21)</td>
<td>20.3 (16)</td>
</tr>
</tbody>
</table>

Table 4 compares the indicated likelihood of entering general practice for rural and urban students. Rural respondents have significantly greater indicated likelihood of entering general practice (Cramer’s V = 0.213, p = 0.036). Analysis showed no change in indicated likelihood of entering general practice in either rural or urban students from pre-course to post-course (urban p = 0.730, rural p = 0.664).

Table 4. Indicated likelihood of entering general practice for urban and rural respondents

<table>
<thead>
<tr>
<th>Response</th>
<th>Urban % (n)</th>
<th>Rural % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will</td>
<td>32.4 (36)</td>
<td>42.9 (15)</td>
</tr>
<tr>
<td>Maybe</td>
<td>41.4 (46)</td>
<td>54.1 (18)</td>
</tr>
<tr>
<td>Will not</td>
<td>26.1 (29)</td>
<td>5.7 (2)</td>
</tr>
</tbody>
</table>

Respondents were asked whether their undergraduate programme had had any influence on their attitude toward a career in rural general practice, and, if the answer was yes, whether that influence was positive or negative. There was a significant positive shift in attitude as influenced by the undergraduate programme (Tau-c = 0.301, p <0.0005), with only 40% (n = 35) of the pre-course respondents indicating that the undergraduate programme had a positive influence compared with 69% (n = 55) post-course (Figure 2). The proportion of respondents who indicated the undergraduate programme had a negative influence dropped from approximately 13% (n = 11) to 4% (n = 3). The remaining respondents indicated that their attitude was not influenced by the undergraduate programme.
When asked whether they recognised rural general practice as a specific discipline of medicine, a higher proportion of respondents classified rural general practice as a specific discipline of medicine after the rural attachment. This change was significant with 70.1% (n = 61) pre-course increasing to 85.9% (n = 68) post-course (Cramer’s V = 0.189, p = 0.015). The proportion amongst urban students increased from 66% (n = 35) to 81.4% (n = 47) and rural students from 88.2% (n = 15) to 100% (n = 18).

There was an increase in the proportion of respondents who had discussed rural general practice as a career among their peers. The overall increase was a highly significant rise, from 52.9% (n = 46) to 73.4% (n = 58) (Cramer’s V = 0.215, p = 0.022). The number of respondents of urban origin in this category increased from 47.2% (n = 25) to 69.5% (n = 40), with that of rural respondents increasing from 64.7% (n = 11) to 83.3% (n = 15).

Asked whether the rural GP they had met was a good role model, 92% (n = 80) answered ‘yes’ after the attachment compared with 72% (n = 57) before.

Prior to the rural course, 53% (n = 46) of students had already decided on a branch or specialty of medicine as a career choice. This figure changed slightly to 57% (n = 45) after the course.

**Discussion**

These results indicate that the fifth-year rural attachment at Dunedin School of Medicine (DSM) has a strongly positive effect on the attitudes of students towards a career in rural general practice. There was a significant increase in both the number of students who considered rural general practice as a career, and their indicated likelihood of actually entering a career as a rural GP. Only 4% of respondents indicated a negative effect of the attachment. It is, however, disconcerting that over 50% of fifth-year medical students at DSM had not ever considered the idea of a career as a rural GP before the rural attachment, and nearly 53% had already made up their minds on career direction.

Our results are in keeping with previous findings that students of rural origin have a higher indicated likelihood of entering rural general practice than their urban...
counterparts.\textsuperscript{4-6} It is, however, encouraging that the positive shift in the indicated likelihood of entering rural general practice pre-course to post-course is similar for students of rural and urban origin. These results suggest that both student origin and undergraduate experience have positive effects on the likelihood of entering rural general practice. When these two factors are combined, the effect is even larger.

There was also a significant difference when comparing the likelihood of rural and urban students entering into general practice in that rural students are more likely to enter general practice per se.

Respondents in this study were asked whether they considered themselves to come from either a rural or urban background. This approach is different from other studies, where respondents are categorised according to the size of the town where they grew up, usually in conjunction with government census classifications.\textsuperscript{21} The advantage of asking the respondents to classify themselves is that there is not the problem of attempting to classify respondents who may have spent some of their formative years in a rural environment and other years in an urban one. For example, a person who attended secondary school in a major city may have grown up in a small centre and may identify as rural. In addition, classification according to population size may be somewhat misleading, as it is possible that a larger town may in fact be ‘more rural’ than a smaller town that is closer to a major urban area. A disadvantage of our method is that two respondents from the same place may classify themselves differently. In addition, when asked how likely it is that they will become a rural GP, one respondent’s idea of what constitutes rural general practice may be quite different from another’s.

The difference in classification also leads to differences in comparing the results with other studies. Heath et al found that only 6.9% and 4.5% of Otago Medical School students lived in towns of fewer than 1000 people when they were between the ages of 5 and 12 years, and 13 and 18 years respectively.\textsuperscript{21} Even when minor urban areas (population under 10 000) are included, the percentages rise to only 17.2% and 13.6%. By comparison, this study found that approximately 23% of students identified as being of rural origin. The higher percentage in this study is most likely due to the method of classification of rural and urban origin; for example, some students may state that they are of rural origin even though they may have grown up living in towns of over 10 000 people.

There is evidence that rural attachments for medical students provide a good educational experience of a generalist nature offering opportunities not easily obtained in other settings.\textsuperscript{10,22} Therefore, the argument for rural placements has both an educational and a workforce value. The current rural course at DSM has received excellent student feedback. It is possible that some of the changes measured may relate to the quality of the learning experience and the immediacy of the course, rather than the nature of the branch of medicine the students studied.\textsuperscript{23}

Important findings from this study are that the fifth-year rural health attachment at DSM has:

- resulted in more students considering rural general practice as a career choice;
- increased the number of students stating there is a likelihood they may enter rural general practice;
increased the number of students viewing rural general practice positively, whether or not they would consider or choose it as a career;

increased the number of students who regard rural general practice as a unique discipline;

confirmed the influence of student origin on the stated likelihood of entering rural general practice.\textsuperscript{4-6}

Also of significance is the finding that approximately 50% of the students felt that they had already decided on a career choice by their fifth year.

Our results lend weight to the belief that medical school admission and educational policies can influence student attitudes towards entering a career in rural practice. We suggest the following as a long-term strategy for Government and medical schools to address rural medical workforce issues in New Zealand:

- Undergraduate students should be given increased experience of rural medicine.
- This experience should commence earlier in the course and probably needs to be repeated throughout the undergraduate programme.
- Rural medicine should be developed as a specific discipline of medicine in order to make it a more visible career option.
- Rural origin should be a consideration in medical school selection.

It must be remembered that these results relate only to respondents’ indicated career intentions. It is possible that students who indicated a high likelihood of entering rural general practice may in fact not, and vice versa. The immediacy of the administration of the questionnaire to the end of the course is a concern, and we would expect a drop off in effect over time.\textsuperscript{23} An interim study on the maintenance of the attitudinal changes demonstrated here is currently underway for students in their Trainee Intern year. Our long-term plan is to track the respondents’ career choices five years on and compare these with students from other schools who did not have such a high degree of exposure to rural health in their undergraduate course. Such a follow up would be extremely useful as a way of determining whether those who indicated an increased likelihood of entering rural general practice did in fact follow this career path, and whether there is a discernible ‘downstream’ effect.

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**Acknowledgements:** Al Penrose contributed to the analysis of the data in the initial phase of the study. We are grateful for the support of the members of the Department of General Practice, DSM, for feedback and the medical students who gave up their time to complete the questionnaire.

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Insertion of intrauterine devices: a comparison of experience with Mirena and Multiload Cu 375 during post-marketing monitoring in New Zealand

Mira Harrison-Woolrych, Lifeng Zhou and David Coulter

Abstract

Aim To compare the incidence of reported insertion problems with the levonorgestrel-releasing intrauterine device (Mirena) with that of the copper device Multiload Cu 375.

Methods Prescription Event Monitoring (PEM) methodology, as used in the Intensive Medicines Monitoring Programme, was used to identify cohorts of women and record events associated with insertion.

Results Data were analysed from 16 159 women receiving Multiload Cu 375 between 1991 and 2001, and 3452 women receiving Mirena between 1998 and 2001. Difficult insertion was reported more often with Mirena (RR= 2.7, 95% CI = 2.2–3.3, p <0.0001). Stratified analyses suggested this was not explained by the presence of more nulliparous women in the Mirena cohort or the non-contraceptive indications for use of Mirena. Mechanical problems with the device were reported in about 1% of Mirena insertions compared with 0.01% of Multiload Cu 375 insertions and this difference was significant (p <0.001). About 2% of Mirena insertions were performed under general anaesthetic compared with 0.1% of Multiload Cu 375 insertions. Adverse reactions to insertion, including pain and vaso-vagal reaction, were more frequent with Mirena than with Multiload Cu 375 (p <0.001).

Conclusions During the period of study, insertion of Mirena was more difficult and was associated with more device problems and adverse reactions than insertion of Multiload Cu 375.

Intrauterine device (IUD) insertion is a common procedure in clinics and surgeries throughout New Zealand. In this country, more than 90% of insertions of copper IUDs are performed by general practitioners. It is important, for both the inserting doctor and the woman receiving the device, to know the incidence of problems associated with fitting the device (eg, failed insertion) and of adverse events reported at insertion (eg, pain or vaso-vagal reaction).

Previous clinical trials of the levonorgestrel-releasing IUD (levonorgestrel 20 mcg/day or Mirena intrauterine system) have provided limited information about complications of the insertion procedure. A small study (published before Mirena was licensed) reported difficult insertion in 18% of 66 insertions of the levonorgestrel-releasing device. Studies of copper IUDs have reported a lower rate of insertion problems (2% or less) associated with fitting these devices. One prospective, comparative clinical trial suggested that insertion failure and reported pain on insertion occurred more often with the levonorgestrel-releasing device than with the copper T 380 Ag device.

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In New Zealand, both Mirena and the Multiload Cu 375 device have been monitored during the post-marketing period in the Intensive Medicines Monitoring Programme (IMMP). This paper specifically examines complications reported with the insertion procedure for Mirena and compares these with those reported for insertion of the Multiload Cu 375 device.

Methods
The methodology of the IMMP has been described in some detail previously. Essentially, Prescription Event Monitoring (PEM) methodology is used to undertake prospective, observational cohort studies of selected medicines. Usage data and reports of adverse events are collected by means of questionnaires to prescribing doctors. The application of these methods to this comparative study of IUD insertion is described here.

Monitoring of Multiload Cu 375 began in 1991 at the time it was first marketed in New Zealand. Similarly, Mirena was first marketed in 1998 and monitoring of the device began at this time. The packages for Multiload Cu 375 and Mirena contained a registration form to be completed by the inserting doctor. For each insertion the doctor recorded the woman’s details (name, address, date of birth, parity and national patient number) and details of the inserting doctor (plus the general practitioner if different). The registration form had a section to describe problems with insertion or other problems noted at the time of insertion. The inserting doctor recorded these ‘events’ without prompts and there were no restrictions on what should be detailed. The forms for each type of IUD were similar, but for Mirena doctors were also asked to record the indication for use (contraception, menorrhagia or other indication).

Registration forms were returned to the IMMP (forms were pre-addressed with postage paid) and information was entered into databases to establish the patient cohorts. The specific work-site address of each inserting doctor named the health facility where each device was fitted and the inserting doctor was also coded as general practitioner, hospital specialist (eg, gynaecologist) or private specialist. Most of the information for this study was obtained from the registration forms for both devices, but additional information was also available from follow-up questionnaires sent to doctors annually from approximately one year after insertion. The follow-up questionnaires requested information on all adverse events occurring since insertion of each device. Doctors were asked to record the date of onset for each event and it was therefore possible to establish the time from insertion to event.

All events recorded on either the registration forms or the follow-up questionnaires were assessed by at least one physician. Each event was coded using terms from the IMMP adverse-events dictionary. This is based on the World Health Organization Adverse Reactions Terminology (WHOART) with events organised into System Organ Classes (SOCs). The IMMP dictionary has additional terms to cover IUD insertion events (eg, ‘failed insertion’) and has an additional SOC ‘Insertion Problems’ to group together all such events.

To capture all events relating to IUD insertion, the database was searched for events coded as SOC ‘Insertion Problems’ and also for events in other SOCs with a reported onset up to seven days after insertion. For the analysis of the results, events were grouped into inserting problems (eg, failed or difficult insertion) and adverse reactions to insertion (eg, pain or vaso-vagal event). As previous analyses of the Multiload Cu 375 database showed a higher incidence of both insertion problems and adverse reactions in nulliparous women, parity distribution in both cohorts was examined and stratified analyses according to parity were then performed.

All analyses of the IMMP database were performed using SAS software version 8.0. Relative risks (RR) with 95% confidence intervals (CI) were calculated and differences were tested using the chi-square test and Fisher’s exact test where necessary. The t test was employed to compare the age difference between the cohorts.

Results
The IMMP received registration forms for 17 468 Multiload Cu 375 insertions between July 1991 and March 2001. For Mirena, registration forms were received for 3519 insertions between March 1998 and March 2001. The Multiload Cu 375 cohort included 16 159 women with a mean age of 32 years (range 14–56 years) and the Mirena cohort included 3452 women with a mean age of 38 years (range 11–73
years). The Mirena cohort was significantly older than the Multiload Cu 375 cohort (t test, \( p < 0.001 \)).

In the Multiload Cu 375 cohort, parity was recorded for 14 310 (82%) insertions and 1242 (8.7%) of these were performed in nulliparous women. Parity was recorded for 3034 (86%) Mirena insertions and 413 (13.6%) of these were in nulliparous women. The proportion of nulliparous women in the Mirena cohort was significantly greater than in the Multiload Cu 375 cohort (\( p < 0.0001 \)).

For Mirena, information on indication for use was available for 3459 (98%) insertions. Of these, 817 (24%) insertions were for contraception alone and 1667 (48%) insertions were for menorrhagia alone. A combined indication of contraception and menorrhagia was reported in 831 (24%) Mirena insertions and other (unlicensed) indications accounted for the remaining 4% of insertions.

General practitioners (GPs) performed 15 797 (92% of 17 197 insertions where information was available on inserting doctor) of the Multiload Cu 375 insertions. For Mirena insertions, 1182 (34% of 3454 insertions where information was available) were performed by GPs, with 2272 (66%) insertions performed by hospital doctors or private specialists.

**Device problems** In the Multiload Cu 375 cohort, two mechanical problems with the device were reported, giving an incidence of 0.01%. For Mirena, 37 device problems were reported including ‘failed release’ (15), ‘difficult release’ (9), ‘insertion tube problems’ (4), ‘threads hard to cut’ (3), and other device problems (6). This gives an incidence of device problems of approximately 1% for Mirena insertions, which is significantly greater than the incidence of device problems reported with the Multiload Cu 375 device (RR = 91.8, 95% CI = 22.1–380.8, \( p < 0.001 \)).

**Insertion under general anaesthetic** There were 17 reports (0.1% all insertions) of insertion under general anaesthetic (GA) in the Multiload Cu 375 cohort. Three of these reports did not state the reason for use of GA and 14 stated that IUD insertion took place at the time of another procedure – most often dilatation and curettage (D&C) (9 reports) or termination of pregnancy (5 reports). In the Mirena cohort there were 73 reports (2% all insertions) of insertion under GA and, of these, 40 (55%) reports did not give a reason for use of general anaesthesia. Of the remaining 33 reports, 16 stated insertion took place during another procedure (most often hysteroscopy and D&C), 11 stated previous failure or expected difficulty of insertion, 3 reports stated cervical dilation was required, and 3 reports indicated patient preference was the reason for use of GA.

The incidence of insertion under GA for Mirena was significantly higher than the incidence for Multiload Cu 375 (RR = 21.3, 95% CI = 12.6–36.1, \( p < 0.0001 \)). When only those reports associated with known or predicted insertion difficulty were included (14 reports for Mirena and none for Multiload Cu 375) the incidence of insertion under GA remained significantly higher for Mirena (Fisher’s exact test, \( p = 0.04 \)).

**Comparison of problems reported with insertion of Multiload Cu 375 and Mirena** The most commonly reported insertion problems with each device are shown in Table 1. There was a significantly greater rate of difficult insertions reported for Mirena than Multiload Cu 375 (RR = 2.7, 95% CI = 2.2–3.3, \( p < 0.0001 \)), but other
insertion problems, including failed insertion, did not significantly differ between the devices.

Table 1. Comparison of insertion problems between Multiload Cu 375 and Mirena

<table>
<thead>
<tr>
<th>Event reported</th>
<th>Multiload Cu 375</th>
<th>Mirena</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 17 468)</td>
<td>(n = 3519)</td>
<td></td>
</tr>
<tr>
<td>nI (%)</td>
<td>nI (%)</td>
<td>nI (%)</td>
<td></td>
</tr>
<tr>
<td>Difficult insertion</td>
<td>236</td>
<td>127</td>
<td>2.67 (2.16–3.30)</td>
</tr>
<tr>
<td>Failed/incomplete insertion</td>
<td>76</td>
<td>17</td>
<td>1.11 (0.66–1.88)</td>
</tr>
<tr>
<td>Cervical spasm</td>
<td>54</td>
<td>10</td>
<td>0.92 (0.47–1.81)</td>
</tr>
<tr>
<td>Uterine perforation*</td>
<td>6</td>
<td>2</td>
<td>1.65 (0.33–8.19)</td>
</tr>
<tr>
<td>Total</td>
<td>372</td>
<td>156</td>
<td>2.08 (1.73–2.50)</td>
</tr>
</tbody>
</table>

I = incidence; *includes perforation recognised at the time of insertion only

Stratified analysis of difficult insertion reports according to parity

Table 2 shows the incidence of difficult insertion in nulliparous women compared with parous women for each device. This stratified analysis showed there was a significantly higher incidence of ‘difficult insertion’ reports in both nulliparous and parous women with the Mirena device compared with those receiving Multiload Cu 375 (p <0.01 for each analysis).

Table 2. Comparison of ‘difficult insertion’ reports between Multiload Cu 375 and Mirena stratified by patient’s parity

<table>
<thead>
<tr>
<th>Parity</th>
<th>Multiload Cu 375</th>
<th>Mirena</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insertions</td>
<td>Difficult insertions</td>
<td>I (%)</td>
</tr>
<tr>
<td>Nulliparous</td>
<td>1242</td>
<td>31</td>
<td>2.5</td>
</tr>
<tr>
<td>Parous</td>
<td>13 068</td>
<td>171</td>
<td>1.3</td>
</tr>
</tbody>
</table>

I = incidence

Stratified analysis by indication for Mirena

For Mirena, the incidence of insertion problems in women receiving the device for contraception alone was 5.0% (41 events in 817 insertions). In women receiving Mirena for indications other than contraception the incidence was 3.4% (62 events in 1853 insertions). This difference was significant (RR = 1.5, 95% CI = 1.0–2.2, p <0.05).

Comparison of adverse reactions to insertion

Table 3 shows the most commonly reported adverse reactions experienced during (and immediately following) insertion of Multiload Cu 375 or Mirena. Pain on insertion, vaso-vagal reaction (including fainting, dizziness, hypotension, syncope and bradycardia) and nausea and vomiting all had a higher incidence with Mirena insertions. In total, adverse reactions were experienced significantly more frequently by women having Mirena fitted than by those having the Multiload Cu 375 device fitted (RR = 1.8, 95% CI = 1.4–2.3, p <0.0001).
Table 3. Comparison of adverse reactions at the time of insertion

<table>
<thead>
<tr>
<th>Adverse reactions</th>
<th>Multiload Cu 375</th>
<th>Mirena</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 17 468</td>
<td>n = 3519</td>
<td></td>
</tr>
<tr>
<td>Associated pain</td>
<td>121</td>
<td>45</td>
<td>1.28</td>
</tr>
<tr>
<td>Bleeding</td>
<td>27</td>
<td>2</td>
<td>0.06</td>
</tr>
<tr>
<td>Vaso-vagal reaction</td>
<td>58</td>
<td>26</td>
<td>0.74</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
<td>6</td>
<td>3</td>
<td>0.09</td>
</tr>
<tr>
<td>Other reactions*</td>
<td>6</td>
<td>1</td>
<td>0.03</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>77</td>
<td>2.19</td>
</tr>
</tbody>
</table>

I = incidence; *other reactions at the time of insertion included sweating (1), chest discomfort (1), pallor (1), convulsion (1) and malaise/fatigue (2) in the Multiload group, and rigor (1) in the Mirena group

Discussion

The results of this prospective, post-marketing study confirm an early report that suggested the levonorgestrel-releasing IUD may have been difficult to insert in some women. During the period of our study, difficult insertion was the most frequently reported insertion problem for both Mirena and Multiload Cu 375 and the incidence of this problem for Mirena was significantly greater than for the copper device. However, difficult insertions were reported in fewer than 4% of Mirena insertions, which is much lower than the earlier report of 18%.

A previous clinical trial reported that difficult and failed insertions (as a combined endpoint) occurred significantly more frequently on inserting a levonorgestrel-releasing device compared with a copper IUD. Our study had sufficient insertion numbers to allow separate analysis of difficult and failed insertions, which is important as these events have different clinical implications. Interestingly, although our results reported significantly more difficult insertions for Mirena, there was no difference in the incidence of failed insertion (less than 0.5% of all insertions) between Mirena and Multiload Cu 375. This might be because there were significantly more insertions under general anaesthetic (which may be less likely to fail) in the Mirena cohort. Alternatively, there may be a small group of women in whom insertion of any IUD is not possible for various reasons, eg, presence of cervical stenosis.

The majority of Mirena devices in this study (66%) were inserted by specialists or hospital doctors, whereas the majority of Multiload Cu 375 devices were inserted by general practitioners. Although most women during this period were likely to have been routinely referred to hospital for Mirena insertion, some referrals may have been for anticipated or previous difficult insertion. Significantly more Mirena devices were inserted under general anaesthetic compared with Multiload Cu 375 and it is interesting to consider how this might relate to the increased incidence of difficult insertion reported with Mirena. For 16 of the 73 (22%) Mirena insertions under GA, the device was inserted during another operative procedure (for example hysteroscopy and D&C for investigation of menorrhagia) and thus it seems likely that the insertion was part of a routine referral. However, study of the registration forms also showed that some insertions were performed under GA because of inability to insert Mirena
with local anaesthesia, or because of the need for cervical dilation, or anticipated inserting problems. There were no reports of Multiload Cu 375 insertions under GA for these reasons and therefore insertions under GA for known or anticipated insertion difficulty occurred significantly more often with Mirena.

We previously reported that age is not a risk factor for insertion problems with Multiload Cu 375, but that nulliparity is associated with a higher incidence of insertion difficulties and adverse reactions to insertion. Therefore, in this study, stratified analyses were performed to determine if parity might be a confounding factor for the higher incidence of insertion difficulties reported with Mirena. These analyses showed that insertion problems in both nulliparous and parous women were significantly higher in the Mirena group and it is therefore unlikely that the higher numbers of nulliparous women in the Mirena group were the explanation for the higher rate of insertion problems.

The Mirena device is also indicated for non-contraceptive conditions, in particular menorrhagia, and it is possible that use in these patients may result in a higher incidence of insertion problems than for devices used for contraception alone. However, stratified analysis by indication for use showed that women receiving Mirena for menorrhagia had a significantly lower incidence of problems fitting the device than women who used the device for contraception only. Possible confounding in this observation is that some of the insertions for menorrhagia were carried out under general anaesthetic and these insertions were perhaps unlikely to be reported as difficult. There is, however, no evidence that indications other than contraception contribute to the higher rate of difficult insertions with Mirena.

An important observation during this study was the reporting of a higher incidence of ‘device problems’ (eg, failed release) for the Mirena device compared with the Multiload Cu 375. However, since the insertions in this study were performed, the pharmaceutical company that markets Mirena (Schering NZ Ltd) has changed the inserter for Mirena to a ‘comprehensive inserter’ and now claims the release of the device occurs more automatically than in the previous inserter. This switch was completely achieved in New Zealand by June 2002 and therefore none of these ‘new’ devices were included in this study. A further study will be necessary to determine if the new inserter alters the incidence of device problems (or other insertion problems) and this will be possible as recruitment of women to the IMMP cohort for Mirena continues.

There was an increased incidence of adverse reactions associated with insertion of Mirena. In particular, pain and vaso-vagal reaction were reported significantly more often with Mirena than with Multiload Cu 375 insertion. This confirms a report from an earlier clinical trial that reported increased pain on Mirena insertion compared with a copper IUD. However, the incidence of painful insertion was about 1% of all Mirena insertions in our study, which may be considered an acceptably low rate.

Following publication of a meta-analysis of clinical trials that compared the contraceptive effectiveness, tolerability and acceptability of the levonorgestrel-releasing device compared with other reversible contraceptives, it was suggested that the IUD of choice for women without menstrual problems should be a standard copper device rather than Mirena. The results of our detailed, post-marketing insertion study strengthen this conclusion. Reporting from ‘real-life’ clinical practice
showed that the insertion procedure for Mirena was associated with more difficult insertions, more device problems and a higher incidence of adverse reactions than have been reported with insertion of the Multiload Cu 375 device.

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Chiropractic manipulation for non-spinal pain – a systematic review

Edzard Ernst

Abstract

Aims Chiropractic manipulation is mostly used for spinal problems but, in an increasing number of cases, also for non-spinal conditions. This systematic review is aimed at critically evaluating the evidence for or against the effectiveness of this approach.

Methods Five electronic databases were searched for all randomised clinical trials of chiropractic manipulation as a treatment of non-spinal pain. They were evaluated according to standardised criteria.

Results Eight such studies were identified. They related to the following conditions: fibromyalgia, carpal tunnel syndrome, infantile colic, otitis media, dysmenorrhoea and chronic pelvic pain. Their methodological quality ranged from mostly poor to excellent. Their findings do not demonstrate that chiropractic manipulation is an effective therapy for any of these conditions.

Conclusions Only very few randomised clinical trials of chiropractic manipulation as a treatment of non-spinal conditions exist. The claim that this approach is effective for such conditions is not based on data from rigorous clinical trials.

Joint manipulation is frequently used by chiropractors, osteopaths, physicians, physiotherapists and other healthcare professionals to treat a wide range of conditions. Even though the domain of chiropractic manipulation is spinal pain, it is frequently also used for non-spinal syndromes. Recent survey data from the US and Canada, for instance, show that 6% of all patients seen by chiropractors have non-musculoskeletal problems. An Australian survey demonstrated that more than half of the responding chiropractors favoured the role of spinal adjustments in the management of patients with visceral conditions.

The American Chiropractic Association defines manipulation as:

‘…a passive manual manoeuvre during which the three-joint complex is carried beyond the normal physiological range of movement without exceeding the boundaries of anatomical integrity. The essential characteristic is a thrust – a brief, sudden, and carefully administered ‘impulsion’ that is given at the end of the normal passive range of movement. The ‘dynamic thrust’ is the defining factor, which distinguishes manipulation from other forms of manual therapy. The thrust technique can be low or high velocity. The most common characteristics of the adjustive dynamic thrust are a controlled force delivered with high velocity, in a specific direction or line of drive, at a regulated magnitude and depth. In short, manipulation is a passive dynamic thrust that causes an audible release (cavitation) and attempts to increase the manipulated joint’s range of motion.’

[1] [2] [3]
The one-year prevalence figures for manipulation in representative population samples range between 10% (1988, Austria) and 33% (1996, UK). In the US, the proportion of the general population using chiropractic has doubled during the last 20 years. At present, there are about 50 000 chiropractors in active practice in North America, and their number has tripled between 1970 and 1990. It has been estimated that by 2010 their number will have doubled again.

Several authors have reviewed the evidence for spinal manipulation or mobilisation as a treatment of spinal pain. This paper aims at critically evaluating the evidence for or against the effectiveness of chiropractic manipulation as a treatment of non-spinal conditions.

**Methods**

The following databases were searched, each from their inception to February 2003: Medline, Embase, CISCOM, Amed and The Cochrane Library. Furthermore, other experts were consulted. The keywords used were: chiropractic, spinal manipulation, spinal adjustments, controlled clinical trials, manual therapy, pain. The bibliographies of all articles thus located and major chiropractic texts were screened for further relevant papers. No language restrictions were applied.

Trials of spinal manipulation for treatment of headache/migraine have recently been submitted to a systematic review and were thus excluded. Non-randomised studies, trials of disease prevention, studies of conditions not related to pain management, clinical trials of mobilisation (as distinct from manipulation), and studies in which the therapists were not chiropractors were also excluded.

The last exclusion was deemed appropriate because the chiropractic approach differs profoundly from that of other manual therapists ('The 'dynamic thrust' is the defining factor, which distinguishes manipulation from other forms of manual therapy.') While manipulation usually involves high-velocity thrusts (see above), mobilisation 'includes any manual therapy directed at joint dysfunction that does not involve a high velocity thrust'.

All trials meeting the above-mentioned criteria were read in full. Information on trial methodology, patient population, treatment schedule, outcome measures, follow up and results was validated and extracted by the current author in a standardised way (Table 1). Methodological quality was assessed by two independent evaluators using the Jadad score, which ranges between a minimum of 0 and a maximum of 5. It is a validated measure for methodological quality of clinical trials based on the absence or presence of design features such as randomisation, double blinding, description of withdrawals or dropouts, etc. Statistical pooling (ie, meta-analysis) of the data was anticipated but turned out to be impossible, mainly because of the heterogeneity of the primary studies.

**Results**

Eight publications met the inclusion criteria. Their methodological quality ranged from poor to excellent. Key data from all studies are summarised in Table 1 (see end of article).

Kokjohn et al conducted a randomised controlled trial (RCT) with 45 women suffering from primary dysmenorrhea. They were treated either with high-velocity, short-lever, low-amplitude thrusts to all clinically relevant vertebral levels or with a sham intervention consisting of thrusts at an irrelevant level. The study was aimed at determining acute effects only and thus only one treatment session took place. Abdominal pain was measured with a visual analogue scale and menstrual distress with the Menstrual Distress Questionnaire. In addition, levels of prostaglandin metabolites were quantified in the peripheral blood. The results show a remarkable drop of prostaglandin levels in both groups. Inter-group comparisons show that pain and distress were alleviated significantly more in the experimental compared with the control group.
Blunt et al conducted a cross-over study including 21 patients with fibromyalgia. These patients were treated for four weeks with spinal manipulation, soft-tissue manipulations and stretching. During the control phase, no such treatment was applied. Medication was similar in both phases and was continued unchanged throughout. The authors noted significant improvements in pain and range of motion when comparing pre-manipulation and post-manipulation measurements. No inter-group comparisons were made and the study design allowed no control of placebo effects. These and other methodological weaknesses render this pilot study uninterpretable in terms of therapeutic efficacy.

Davis and colleagues compared oral ibuprofen at decreasing doses (800 mg three times a day to twice daily) with a series of manipulations of the cervical spine and the upper extremities as a treatment for carpal tunnel syndrome. The study included 91 patients and was evaluator blind. There were considerable improvements in both groups but no statistically significant difference between them. The authors nevertheless concluded that carpal tunnel syndrome may be treated with conservative medical or chiropractic care.

Wiberg et al randomised 50 babies with infantile colic to receive either oral medication (as licensed in Denmark) or three to five sessions of spinal manipulation ‘with specific light pressure with the fingertips’. The main outcome measure, time of crying per day, improved significantly more in the experimental compared with the control group. It should be noted, however, that the former group was significantly younger than the latter.

Sawyer et al published a pilot study of spinal manipulation versus sham spinal manipulation for children with otitis media. The sham intervention involved manual handling of the spine for diagnostic purposes without the high-velocity thrust performed in the experimental group. The authors do not reveal any results that suggest real spinal manipulation to be superior to sham treatment. They do, however, state that controlled trials of sham spinal manipulation are feasible.

Hondras and colleagues randomised 138 patients with dysmenorrhoea in two groups. The experimental group received spinal manipulation in the form of high-velocity, short-lever, low-amplitude thrusts with a force greater than 750 N delivered at all clinically relevant vertebral levels and sacroiliac joints bilaterally. The control group received thrusts with a force of around 200 N delivered to the left L2/3 segment, which was deemed irrelevant for the condition in question. Treatments were administered on Day 1 of cycles 2, 3, and 4, and on Day 7 before cycles 3 and 4. The primary outcome measure was pain measured with a visual analogue scale. The results did not yield significant inter-group differences between real and sham treatments.

Olafsdottir and colleagues conducted an RCT testing spinal manipulation versus a simple sham procedure for infants suffering from typical infantile colic pain. The primary outcome measure was a verbal rating scale by parents. The results show some improvements in both groups but do not reveal significant differences between real and sham therapy. The authors make the following interesting point: ‘This study emphasises the need for placebo-controlled and blinded studies when investigating alternative methods to treat unpredictable conditions such as infantile colic.’
Hawk et al recruited 39 women with gynaecological pelvic pain and treated them with a series of either spinal adjustments or sham adjustments. The trial was set up as a multicentre pilot study, and the authors did not formally evaluate the results. They did, however, comment that ‘patients in both groups were satisfied with their care and blinding appeared to be successful. Pain Disability Index change scores were not consistent across sites’.

**Discussion**

Perhaps the most important result of this systematic review is the fact that very few RCTs exist in this area. Four of the eight RCTs had pilot character. The range of conditions is large and seems arbitrary. For any single condition a maximum of two RCTs only are available. This paucity of data limits the conclusiveness of this systematic review but does in itself represent an important finding, not least in relation to the widespread use of chiropractic manipulation for non-spinal pain.

Chiropractic manipulation has been tested in conditions as diverse as fibromyalgia, carpal tunnel syndrome, infantile colic, otitis media, dysmenorrhoea, and chronic pelvic pain. There are a lack of independent replications, and multiple weaknesses in the trial designs have to be noted. They include small sample size, lack of follow up, lack of control for placebo response, lack of blinding and use of non-validated outcome measures. Where independent replications have been published they failed to confirm the initially encouraging findings. None of the high-quality trials (ie, those with a Jadad score of 5) yielded a conclusively positive result. The only study that generated positive results (ie, suggesting the superiority of manipulation over medical treatment of infantile colics) suffered from significant methodological limitations, eg, no control of placebo effects, no blinding, no validated outcome measure. In this study, the observed effect is of questionable clinical relevance; it scored only 3 of 5 possible points on the Jadad score. Most importantly, a larger and more rigorous study (Jadad score = 5) of the same indication failed to confirm the positive result.

The combination of paucity and often low-quality primary data seriously limits the validity of the findings and the ability to generalise them. Moreover, one cannot be sure that all relevant RCTs have been identified, and the influence of publication bias is difficult to assess. In this context, it is noteworthy that no unpublished trials were identified with the above-mentioned search strategy. It could be argued that pilot studies should be omitted from this review. On the other hand, one might stress that it is the very purpose of systematic reviews to summarise evidence from even the smallest and most preliminary trials as long as they meet the pre-defined entry criteria.

The above evidence does not demonstrate the ineffectiveness of chiropractic manipulation for non-spinal syndromes. The evidence does, however, show that any claims that chiropractic manipulation might be effective in the treatment of non-spinal syndromes are not based on data from well-designed clinical trials. Critics of chiropractic theory would add that the notion of a benefit from chiropractic manipulation for non-spinal problems is scientifically implausible; in other words, there is no compelling rationale why manual adjustment of spinal malalignment should reduce non-spinal symptoms. A further point to bear in mind is the fact that chiropractic manipulation has repeatedly been associated with serious
complications;\textsuperscript{28} this has obvious implications for a risk-benefit analysis and is a further important reason for segregating chiropractic trials for this review. The risks of spinal manipulation can be considerable,\textsuperscript{29} while the benefits for non-spinal conditions have yet to be demonstrated. It follows that an analysis of risk versus benefit has to yield a negative result.

Others might argue that the popularity of chiropractic amounts to proof of its efficacy. The frequency of chiropractic visits by the general population has been evaluated at 100 visits per 100 person-years in the US and 140 visits per 100 person-years in the US and Canada.\textsuperscript{30} Six per cent of these visits are likely to be due to non-musculoskeletal problems.\textsuperscript{1} Interestingly, patients with such complaints are more satisfied than other chiropractic patients.\textsuperscript{1} The open question is whether this level of satisfaction is due to specific or non-specific therapeutic effects.\textsuperscript{26}

An important finding of this review is that high-quality studies (with a Jadad score of 5) of manipulation are feasible. This is not to imply that the issue of placebos in controlled clinical trials of chiropractic has been fully resolved. In fact, one aim of this review is to stimulate further research into this and related areas. Rigorous RCTs should now be conducted by those who make (and profit from) claims of efficacy. These RCTs should be conducted patient blind and evaluator blind against a sham control intervention in order to allow for placebo effects that have repeatedly been demonstrated.\textsuperscript{26} Obviously, they should be of sufficient sample size (ideally based on a proper sample-size calculation with sufficient power avoiding type I and II errors) and employ validated outcome measures of clinical effectiveness.

In conclusion, the notion that chiropractic manipulation is an effective treatment of non-spinal pain syndromes is not based on conclusive evidence. Those who make claims of effectiveness should provide the evidence to back them up.

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<td>• daily hours of crying</td>
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| Sawyer (1999)
(22) | RCT, 2 parallel arms | 5 | 20 children with at least 3 episodes of otitis media/year and signs of effusion | SM at level of spinal malalignment sham SM (10 sessions during 4 weeks) | • score of tympanometric and otoscopic measurements | 4 weeks | No interpretable findings regarding efficacy | Pilot study, authors concluded that full-scale RCT is feasible | None possible |
| Hondras (1999)
(23) | RCT, observer-blind, 2 parallel arms | 3 | 138 women with moderate to severe dysmenorrhoea | A) SM at relevant spinal segment B) SM at irrelevant spinal segment (5 sessions during 3 cycles) | • pain (VAS) • plasma level of prostaglandin F2α metabolite • Moos’ Menstrual Distress Questionnaire | 4 cycles (including 1 month run-in phase) | VAS scores decreased in both groups, no significant inter-group differences in any outcome measure | Demonstrates powerful placebo effect and absence of specific therapeutic effect of SM | Negative |
| Olafsdottir (2001)
(24) | RCT, 2 parallel arms | 5 | 86 infants with infantile colic | A) SM at dysfunctional articulations B) undressing the child and holding it but no SM (= sham intervention) (3 sessions during 8 days) | • verbal rating scale of improvement as judged by parents | 8–14 days | No significant inter-group differences, in experimental group 69.9% of all patients improved (60.0% in control), hours of crying decreased from 5.1 to 3.1 in experimental group (5.4 to 3.1 in control) | Exact type of chiropractic treatment previously agreed by a reference group of 14 chiropractors, both doctor in charge and parents fully blinded | Negative |
| Hawk (2002)
(25) | RCT, 2 parallel arms | 5 | 39 women with (gynaecological) pelvic pain | A) lumbar spine flexion-distraction and trigger point therapy B) sham SM (14 sessions during 6 weeks) | • Pain Disability Index | 6 weeks | Effects not consistent and effect size not calculated | Pilot study | Neutral |

*positive = manipulation significantly more effective than control intervention; negative = manipulation not significantly more effective than control intervention.

ROM = range of motion; SM = spinal manipulation; VAS = visual analogue scale.
Twenty years of follow up of a rare lipoprotein variant (apoE2-Dunedin) in twins

Edwin Nye

The clinical course over a span of twenty years is reported from identical twin males, aged 47 years when first seen. It was discovered that they represented a possibly unique apolipoprotein E2 variant, characterised by massive hypertriglyceridaemia with delayed clearance of very-low-density lipoproteins and chylomicrons. In the course of the long follow up they both developed maturity-onset diabetes and vascular disease, including coronary artery disease.

Case report

Male identical twins, aged 47 years, were seen in a lipid clinic after they had been referred for investigation of massive hypertriglyceridaemia. The finding was by chance in one of the men but the same abnormality was seen in his twin brother and a genetic basis for the finding was suspected. Twenty years later the two men are still alive and are followed at intervals in an outpatient department of Dunedin Hospital. It was found that the men had no known blood relatives, since they had been adopted as children. They were unmarried and had no children of their own.

The clinical findings were reported in 1986, after four years of follow up, and the nature of the lipoprotein abnormality was defined by reference to the amino acid sequence of the apoE2 variant in these men. In summary, the apolipoprotein (apo) E2 is characterised by a single amino substitution at the 158 position of arginine with cysteine, compared with the isoforms E3 and E4. In the homozygous E2/2 condition there is a delayed clearance of very-low-density lipoproteins (VLDLs) and of chylomicrons. However, in the men reported here the findings were unusual in that the pattern was that of a massive hypertriglyceridaemia (a type V pattern).

Investigation of the amino acid sequence of the apoE2 in these brothers showed that they had a previously undescribed substitution of cysteine for arginine at the 228 position in the 299 amino acid sequence of the apoE2 polypeptide. The shorthand term apoE2-Dunedin was coined for this variant.

Both men (BA and NA) were overweight when first seen and weight loss was associated with some improvement in the lipoprotein profile. Neither brother was a smoker although both drank some beer about once weekly, occasionally heavily in the case of NA. Neither had clinical stigmata of hyperlipidaemia. They were not clinically diabetic although, in retrospect, the fasting blood sugars in both men were 7.0 mmol/l when first seen.

Case 1 (BA)

When seen originally, BA weighed 90.6 kg (BMI 37.7) but was able to reduce his weight to 86.2 kg a year later with improvement in his blood lipid profile. At this stage he was not complaining of chest pain or intermittent claudication. His resting
ECG was normal. He was not seen for 12 years after initial studies and was later referred to the diabetes service of the hospital with a fasting blood sugar level of 14.1 mmol/l with glycosuria. He was diagnosed as having maturity-onset diabetes and responded well to dietary measures. Three years later he complained of some chest pain on exercise and was found to have ischaemic changes on an exercise stress test. The test was repeated as recently as 2001 and at this time he complained of ‘slight’ chest pain with similar ST segment changes to those noted earlier. Fundoscopy at yearly intervals after he came under the care of the diabetes clinic showed no changes of diabetic retinopathy.

A further exercise test confirmed the earlier finding of significant ischaemia. He had managed to reduce his weight to 74 kg. At this stage, echocardiography showed left ventricular inferior wall hypokinesis and akinesis of apex and mid segments, consistent with a previous inferior myocardial infarction.

**Case 2 (NA)**

NA was of similar build to his brother and weighed 88 kg (BMI 36.6) when first seen. He complained originally of some pain in his left arm on effort, but at the time this was not thought to be anginal pain as he had had some previous chest trauma and his resting ECG was normal. He was also diagnosed as having gout and was treated with a uricosuric drug (sulphinpyrazone). Twelve years after being originally seen, NA was found to have a fasting blood sugar of 26.4 mmol/l and he was considered to have maturity-onset diabetes. At the same time his ECG showed evidence of an inferior myocardial infarct. Thyroid function was considered normal on the basis of a thyroid-stimulating hormone (TSH) reading of 1.93 µIU/l (laboratory range 0.3–5.0). One year later neurophysiological studies revealed a diffuse peripheral neuropathy, consistent with his diabetic state. At no time during annual fundoscopy examinations was he deemed to have diabetic retinopathy.

Fifteen years after first being seen he began to have symptoms of peripheral vascular disease in spite of what was regarded as satisfactory control of his diabetes. He did not have diabetic retinopathy on serial examinations at yearly intervals. His weight fluctuated, at best being 68 kg. In general, his lipid profile improved when weight control improved.

At sixteen years of follow up it was noticed that his TSH had risen to 7.54 µIU/l and he was treated with thyroxine. Over the follow-up period he was always normotensive and microproteinuria was never detected.

**Discussion**

The possibility of a long follow up, twenty years in fact, of identical twin males with what may be a unique apoE2 variant was deemed to be of interest in demonstrating the fairly parallel course of their clinical states. Both developed maturity-onset diabetes and both developed vascular disease, in particular evidence of coronary heart disease. One brother (NA) developed very troublesome peripheral neuropathy but, at the time of this report, this had not happened to his twin.

The apoE phenotype has three common alleles, respectively designated E2, E3 and E4.
The E2 allele has a cysteine at residue 158. These brothers had the usual cysteine at position 158 in the amino acid sequence but differed from normal by a substitution of cysteine for arginine at position 228.

In terms of the risk of development of cardiovascular disease in the different apoE categories, namely E2, E3 and E4, it has been reported from the Framingham offspring study that, in men, the lowest prevalence for the development of cardiovascular events was for the apoE3 group (101.6/1000). Those having the apoE2 phenotype were in an intermediate position at 131.2/1000, compared with the apoE4 group at 145.7/1000. However, the Framingham offspring analysis also adjusted for other risk factors contributing to coronary heart disease risk, such as diabetes, when it was found that the odds ratio for men in the apoE2 group was 1.94 greater than that of the E4 group.

The twin brothers reported here both developed diabetes, which suggests an inherited factor contributing to their medical status, but in the absence of any identified blood relatives this remains speculative. It would certainly pose the question of the relative risks they ran for the development of vascular disease from diabetes in the one case, and their dyslipidaemia in the other. The possibility that the two conditions, maturity-onset diabetes and dyslipidaemia, were the expression of different genetic factors in the genome of these men cannot be discounted. The reporting of the clinical course of subjects with apolipoprotein variants, in this case apoE2-Dunedin, clearly has relevance to aspects of prognosis, in the present instance to possible connections with maturity-onset diabetes and vascular disease. In the absence of information it may be difficult sometimes to recommend specific therapies, either to reduce potentially atherogenic blood lipids, such as VLDLs and intermediate-density lipoproteins (IDLs), where these are elevated, or to stress the lifestyle changes that would delay, or prevent, maturity-onset diabetes. In some cases the latter strategy may, of course, also favourably affect the blood lipid profile. On the other hand, the 20 years of survival in these men after diagnosis to the age of 67 years may argue for a relatively benign course, notwithstanding the presence of vascular complications, even in the presence of two known risk factors for early death.

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Is there a role for placebo analgesia?

Jon Jureidini

A significant portion of the response to drugs (often quoted as 40%) can be attributed to placebo (‘I shall please’). Placebo is that component of the response that is thought not to be explained by ‘specific mechanisms’ of treatment, but by some combination of factors including activation of endogenous opioids, natural recovery, the medical context, conditioning, suggestion and statistical artefact.\(^1,2\) Even authors sceptical about the ‘powerful placebo’ acknowledge a significant effect of placebo analgesia over no treatment.\(^3\) This response is not surprising, since pain (‘an unpleasant sensory or emotional experience associated with actual or potential tissue damage or described in terms of such damage’)\(^4\) is a multidimensional phenomenon involving sensory, affective, motivational, and environmental components. Historically, placebo analgesia was not accompanied by appropriate explanation and consent.

A man with cerebral palsy presented frequently to an emergency department with painful muscle spasm. He was routinely treated with diazepam until a resident substituted an injection of saline, which apparently proved equally effective in terminating spasm. The use of saline was repeated many times without the patient’s knowledge. The patient found out about the deceit several years later and a subsequent high-lethality suicide attempt was partly attributed to his humiliation.

Because of the risks associated with infringement of autonomy, placebo drug use has been discontinued in most branches of medicine.\(^5\) However, my experience as a consultation-liaison psychiatrist and my inquiries of three other pain clinics suggest that there is still significant use of placebo analgesia in chronic pain. I suggest that, independent of concerns about infringing patient autonomy, the efficacy of the clinical use of placebo analgesia is questionable.

There are a number of ways that placebo analgesia can be used, according to whether it is for assessment or treatment, and whether the procedure is open, single-blinded or double-blinded. Of the possible combinations, the following have been used or are feasible.

**Single-blinded, for assessment**

Even now, in some cases of diagnostic uncertainty, placebo is used without consent.

A 13-year-old girl was admitted to hospital with back pain. No cause could be identified for the pain, which had not been responsive to a combination of nonsteroidal anti-inflammatory drugs and analgesics. A registrar gave vitamin B6, which he represented to the girl and her family as being a strong analgesic. She did indeed have a more positive response to the placebo than she had had to the active drugs. This outcome was understood by the doctor to demonstrate that her pain was ‘non-organic’, and to free him from responsibility for her care.
Setting aside the logical fallacy (‘organic’ pain also responds to placebo), such use of placebo places the clinician in a quandary about what to do next. To continue the ‘treatment’ with placebo, thereby perpetuating the deceit, seems unacceptable. Confronting the patient with her response to an inactive drug would potentially cause her loss of face, undermining therapeutic alliance.

**Double-blinded, for assessment, single-dose**

If most clinicians reject the diagnostic use of placebo without consent, is there still a place for single-patient blinded assessment of placebo versus active analgesic in chronic pain? Here, the patient is told that she is going to have a single dose of each of two or more medications, one being inactive. It is explained that the aim is to separate out active drug effects from the inevitable placebo effect. The rationale is that potentially dangerous or disabling treatments can be avoided if they are not proven to be superior to placebo. Patients are usually reassured that a placebo response does not negate the reality of the pain. (This is a view not necessarily held by the treating physicians; even a relatively recent textbook distinguishes ‘genuine’ pain from some unspecified alternative.)

The single-patient, placebo-controlled, double-blinded assessment of analgesia characteristically uses only a single dose of each substance. On that basis, it aims to identify those patients whose response to the trialled analgesic is no different to placebo. Four patterns of analgesic response are possible. Those who respond to: (1) active drug only; (2) neither; or (3) only placebo, would have been as effectively categorised in an assessment without placebo (group 1 as responsive to active drug, and groups 2 and 3 as non-responsive), and nothing new is learned from the assessment. It is the group who responds to: (4) both drug and placebo, who might be thought to be helped by the introduction of placebo. It is reasoned that the apparent effect of the target analgesic is spurious, and an unhelpful drug that would have appeared effective in a non-placebo assessment can now be avoided.

But even for sub-population 4, the information that comes from a single-dose, placebo-controlled assessment is ambiguous. Ordinary research data are concerned with population averages rather than individuals. It will not tell us whether a 70% response rate means that: (a) seven of ten individual patients will always respond to a drug, and three of ten, never; or (b) any given individual will respond to seven of ten doses. There is good evidence that individuals’ response to both active drug and placebo varies from one administration to another.\(^7-9\) Lasagna and colleagues found that only 45% of 69 post-operative patients who received two or more doses of placebo were consistent in their analgesic response to placebo.\(^8\) Simple arithmetic shows that if there is even a small percentage of inconsistent responses, a single dose in an individual will not give a valid indication of likely future analgesic effect of drug or placebo.

**Double-blinded, for assessment, multiple doses (n-of-1 trial)**

Multiple doses of both active drug and placebo could be assumed to give a more reliable indicator of placebo responders. How then would those patients who respond well to placebo be managed? If response to both placebo and active analgesia is interpreted as meaning that active drug has not significantly contributed to analgesia, one option would be to withhold all drugs, because chemicals are not playing a
significant part in analgesia. However, in doing so, the patient is being denied analgesia that they have experienced as effective in reducing pain. My clinical impression is that the most common outcome of finding that patients respond equally to placebo and active drug(s) is that an active drug is given anyway, perhaps grudgingly. It is not clear whether the aim is to exploit the placebo effect or because of the need to ‘do something’. But if this is the option chosen, decision making has not been enhanced by virtue of the placebo-controlled assessment, as a simple trial of active drugs would have identified the apparently effective option. The placebo assessment has only exposed the doctor and patient to the risk of disrespectful treatment.

A 45-year-old woman had a one-year history of disabling shoulder pain. Repeated investigations found no cause. Injections of various substances, including saline, into the site of pain, demonstrated good response to both active drugs and saline. She was subsequently treated with active drug, initially with good response, but when this response waned, the treating physician reverted to injected saline (without disclosing to the patient that placebo was being used). The patient later was found to have a tumour in her scapula, and her distress at the misdiagnosis was exacerbated by the dishonest treatment she had received.

Open, for treatment

In those patients for whom placebo analgesia is demonstrated to be equally effective to active drug in a properly conducted n-of-1 trial, then it could be given as treatment, with the knowledge of the patient. A small study has suggested that patients presenting with ‘neurosis’ are responsive to placebo medication even if they are fully informed that the substance given is chemically inactive. Unfortunately, there is evidence that placebo effect attenuates with repeated use (‘placebo sag’). Our current understanding of placebo is too poor to allow us to develop strategies to accentuate the positive response. Nearly all studies of clinical analgesia measure the difference between the placebo condition and the active treatment condition, but fail to measure the placebo effect. Research experience and theoretical models in fields such as hypnosis might give us some guidance as to possible strategies to explore the contributions of suggestion, desire and expectation factors to analgesia, and to point to ways to make better, and informed, use of the placebo analgesia response.

Conclusion

Single-dose, blinded, therapeutic placebo assessments do not adequately differentiate active drug responders from non-responders. Furthermore, those patients who respond well to placebo should not be denied some form of treatment. Therefore, there may be little role for blinded placebo assessments in pain management. Given the current state of our understanding of placebo, it might be better for patients with pain to be offered what is clinically judged to be appropriate analgesia, bearing in mind the large inter-individual variance in dose response. Continued treatment should be based on the balance of subjective benefit, impact on functioning, side effects, and risk, accepting that the benefits of the drug may not be solely pharmacological. It is understandable that clinicians working in this field should seek anxiously after certainty and ‘science’ in the face of ambiguity. The danger is that assessments with
placebo medication offer only an illusion of certainty. The cost of this illusion is that patients may be denied beneficial treatment, and subject to possible denigration.

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**References:**

Severe hyperkalaemia with prescription of potassium-retaining agents in an elderly patient

Jennifer Martin, Susannah Mourton and Gary Nicholls

Plasma levels of potassium are kept within the normal range through a complex interplay of neurohormonal systems, acid-base balance, dietary electrolyte intake (both potassium and sodium), and renal function. Long-term maintenance of plasma potassium within this normal range demands that elimination, dominated under most circumstances by urinary excretion, equates with dietary potassium intake. When more than one renal excretory mechanism is impaired, hyperkalaemia may result. This case report describes a patient in whom hyperkalaemia developed, the consequence of multiple factors acting to impair urinary potassium excretion.

Case report

An 81-year-old man was admitted to hospital with generalised weakness attributed to hyperkalaemia. Congestive heart failure had been treated for many years with the angiotensin converting enzyme (ACE) inhibitor enalapril (5 mg per day) along with frusemide (40–80 mg per day). Plasma levels of creatinine regularly ran at 0.14–0.20 mmol/l (normal 0.05–0.11 mmol/l) and potassium, 4.3–4.8 mmol/l (normal 3.5–5.0 mmol/l). Six weeks prior to admission he was prescribed spironolactone (25 mg per day) for swollen ankles, and for three weeks he had taken trimethoprim-sulphamethoxazole (80/400 mg per day) as antimicrobial treatment for foot ulcers. He was taking a low-sodium diet. Plasma potassium on admission was 7.2 mmol/l, urea 19 mmol/l (normal 2.7–7.8 mmol/l) and plasma creatinine 0.31 mmol/l. The ECG showed a sinus bradycardia (46 beats/minute) with junctional escape, broad QRS and peaked T waves. Plasma renin activity was elevated at 2.6 nmol/l/hour (normal range 0.4–2.3 nmol/l/hour) as might be expected with ACE inhibitor and frusemide therapy, and plasma aldosterone was 140 pmol/l (normal 100–800 pmol/l).

All medications were withdrawn, and treatment consisted of intravenous insulin, glucose and calcium gluconate, and oral resonium-A. On the third day of hospitalisation the plasma potassium had fallen to 3.8 mmol/l, and plasma creatinine to 0.26 mmol/l. Following discharge, plasma creatinine fell further to 0.16 mmol/l and potassium was normal while he took his usual doses of ACE inhibitor and frusemide.

Discussion

ACE inhibitors regularly induce a positive, cumulative potassium balance and a small rise in plasma potassium in patients with cardiac failure.\textsuperscript{1} Although the combination of an ACE inhibitor and the potassium-sparing diuretic spironolactone was shown in the 1980s to be capable of inducing severe hyperkalaemia,\textsuperscript{2,3} the Randomised Aldactone Evaluation Study (RALES) later demonstrated that a low dose (25–50 mg daily) of spironolactone added to standard treatment that included an ACE inhibitor reduced substantially the risk of morbidity and death among patients with severe heart failure associated with impaired left ventricular systolic function.\textsuperscript{4} Subsequent reports
of hyperkalaemia in patients taking this drug combination emphasised the need for caution (particularly in the elderly and when renal function is impaired) and for regular monitoring of plasma potassium and renal function.\textsuperscript{5–7} Of relevance to our patient, it was later reported that trimethoprim, through an amiloride-like action can induce a rise in plasma potassium and, particularly in those with renal insufficiency, can cause hyperkalaemia.\textsuperscript{8} Not surprisingly, a combination of an ACE inhibitor with trimethoprim might be expected to induce hyperkalaemia, as was reported by Bugge.\textsuperscript{9} We are not aware of reports in which a patient has received the triple combination of potassium-retaining drugs, namely an ACE inhibitor, the potassium-sparing diuretic spironolactone, and trimethoprim. Additional features that probably contributed to hyperkalaemia in our patient were impaired renal function (presumably in relation to severe cardiac impairment as well as advanced age) and dietary sodium restriction. It is evident that, for a number of reasons, the elderly are less able to excrete a potassium load than younger subjects.\textsuperscript{10}

This case illustrates that whereas therapeutic agents given individually might reduce the renal excretion of potassium and induce a minor rise in plasma potassium, in combination they can induce potentially fatal hyperkalaemia, especially in the elderly, when dietary sodium intake is restricted, and when renal function is compromised.

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**References:**


The operative treatment of movable kidney

This extract is taken from an article by William Collins MB (Lond) of Wellington, published in the New Zealand Medical Journal 1903, Volume 3 (10), p131–2

In introducing the subject of operation on movable kidneys to you, I wish it to be understood that I do not consider an operation is called for in a large number of cases. It is surprising in how many people the kidneys are found movable, and yet in whom this mobility seems to cause very few symptoms. Movable kidneys are most common in women, and are co-existent very often with some disease of the genital organs. In determining whether in a given case an operation is likely to be attended by benefit one has first of all to find out if the kidney is the real cause of the patient’s sufferings. You have to find out whether the movable kidney is healthy, or the seat of carcinoma, tubercle, stone, or abscess. You have to eliminate the symptoms which may be caused by dyspepsia and constipation, appendical [sic] disease, gallstones; in women, by ovarian and uterine disease. I have frequently found movable kidneys in women who suffer from dysmenorrhoea, also in women who have had severe labours, and in those who have become thin and emaciated from having had children too frequently. Those cases where the kidney has been dislocated by injury are most likely to be benefited by operation. In highly neurotic women who have movable kidneys I should hesitate in advising operation, nor would I operate in women who are approaching the climacteric period. In most poorly nourished women I believe that an operation can be avoided by rest and improvement of the general health.
THE OPERATIVE TREATMENT OF MOVABLE KIDNEY.

[By William Collins, M.B. (Lond.), Wellington.]

In introducing the subject of operation on movable kidneys to you, I wish it to be understood that I do not consider an operation is called for in a large number of cases. It is surprising in how many people the kidneys are found movable, and yet in whom this mobility seems to cause very few symptoms. Movable kidneys are most common in women, and are co-existent very often with some disease of the genital organs. In determining whether in a given case an operation is likely to be attended by benefit one has first of all to find out if the kidney is the real cause of the patient's sufferings. You have to find out whether the movable kidney is healthy, or the seat of carcinoma, tubercle, stone, or abscess. You have to eliminate the symptoms which may be caused by dyspepsia and constipation, appendical disease, gall-stones; in women, by ovarian and uterine disease. I have frequently found movable kidneys in women who suffer from dysmenorrhœa, also in women who have had severe labours, and in those who have become thin and emaciated from having had children too frequently. Those cases where the kidney has been dislocated by injury are most likely to be benefited by operation. In highly neurotic women who have movable kidneys I should hesitate in advising operation, nor would I operate in women who are approaching the climacteric period. In most poorly nourished women I believe that an operation can be avoided by rest and improvement of the general health.

Five years and a half ago I was consulted by a lady for pain mostly in the right side, nausea, vomiting, and general abdominal discomfort. She was thin and emaciated. She had had three children in seven years. Her symptoms were always relieved when she was lying down. Both kidneys were found movable, the right more than the left; the right kidney was, moreover, tender on manipulation. I explained to her that I believed the mobility of the kidneys had something to do with her symptoms, and stated also that if she would rest and be fed up she might possibly avoid the necessity for an operation. On making her lie flat in bed without a pillow, and by raising the end of the bed 14 in., I found that it was much more difficult to feel the kidneys. I suggested that she should lie in bed for six weeks or two months with the end of the bed raised 14 in. and be in the meantime fed up. This she consented to do. By appropriate feeding she improved in general health, and at the end of two months she was allowed to move about. Since then I have seen her occasionally, and there has been no return of her symptoms.
The dual functions of trigger factor, a eubacterial chaperone. M Booth, S Wilbanks. Department of Biochemistry, Otago School of Medical Sciences, University of Otago, Dunedin.

The correct folding of enzymes into their unique three-dimensional structures is essential for the survival of all organisms. A number of proteins, known as chaperones, help in the folding process by accelerating specific steps, and/or preventing aggregation. Trigger factor is a eubacterial-specific chaperone that possesses two functions involved in protein folding: chaperone and peptidyl prolyl cis/trans isomerase (PPIase) activities. The relationship between these activities is, however, unclear. This study aimed to deduce whether the two functions are separable, a finding that is essential for further study of trigger factor’s potential as a drug target in eubacterial pathogens.

The requirement of each individual function was investigated by the ability of variant constructs to complement a trigger-factor-deficient \textit{Escherichia coli} strain. The constructs consisted of a \textit{Mycobacterium tuberculosis} trigger factor naturally lacking both activities, or \textit{E. coli}/\textit{M. tuberculosis} chimerae in which either one of the two activities is deficient. Expression of the trigger factor variants resulted in an exponential-phase doubling time of 1.5 ± 0.05 hours, equal to that of the trigger-factor-deficient strain. In addition, the ability of each variant trigger factor to prevent the aggregation of proteins during stress-induced protein unfolding was analysed using two-dimensional gel electrophoresis. Aggregated protein was isolated and analysed; prevention of aggregation was detected as a decrease in the level of protein present compared with a trigger-factor-deficient control. All variants showed an approximate fivefold decrease in protein aggregation.

This study shows that, while neither function alone is capable of restoring normal growth to trigger-factor-deficient \textit{E. coli}, the two functions are separable with the chaperone function being retained even in the absence of PPIase activity. This study addresses the contribution of the dual functions of trigger factor to the suppression of aggregation. However, further work is required to evaluate their contribution during the refolding of proteins.

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Biomolecular markers for determining prognosis in colorectal cancer – a systematic review. A Chatterjee\textsuperscript{1}, J L McCall\textsuperscript{2}, A E Reeve\textsuperscript{1}. \textsuperscript{1}Cancer Genetics Laboratory, Department of Biochemistry, Otago School of Medical Sciences, University of Otago, Dunedin; \textsuperscript{2}Department of Surgery, University of Auckland and Hepatobiliary and Upper Gastrointestinal Unit, Department of Surgery, Auckland Hospital, Auckland.

Colorectal cancer is the second most common form of cancer in New Zealand. The techniques (eg, Dukes staging) used to determine prognosis are often inaccurate. The analysis of molecular markers, including levels of expression of genes and proteins, is a potentially more accurate method of prognostic determination. Comprehensive reviews would provide clear summaries of the vast volume of literature in this field. A systematic review is a powerful method of literature evaluation utilising a well-established, bias-minimising methodology.

Papers that discussed the relationship of a molecular marker to prognosis in colorectal cancer were sought for this systematic review. Keyword and subject-heading searches of literature databases, based on three parameters – colorectal cancer, prognostic indicators and molecular biology – yielded more than 5000 papers. The inclusion of a paper in the review was based upon manual assessment of its abstract, first to verify its relevance, and also to select only those markers supported by the strongest evidence (studied in more than 100 patients for more than five years) – 118 papers in total. The descriptive relationship of each marker to prognosis, with a quantitative indication of the strength of the relationship (eg, p values), was extracted from each paper.

Eight markers were identified that had been assessed in more than five publications. Altered expression of p53, Ki-67, thymidylate synthase, carcinoembryonic antigen, p27, and Ki-ras were associated with prognosis, as were the presence of 8q loss of heterozygosity and microsatellite instability.

Each of these markers was strongly associated with prognosis in multiple publications (26 for p53). This suggests that combined assessment of these markers may yield a more accurate method of prognostic determination. However, further experimental research, regarding which multiple markers are assessed together in a single study, is needed before this potentially more accurate method of prognostic determination can be incorporated into clinico-pathological practice, allowing full benefits for clinicians and patients to be realised.

\textit{This study was supported by a Dunedin School of Medicine summer research scholarship}

Pre-testing of pictograms used in medicines dispensed in missions of humanitarian relief. \textsuperscript{1}de Silva, K Ryan, G Becket, R Vaillancourt. School of Pharmacy, University of Otago, Dunedin.

The Canadian Forces send Disaster Assistance and Response Team (DART) personnel on missions of humanitarian relief. A majority of people to whom healthcare services are provided during these missions do not speak English, Spanish or French. This presents a serious communication problem for healthcare workers who attempt to give directions for medication.
A project was developed to adapt the United States Pharmacopoeia pictograms for this purpose. The aim of this study was to ascertain non-English-speaking people’s understanding of sixteen pictograms and to test the cultural appropriateness of the images used. Interviews were conducted via an interpreter with Kurdish, Khmer and Korean participants, who could neither read nor speak English, Spanish or French. Individual interviews were conducted to determine how the individual understood the pictograms, while focus-group interviews consisting of six to eight participants were conducted to determine the community perception and cultural relevance of these pictures. The demographic data and response to each pictogram were recorded in terms of a ‘Degree of Success Scale’ (a = no misunderstandings; b = timing errors; c = route of administration errors; d = quantity errors; e = auxiliary directions errors; f = other problems) for each participant.

Some pictograms were well understood while others caused confusion. Some pictures were not understood because the picture was not clear, the picture was culturally irrelevant (the concept of alcohol was misunderstood by over 75% of Khmer and Kurdish participants, but well understood by the Korean participants), or the picture was misinterpreted (over 87% of Kurdish interpreted the ‘take with food’ symbol as ‘crush the tablet’). The pictograms that were not well understood would have to be redesigned. These pictures will eventually be evaluated in the field and used in missions of humanitarian relief. They could also be used in New Zealand community pharmacies to communicate with patients with low literacy levels.

This study was supported by the Canadian Armed Forces and the New Zealand Pharmacy Education and Research Foundation.

GABA-A and nicotinic receptors do not mediate the inhibition of long-term potentiation by amyloid-beta in the rat. S Hulme, W C Abraham. Department of Psychology, University of Otago, Dunedin.

The level of soluble amyloid-beta (Aβ) is elevated in the brains of patients with Alzheimer’s disease and correlated with the degree of memory impairment. This impairment may be due to the fact that Aβ inhibits long-term potentiation (LTP) of synaptic transmission, a putative neural mechanism underlying learning and memory. This experiment investigated the role that GABA-A and nicotinic acetylcholine receptors (nAChRs) may play in mediating the inhibition of LTP by Aβ.

Experiments were conducted in vitro in transverse rat hippocampal slices (400 µm) with area CA3 removed. Field excitatory postsynaptic potentials were recorded in the stratum radiatum of area CA1, following test pulse (1/30 s) stimulation of the Schaffer collateral afferents. To test whether Aβ1-40 impairs LTP induction through up-regulating GABA-A interneuronal inhibitory activity, high-frequency stimulation (HFS, 100 Hz) was delivered either in the presence of the GABA-A antagonist picrotoxin (100 µM) or in picrotoxin plus Aβ1-40 (200 nM). HFS, in the presence of picrotoxin alone, elicited 26 ± 7% LTP (mean ± standard error of the mean, n = 4). Aβ1-40 pre-incubation significantly reduced this level of LTP to 5 ± 5% (n = 4; Student’s t(6) = 2.45, p <0.05).

In the second experiment we tested whether nAChRs, which avidly bind Aβ, mediate the inhibition of LTP by Aβ. However, neither a low dose of the nAChR antagonist...
methyllcaconitine (100 nM), which selectively blocks α-7 nAChRs, nor a non-selective higher dose of the drug (1 µM) prevented the inhibition of LTP by Aβ1-40. These findings indicate that neither GABA-A nor nACh receptors mediate the inhibition of LTP by Aβ.

This research was supported by an Otago Medical Research Foundation summer scholarship and the Health Research Council of New Zealand

Obstetricians’ and midwives’ perception of their role in the identification and management of family violence. M Lauti, D Miller. Department of Women’s and Children’s Health, Dunedin School of Medicine, University of Otago, Dunedin.

Pregnancy is a particularly at-risk time for women to become victims of family violence and has been identified as a time that provides a unique window of opportunity for identification and management of abused women. Abused pregnant women are at risk of poor obstetric outcomes, which could be improved by increased identification and disclosure rates.

The aim of this pilot study was to investigate opinions of obstetricians and midwives regarding their perceived role in identification and management of family violence. Specifically, their opinions were sought about barriers to identification and management, and possible ways to overcome these barriers.

Two focus groups were conducted, one for obstetricians and one for midwives, as well as semi-structured interviews with three obstetricians. The total number of participants was five obstetricians and five midwives. Discussions were audio taped and transcribed. Completed transcripts were checked for accuracy and analysed independently by two researchers. Content analyses were integrated and themes were grouped as identification or management issues.

The study findings, though consistent with previous literature, also identified new themes. Themes discussed surrounding identification issues included inquiring about family violence, screening, barriers to and facilitators of identification. Themes discussed surrounding management issues included impact on the practitioner, mandatory reporting, barriers to and facilitators of management. New themes included the possibility of inappropriate screening identifying a woman’s historic abuse, need for debriefing procedures and the serious boundary issues experienced by midwives who may become entangled in the power imbalance of a woman’s abusive relationship.

This study concluded there are significant issues for New Zealand obstetric health professionals that need to be addressed for the development of effective training and guidelines. Also, a further study is required, including further focus groups and a nationwide survey, to achieve saturation of themes and further exploration of the identified issues.

This study was supported by a summer scholarship from the Medical Council of New Zealand

Identical (homozygous) twins constitute genetically indistinguishable individuals and are therefore invaluable in the study of traits and disease susceptibility. The development of dental plaque, which precedes both caries and periodontal disease, depends on the ability of colonising bacteria to bind initially to the acquired enamel pellicle – a film composed of a diversity of variable macromolecules, mostly of salivary origin. The purpose of this study was to assess the influence of human genetic variation on the selection of oral bacteria, by genotypic comparison of isolates from the teeth of pairs of homozygous and heterozygous (genetically distinct) twins.

Ten pairs of twins (five homozygous and five heterozygous) aged three to six years old participated. The labial surfaces of the lower incisors were swabbed and the recovered material plated onto highly selective Mitis-Salivarius agar to culture bacteria of the genus *Streptococcus*. At least forty randomly selected bacterial colonies were purified and genotypically compared by randomly primed polymerase chain reaction (RP-PCR). A negative control (no DNA) and a positive control (S. *mitis* strain I18) were included in each RP-PCR run. The resulting amplicons were electrophoretically separated and bacterial genotypes ascribed by reference of amplicon banding patterns to DNA calibration markers. Inter-individual similarities were determined according to the frequency at which indistinguishable genotypes were shared.

Among homozygous twins, 57.8 ± 38.0% of bacterial genotypes were shared between siblings, whereas 57.9 ± 31.3% of genotypes were shared between heterozygous siblings. No genotypes were shared between families. There is, therefore, no evidence that the genetic background of an individual influences streptococcal strain selection in the oral cavity. The source of colonising bacteria, the frequency of transmission between individuals, diet composition and other non-genetic factors may therefore constitute more influential determinants of bacterial colonisation of the oral cavity of young children.

*This research was supported by a University of Otago Oral Microbiology and Dental Health Research Summer Scholarship*

STAT proteins are selectively expressed in the rat adrenal medulla. M Nilsen, S Bunn. Department of Anatomy and Structural Biology, Otago School of Medical Sciences, University of Otago, Dunedin.

The chromaffin cells within the adrenal medulla mediate the body’s adaptation to physiological stresses, which are numerous but may include microbial infection, as conveyed by signals from the immune system. Cells of the immune system signal with cytokines, which stimulate an intracellular signal transduction pathway using STAT (signal transducers and activators of transcription) proteins. The purpose of this study was to determine if cells of the rat adrenal medulla express STAT proteins and thus have the potential to respond to cytokines.

To examine the expression of the seven different STATs, Western blotting was used on samples of rat adrenal medulla, employing commercially available, isoform-
specific anti-STAT antibodies. The distributions of the three predominant STATs were then investigated using immunohistochemistry on slices of fixed rat adrenal glands.

The predominant STATs were 3, 5a, and 5b; STAT 1 was also present. The immunohistochemistry showed that each of the predominant STATs had distinct distributions. In each case the medulla was more heavily stained than the cortex. In the adrenal medullae there were distinct clumps of staining, perhaps associated with specific cell clusters. Some groups of cells exhibited nuclear staining, where the STATs appeared to have translocated to the nucleus, suggesting possible STAT activation.

Some STATs, but not all, were present in the rat adrenal medulla. While some cells had high levels of a particular STAT, some cells had none at all. The expression of each STAT examined was differentially distributed. The presence, distribution, and possible nuclear translocation of the STATs support the theory that the immune system may activate chromaffin cells of the adrenal medulla through the STAT signalling pathway.

This research was supported by a Health Research Council of New Zealand summer scholarship.


The aim of this project was to determine if hyperhydration and an increase in plasma volume (hypervolaemia) can be achieved with ingestion of a solution with high sodium concentration to enhance subsequent exercise performance in the heat.

Seven male endurance-trained runners (36.4 ± 13.4 yr) each performed two treadmill trials (70% VO₂ max) in the heat (32°C, 50% relative humidity) to exhaustion. Experimental tests were randomised and separated by at least one but less than three weeks. In one trial a low-sodium (10 meq Na⁺/L) beverage was ingested and in the other a high-sodium (164 meq Na⁺/L) beverage was ingested. Ingestion took place, at rest, over a 60-minute period, with the beverage volume (10 ml/kg body weight) being divided into seven portions and fed every 10 minutes until fully consumed. Exercise commenced 30 minutes after the last beverage ingestion. Blood samples were drawn at rest (-105 min), after drinking (-30 min), right before exercise (-5 min), and at the end of exercise. The samples were analysed for haemoglobin (Hb), haematocrit (Hct), plasma volume, plasma sodium, and osmolarity. Plasma volume change was calculated from Hct and Hb. Time to exhaustion was the measure of performance and significant difference was established by a two-paired t test. Significance of effects of beverage and time on plasma volume and sodium concentration was established by a two-way ANOVA.

High sodium ingestion increased plasma volume over time (ANOVA, p = 0.006) and time to exhaustion (high Na⁺ beverage = 74 ± 32 min; low Na⁺ beverage = 60 ± 30 min; mean ± SD) was increased (p = 0.021). Plasma sodium concentration varied widely and was not significantly different between trials.
Hyperhydration and hypervolaemia can be achieved with ingestion of a solution with a high sodium concentration prior to exercise and contributes to enhanced endurance exercise performance by men in the heat.

This study was supported by a summer scholarship from the Health Research Council of New Zealand

Comparison of the rates of newly diagnosed HIV and AIDS among men who have sex with men in developed countries. A Verrall, N Dickson. Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, Dunedin.

As in many other developed countries, sex between men has accounted for the majority of HIV infections in New Zealand. The New Zealand AIDS Epidemiology Group’s most recent data show that, by the end of June 2002, men who have sex with men (MSM) represented two thirds of people ever diagnosed with HIV in New Zealand, although the proportion of those diagnosed within the last six months was lower (45%).

The aim of this study was to compare the rates of newly diagnosed HIV and AIDS cases among MSM in New Zealand to those of data collected from national surveillance studies from similar developed countries. Rates of HIV and AIDS cases where exposure has been attributed to sex between men were calculated per 100 000 men aged 15 to 59 in New Zealand, Australia, Sweden, Canada, the United Kingdom and the United States.

In all countries, newly diagnosed AIDS rose rapidly through the 1980s and declined in the 1990s. The profile of New Zealand’s epidemic differs from those studied, with new diagnoses stabilising early and declining to a limited extent. However, the most substantial decline in New Zealand’s rates was achieved in the late 1990s, after those in Australia, Sweden and the United Kingdom. In New Zealand during 2000 the number of AIDS diagnoses attributed to sex between men per 100 000 men was 1.19. This is half that of Australia (2.64) and lower than that of the UK (1.74). Rates of newly diagnosed HIV attributed to sex between men per 100 000 men were also low in New Zealand (2.73), being approximately one third of those observed in Australia (8.76) and the UK (8.34).

New Zealand has achieved low rates of newly diagnosed AIDS. However, New Zealand’s low rates of HIV must be interpreted with caution given comparatively low levels of HIV testing.

This study was supported by a summer scholarship from the Medical Assurance Society

Microanatomy of the human abdominal muscles. S Woodley, M Duxson, S Mercer. Department of Anatomy and Structural Biology, Otago School of Medical Sciences, University of Otago, Dunedin.

The anatomy and functions of the human abdominal muscles are of importance to anatomists, clinicians and biomechanists alike. This complex group of muscles has been reported to be responsible for, or contribute to, a multitude of diverse functions.
These include protection and support of the abdominal viscera, movements of the trunk, and maintenance or raising of intra-abdominal pressure, assisting with functions such as defecation, micturition, parturition, vomiting, and forced expiration. In order to understand the specific functional capabilities of the abdominal muscles, knowledge of the underlying anatomical structure is essential. Although the gross morphology of these muscles has been extensively described, details regarding fine architecture and patterns of innervation are not well known. Therefore, the purpose of this study was to clarify the microanatomy of the human abdominal muscles.

Samples of fascicles (groups of muscle fibres wrapped in a common perimyseal sheath) were taken from eight cadaveric abdominal muscles. These fascicles were stained and analysed to determine both the patterning of muscle fibres and the neural inputs to the muscles (as indicated by the presence of neuromuscular junctions or endplate bands). The number of endplate bands along a fascicle was variable (between one and five), and appeared to be largely determined by fascicular length. In the majority of cases, a single endplate band was observed in fascicles less than 50 mm in length, while multiple endplate bands (usually two or three) were found in fascicles longer than 50 mm. Identification of scattered myomyonal (muscle-to-muscle) junctions verified that individual muscle fibres rarely extended the entire length of a fascicle. The observed microanatomy reinforces the concept that the human abdominal muscles are not designed for fine motor control.

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Christchurch Hospital’s Chest Pain Assessment Unit: the first six months. C M Young, I G Crozier, C Cruickshank, H Ikram. Department of Cardiology, Christchurch Hospital, Christchurch.

A Chest Pain Assessment Unit (CPAU) was established at Christchurch Hospital in November 2001 to assess patients with acute chest pain who had no high-risk features at presentation. The Unit aimed to reduce length of stay to less than 24 hours and to minimise incorrect diagnosis. Prospective audit was undertaken of the first six months of treatment by the Unit.

Patients admitted to CPAU have myocardial infarction excluded by troponin testing, with most then having pre-discharge exercise treadmill test.

Two hundred and thirty two patients (122 male, mean age 53 years) were assessed in CPAU. Six patients (2.6%) had non-ST-elevation myocardial infarction. Exercise treadmill testing was performed in 197 patients (84.9% of all CPAU patients), with 157 (79.7%) being negative.

One hundred and seventy two patients (74.1%) were discharged directly home from CPAU, with median length of stay 21.0 hours. The remaining 60 patients were admitted to the ward for further management. Median length of stay for this group was 15.2 hours in CPAU and further 43.5 hours on the ward.

Overall, a final diagnosis of acute coronary syndrome was made in 21 patients (9.1% of all CPAU patients) of which 17 had angiographically proven disease. In six months of follow up of the patients discharged from CPAU without a diagnosis of acute coronary syndrome there were three readmissions with non-cardiac chest pain, one readmission with a non-ST-elevation myocardial infarction, and no known deaths due to coronary disease. We conclude that CPAU allows for efficient and safe assessment of patients with chest pain who do not have high-risk features at presentation.

The association between chronic pain and psychosocial functioning following spinal cord injury. M A Turner. Department of Orthopaedic Surgery and Musculoskeletal Medicine, Christchurch School of Medicine and Health Sciences, Christchurch.

The aims of the present study are to examine the prevalence of chronic pain secondary to spinal cord injury (SCI), and to examine the extent of the impact of chronic pain on a range of indicators of psychosocial functioning.

A cross-sectional survey, in which data were gathered by face-to-face interview, was conducted. The cohort consisted of 122 individuals (89% of those meeting eligibility criteria) with traumatic SCI and residual neurological impairment who were resident in Christchurch at the time of injury.
Over three quarters (77%) of participants reported the presence of some degree of chronic pain. After controlling for a range of demographic, injury-related, and personality, social, and cognitive factors, increasing levels of characteristic pain intensity were found to be significantly associated with a range of indicators of psychosocial functioning. Those with high characteristic pain intensity had increased rates of psychiatric morbidity (compared with those with no pain) including: high psychological distress (OR = 7.88; 95% CI 2.05–30.28); suicidal ideation (OR = 4.26; 95% CI 1.20–15.08); major depression (OR = 22.18; 95% CI 3.08–159.92); anxiety disorders (OR = 7.60; 95% CI 1.21–47.59); and overall psychiatric morbidity (OR = 4.35; 95% CI 1.27–14.95). They also had increased rates of poor social functioning including: small social network (OR = 4.96; 95% CI 1.64–14.99); low social participation (OR = 4.65; 95% CI 1.30–16.55); and low social integration (OR = 7.60; 95% CI 1.55–37.17). Finally, after adjustment for confounding, higher levels of characteristic pain intensity are associated with poorer adjustment to disability and lower life satisfaction.

Chronic pain places a significant additional burden on psychosocial functioning. Identification of specific areas of psychosocial functioning associated with high characteristic pain intensity should help rehabilitation professionals target interventions to reduce the suffering associated with SCI pain.

Urocortin-1 infusion in normal humans. M E Davis¹, C J Pemberton¹, T G Yandle¹, J G Lainchbury¹, M T Rademaker¹, M G Nicholls², C M Frampton,¹ A M Richards¹.¹Christchurch Cardioendocrine Research Group, Department of Medicine, Christchurch School of Medicine and Health Sciences, Christchurch; ²Department of Medicine, University of the United Arab Emirates, Al Ain, United Arab Emirates.

Urocortin-1, a member of the corticotropin-releasing factor family, has been shown in animal studies to have effects on the pituitary-adrenal axis, the cardiovascular system, circulating neurohormones, renal function and to suppress appetite. For the first time in humans we have evaluated such effects of infused urocortin-1, as well as actions on plasma ghrelin, a hormone known to increase appetite. We also assessed urocortin-1 pharmacokinetics.

Eight healthy, male volunteers taking a diet of constant sodium and potassium content received 50 µg of urocortin-1 intravenously over one hour in a placebo-controlled, randomised, time-matched, cross-over study.

Urocortin-1 infusion compared with placebo increased plasma levels of corticotropin (9.5 ± 1.7 vs 4.2 ± 0.7, p <0.001), cortisol (432 ± 43 vs 213 ± 40, p <0.001), and atrial natriuretic peptide (ANP) (8.5 ± 1.1 vs 6.9 ± 0.7, p = 0.019), whilst suppressing plasma ghrelin (p = 0.008). No haemodynamic or renal effects were observed at the dose used. The plasma urocortin-1 t½ was 52 minutes based on a one compartment model.

In conclusion, a brief intravenous infusion of 50 µg of urocortin-1 stimulates plasma adrenocorticotropic hormone (ACTH), cortisol and ANP secretion, and suppresses plasma ghrelin in healthy, male volunteers. The last effect might contribute to the anorexic action of urocortin-1.
A survey of colonoscopic surveillance for dysplasia in patients with inflammatory bowel disease. R B Gearry\textsuperscript{1}, C J Wakeman\textsuperscript{2}, M L Barclay\textsuperscript{1}, B A Chapman\textsuperscript{1}, M J Burt\textsuperscript{1}, J A Collett\textsuperscript{1}, F A Frizelle\textsuperscript{2}. \textsuperscript{1}Department of Gastroenterology; \textsuperscript{2}Department of General Surgery, Christchurch Hospital, Christchurch.

Patients with inflammatory bowel disease have an increased risk of developing colorectal cancer. Screening colonoscopy is practised to identify dysplasia, allowing early colectomy and reduction in colorectal cancer incidence and mortality.

The aim of this survey was to determine the pattern of screening for dysplasia by colonoscopy in New Zealand.

A survey was developed and posted to all gastroenterologists and general and colorectal surgeons in New Zealand. Doctors were identified using a variety of professional registries. Of 196 posted surveys, there were 156 replies of which 120 were suitable for analysis.

The definition of dysplasia was thought to be ‘unequivocal neoplastic change’ by 21\% of respondents and ‘pre-neoplastic change’ by 68\%. Most doctors commenced surveillance colonoscopy ten years after the onset of symptoms and most perform colonoscopy every three years. The mean number of biopsies was 19 (range 3–42). Recommendations following the finding of low-grade dysplasia (LGD) were variable, with 18\% of doctors referring this group for colectomy. Seventy six per cent of doctors recommended colectomy if high-grade dysplasia (HGD) was found. Ninety six per cent of respondents recommend colectomy for dysplasia-associated mass lesions. Twenty per cent of doctors stated access to endoscopy delayed surveillance colonoscopy.

There were significant differences between the practice of different groups of doctors, especially between general surgeons and other respondents. The results show a wide variety of colorectal-dysplasia screening practice in New Zealand. While most doctors recognise the significance of HGD, LGD remains suboptimally treated. This may be due to confusion concerning the definition of dysplasia.
Non-pylori Helicobacter

This is an electron micrograph of a non-pylori Helicobacter. These species have been associated with gastric disease (including peptic ulcer disease and gastric malignancy), diarrhoea, bacteraemia and systemic disease, including cholecystitis and hepatitis. Some do not produce urease and may currently escape detection. Methodology to detect these bacteria, which can potentially be treated with standard H. pylori treatment regimes, is being developed locally.

We are grateful to Dr Jacqueline Keenan (Department of Surgery, Christchurch School of Medicine and Health Sciences), Stephanie Neal (Department of Electron Microscopy, Canterbury Health Laboratories), and Dr Richard B Gearry (Department of Medicine, Christchurch School of Medicine and Health Sciences) for this issue’s Medical Image.
Symbols and snakes

Symbols are the signatures of human endeavour. They are soundings of the past, statements of the present and signposts to the future. Medicine has its share of symbols. These once included the stethoscope, the white coat and the black bag; but the white coat has been shed, the black bag abandoned and technology stalks the stethoscope.

One symbol persisted – the snake-entwined staff of Asklepios, hero physician and mortal son of the Greek god Apollo, from whom he inherited his mythical healing powers. Not so long ago, this familiar emblem graced the cars of doctors. But with persistent raiding of their cars for drugs and other booty, the badge of Asklepios has also been abandoned.

Disappointed as these symbolic losses are, of further concern is the usurper in the New World – the ‘medical caduceus’, the double-serpent staff with its surmounting wings. The ‘medical caduceus’ is based on the ancient staff of Hermes, messenger of Zeus. Among other things, Hermes was the god of thieves, merchants and commerce. Mercury, Hermes’ Roman counterpart, ‘was even more closely identified with commercial pursuits and was commonly depicted carrying a purse bulging with coins’. In truth, Apollo judged Hermes to be ‘a schemer, subtle beyond belief’.

Some may argue that Hermes’ staff is an inappropriate symbol for modern medicine. But, given medicine’s current climate of corporatisation, commercialism and advertising, it may well be entirely apposite.

MJA 2003;178:529

The media and medicine

Alan Cassels and colleagues recently analysed Canadian daily-newspaper stories from the year 2000 about five new drugs – atorvastatin, celecoxib, donepezil, oseltamivir, and raloxifene – all selected for their high profile in the media. Their most startling findings are that only 32% of the articles mentioned potentially harmful effects, while benefits were discussed almost five times more often than harms. Only 32% of stories mentioned drug costs, and only 26% of stories citing a scientific study included information on the funding source for the study. After excluding industry and government spokespeople, in only 3% of cases did stories mention the potential conflicts of interest of those quoted.

For celecoxib, only 16% of Canadian newspaper articles mentioned potential harmful effects – yet the drug may be associated with an ‘increased incidence of serious adverse events’ compared with older cheaper alternatives. Similarly, when paying for celecoxib was about to cause major financial burdens for public and private health-insurers worldwide, only 13% of stories covered the drug’s cost. Cassels and colleagues conclude that their results ‘raise concerns about the completeness and quality of media reporting about new medications’.

Lancet 2003;361:2097–8
A hot potato?

A genetically modified potato developed in India to contain extra protein is under attack, with opponents claiming that it will result in the neglect of traditional sources of protein and thus exacerbate protein deficiency.

A senior Indian biotechnology official said last week that the potato, which has undergone nearly three years of field trials, could be approved for commercial cultivation before the end of this year.

The potato expresses 40% more protein than wild or cultivated potatoes. The potato has been engineered with a gene, AmA1, from the amaranth plant, a grain that has been consumed for centuries in central America and Asia.

But opponents say the potato will have little impact on human health because the absolute increase in protein is not significant. The protein content of wild potatoes is less than 2% of their weight. An increase of even 40% would raise it to a maximum of 2.8%. Pulses are the most important source of protein in the Indian diet.

BMJ 2003;326:1351
Sound health policy decisions required for prostate cancer screening

The ad hoc experiment of PSA testing continues and men with lower urinary tract symptoms are at no greater risk of prostate cancer than those without symptoms, while overdiagnosis of prostate cancer is a major problem. In a recent chemoprevention trial, 24.4% of men in the placebo group had prostate cancer diagnosed over seven years yet only 6% could expect to develop clinical disease in their lifetime. Therefore, up to 75% of men diagnosed with prostate cancer by PSA screening may never develop clinical disease. They do, however, contribute significantly to radiotherapy waiting times for all cancer patients. The complication rate from treatment is significant and the demand on urological and radiotherapy services considerable. Without evidence of a reduction in prostate cancer mortality, the evidence of harm greatly outweighs the evidence of benefit. The ethical practice of medicine, and public health medicine in particular, requires sound leadership in the development and implementation of health policy. Dr Corwin’s patient appears to be let down as much by health policy decisions as by a shortage of resources.

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References:


Fludrocortisone and chronic fatigue syndrome

In a recent study, Blockmans et al cite two trials (published in 1998 and 2001) that investigated the effects of fludrocortisone as monotherapy in the treatment of chronic fatigue syndrome (CFS). They also discuss two studies (published in 1998 and 1999) finding hydrocortisone alone to be beneficial to patients with CFS. Then, they refer to the hypothesis that a combination of hydrocortisone and fludrocortisone would be better than monotherapy for treating CFS as ‘our hypothesis’. In truth, this hypothesis is mine and was first advanced in 1996, in JAMA.

Blockmans et al also cite a paper of mine, only to dismiss my suggestion that CFS is a mild form of Addison’s disease by objecting that ‘treatment with low-dose hydrocortisone and fludrocortisone should have been beneficial’. Since this treatment, as I have recently reported, continues to be extremely effective in suppressing all my symptoms of CFS, I cannot but surmise that there is some error in Blockmans’ study.

A methodological error may be revealed by the authors’ statement that there was ‘no difference between the active compound and the placebo in appearance or taste’. The authors do not specify how they made the placebo indistinguishable from the commercial tablets of hydrocortisone and fludrocortisone. However, considering that the appearance and taste of those tablets are distinct and characteristic, it is probable that Blockmans et al rendered the placebo apparently identical to the active compound by simplistically putting them into identical capsules.

Unfortunately, as I pointed out and quoted elsewhere, the distorted effects of commercial tablets extemporaneously converted to capsules ‘could severely bias the results’ of clinical trials. On the other hand, it is obvious that the commercial form of a drug is not random, nor changeable arbitrarily, this form being the result of a rational decision based on the pharmacokinetics and pharmacodynamics of the drug. Sublingual drugs, for example, could hardly act adequately if ingested.

If Blockmans et al did hide the commercial tablets of fludrocortisone in capsules, they may have biased their results by incurring the same methodological error that led other researchers to conclude that fludrocortisone is ineffective in the treatment of CFS. By contrast, nearly half of patients treated with fludrocortisone in its normal form of tablets reported ‘complete or nearly complete resolution’ of CFS symptoms. This suggests that the tablets of fludrocortisone are to be allowed to display their typical instantaneous dissolution at the lingual level, which is impossible if they are trapped in capsules, whose delayed disintegration occurs tardily in the stomach.

Considering that CFS and Addison’s disease share 42 clinical features, including all the diagnostic criteria for CFS, and that Addison’s disease is routinely treated with hydrocortisone and fludrocortisone taken in their commercial forms of tablets, Blockmans et al also should have assessed whether patients with CFS can benefit substantially from those steroids administered in their normal, original forms.

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References:


Elizabeth Mary Aird Glennie (nee Ross)

Betty Glennie died in Cairns, Australia, on 31 March 2003. She collapsed during a social function at the home of friends and died in hospital several days later without regaining consciousness.

Born in Dunedin, the only daughter of eye, ear, nose and throat specialist Dr Ken Ross, Dr Glennie graduated MB ChB in 1942 from Aberdeen University Medical School. She had originally enrolled in Home Science at Otago University but later accompanied her elder brother Ken to Aberdeen, where their father had graduated.

She married Dr Harry Glennie in 1940 and had two sons. She worked as a GP in London during the latter part of World War II and returned to New Zealand with her sons in 1949 and commenced general practice in Ranfurly. There she married Stewart Bennison who died some years ago.

In 1951, the family moved to Christchurch and Dr Glennie worked at Sunnyside Psychiatric Hospital, and at the Department of Health from 1954 until she retired in 1987. She was made a life member of the Family Life Education Council, where she was instrumental in setting up Family Life Education in schools. She was very involved in health education and was a popular speaker. She served on the Health Camp Council and was very involved in family planning, becoming a life member of the NZ Family Planning Association.

On retirement, she moved to Brisbane to be with her son Kenneth and later moved to Cairns and her older son Henry, an ear, nose and throat specialist. In her Otago University days Betty won a tennis blue, and in later years she was an enthusiastic golfer and an accomplished bridge player.

She was a very kind, thoughtful, generous, caring person and a good listener. As a result, she was highly respected and valued for her work, help and advice. She was a wonderful friend and will be sadly missed.

She is survived by her two sons, her grandchildren and great grandchildren.

We are grateful to Margaret S Lamont for this obituary.
Alan William McArthur

Alan William McArthur died recently in Dunedin at the age of 83. He was born in Invercargill, and was educated at Winton Primary School, and Southland Boys High School where he was a member of the cricket first eleven.

He graduated from the School of Pharmacy in Wellington as a pharmacist in 1940, and spent the war years in the Medical Division of the Air Force, being amongst the last to be evacuated from Singapore. On discharge, he entered medical school, graduating in 1950. Two years as a house surgeon at Dunedin were followed by four years in general practice.

He then became a registrar in diagnostic radiology at Dunedin, training under Dr AC Begg. In 1960, he became Radiologist at Rotorua Hospital, spending three years in this position. A four-year term at Kew Hospital, Invercargill, followed this.

In 1967, he began training in radiotherapy at Wakari Hospital, qualifying despite many difficulties. During this period, he also carried out regular sessions in diagnostic radiology at Gore, Balclutha, Ranfurly and Oamaru, sometimes with visits to Clyde and Timaru. At this time he travelled at least 50 000 km a year. While at Wakiri he worked on the development of an early prototype isotope scanner with the hospital physicist, Hugh Jamieson. He became widely known and appreciated for his compassion and care of patients.

Later, he spent two years in the A&E Department at Dunedin and completed the Diploma in Clinical Pharmacology. Alan was appointed Director of the Nuclear Medicine Department. This was a fruitful period of development in the specialty and he visited overseas departments widely, introducing best modern practice to his own department.

He retired in 1985 and continued locum work in both New Zealand and Australia, travelling whenever the opportunity presented. He continued part time at both Gore and Dunedin Radiology Departments.

Alan had a passionate interest in medicine typified by his desire to help his patients. He was always ready to go the extra mile to ensure that, where necessary, his diagnostic findings were followed up by the appropriate specialty. He was a generous and gracious colleague willing at any time to help out. His ability to cope with enormous workloads was legendary. He was a great correspondent, keeping in touch regularly with his many friends. He worked until ill health made this impossible, enduring a long, terminal illness with humility. He is survived by his wife, Oi, and four children.

We are grateful to Lewis Beale for this obituary.
Magnetic resonance imaging in stroke


This book is aimed primarily at the clinician who is interested in gaining a deeper understanding of the pivotal role of MRI in stroke investigation. Although a few chapters may be quite technical for some, it is nonetheless very readable with a strong clinical and pathological thread. This is a highly collaborative effort with all but four of the 19 chapters written by two or more contributors, and a total of 44 authors drawn from the USA, UK, Europe, Australia and NZ. In some ways, reviewing this book is like reviewing a journal, with each chapter related to the preceding chapter only in the broader context. There is a degree of overlap of the concepts presented in the different chapters, as with any symposium in a developing field. With many questions about stroke still unanswered, some topics such as the utility of CT perfusion remain controversial, and this multi-author format allowed slightly differing views to be expressed by their proponents, leaving readers to make up their own minds.

The book opens with introductory chapters on the clinical need for accurate imaging, an overview of CT, MRI, SPECT (Single Photon Emission Computed Tomography) and PET (Positron Emission Tomography), descriptions of the role of CT, and an explanation of CT perfusion scanning.

The remainder of the book focuses on MRI, beginning with MRI basics, including a cook’s tour of T1- and T2-weighted images, angiography, diffusion, perfusion, and spectroscopy. Then the clinical use of MRI in stroke is discussed, including the changes of infarction for different sequences (except diffusion imaging, which is discussed later). The chapter on MR arteriography and venography includes useful discussion of MRV limitations in acute thrombosis. The controversial topic of haemorrhage detection by MRI provides another chapter, including increasing literature support for MRI stroke evaluation without CT. Then follows an informative description of animal experimental work on diffusion/perfusion mismatch, the potentially reversible ischaemic penumbra, and how this research fits into the drug development cycle for stroke.

At this point the book becomes more clinically orientated, with chapters on the use of diffusion weighted imaging (DWI) in stroke, the utility of MRI in distinguishing TIA from stroke, the value of contrast perfusion MRI in the decision to thrombolise, and the exciting new technique of arterial spin labelling perfusion scanning, which does not require contrast agent injection. This section is completed by an excellent overview of the clinical role of the newer echoplanar imaging techniques (ie, diffusion, perfusion, and spectroscopy).

The final chapters examine pertinent leading-edge stroke topics: the pathophysiology of the ischaemic penumbra; using the MR-defined ischaemic penumbra to select patients for thrombolysis; validation of MRI as a tool in stroke-drug development; MR spectroscopy of ischaemia; and functional MRI in stroke.
There are ample good-quality illustrations supporting the text, and the print quality is excellent. Throughout the book the terms ‘conventional MRI’ and ‘standard MRI’ are occasionally used, both of which excluded DWI. However, DWI has now become the norm for all new scanners, and these terms were slightly confusing. This is perhaps less a criticism of the book and more a reflection of the rapidity of change in this area.

In summary, the book succeeds in its aim of providing in-depth details about both stroke and its MRI investigation. I would recommend it for radiologists and physicians who are interested in a deeper understanding of the role and range of imaging currently available, how the underlying pathophysiology of ischaemia affects imaging and treatment, and what exciting new developments lie ahead.

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Sociology of health in New Zealand


A broad range of sociological themes in health and healthcare is canvassed in this readable text. The book is designed to support introductory courses in the sociology of health but will have wider appeal, being an accessible introduction to sociological analysis for readers from a variety of backgrounds, including clinicians. The authors aim to ‘sensitise you to this approach, and to demonstrate the strengths of a perspective that emphasises the social (rather than biological or psychological) factors that shape our experiences of health and our relationship to health services.’

Basic sociological concepts are explained in the introductory chapter, and successive chapters discuss inequalities in health, stigmatisation, sexuality, institutions of healthcare, medicalisation, death and dying, the relationships between professional groups, consumerism, mental health, the media, public health and health technology. The bibliography is a fascinating collection of New Zealand research and selected overseas literature for novices in this field, and the listing of relevant web sites is a bonus. A glossary is provided to help overcome the jargon gap.

A major strength of this book is the use of recent New Zealand material wherever possible to illustrate generic themes. However, a brief overview for students of a wide range of topics must be limited in depth, and so some complex and emotionally charged issues relevant to the working lives of health professionals have been reduced to a few generalisations. The changes in functioning and culture of healthcare institutions with the rise of managerialism, and the demoralisation of the healthcare workforce with resulting shortages, are major contemporary issues that are largely untouched. Differences of attitudes, politics and understandings within groups are sometimes moulded into painful caricatures, inviting readers to swallow them whole or cast them aside. For readers of this journal, who have experienced the diverse realities of actually working in the health sector in New Zealand over the past twenty years, this can be somewhat alienating.

Overall, this book discusses a range of interesting and important health-related issues, in a New Zealand context. The sociological approach of the discussion may offer the reader new insights and new challenges.

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