Implementation of the 2013 Psychoactive Substances Act and mental health harms from synthetic cannabinoids

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Leprosy in New Zealand
- Medical Students & informed consent
- An ageing trauma population

7-year retrospective review of quad bike injuries admitted to Starship Children’s Hospital
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Leprosy in New Zealand: an epidemiological update
Richard Yu, Paul Jarrett, David Holland, Jill Sherwood, Catherine Pikholz
This paper looks at the recent trends in cases of leprosy in New Zealand in order to raise awareness of this condition among healthcare professionals. Our data demonstrates that immigrants and their families from countries where leprosy is endemic are at highest risk of developing leprosy, consistent with the fact that leprosy is a disease of close person-to-person transmission. While New Zealand has well-developed integrated healthcare services for treating leprosy, delay to diagnosis is common. By identifying populations at highest risk, we can aim to identify cases earlier and hence treat and prevent transmission more effectively.

Implementation of the 2013 Psychoactive Substances Act and mental health harms from synthetic cannabinoids
Paul Glue, Julie Courts, Michelle MacDonald, Chris Gale, Evan Mason
The New Zealand Government created the Psychoactive Substances Act (PSA) in August 2013 in response to concerns about the safety of synthetic cannabinoids. We compared visit numbers and patient characteristics presenting to Emergency Psychiatric Services in the 3 months before and after the PSA was implemented. In the 3 months post-PSA, there was approximately 50% reduction in patient presentations, compared with the 3 months pre-PSA. Patient demographics (predominantly young males with prior contact with mental health services) and presenting symptoms (mood and psychotic symptoms and suicidality), were identical in both periods. The decrease in mental health harms, as measured by frequency of EPS contacts, appeared to be due to reduced retail availability of synthetic cannabinoids rather than reduced toxicity of available products.

GPs, community pharmacists and shifting professional boundaries
Susan Bidwell, Lee Thompson
This qualitative study aimed to gain insight into how GPs and pharmacists understand the professional role of the pharmacist and its expansion, extension and calls for increased collaboration. Both groups were generally supportive in principle of more collaborative forms of working. Extension and/or expansion of pharmacist roles were met with caution by GPs; pharmacists had mixed views about role expansion. Attempts to encourage one professional group to expand or extend their practice may be perceived as a threat by those adjacent. Mitigation strategies involve clear communication and acknowledgment that interprofessional trust takes time to establish.
Medical Students and informed consent: A consensus statement prepared by the Faculties of Medical and Health Science of the Universities of Auckland and Otago, Chief Medical Officers of District Health Boards, New Zealand Medical Students’ Association and the Medical Council of New Zealand

Warwick Bagg, John Adams, Lynley Anderson, Phillipa Malpas, Grant Pidgeon, Michael Thorn, David Tulloch, Cathy Zhong, Alan Merry

With increasing numbers of medical students and new learning centres being opened, the parties involved in preparing this statement felt that guidelines explaining the process of patient consent would be helpful for students, patients, and supervising doctors. The statement does not attempt to set standards for informed consent. Rather, it describes in a practical way how the various ethical and legal requirements of consent in New Zealand can and should be met in day-to-day clinical work. The contributing parties believe that the document will help support greater involvement of patients in student learning, which relies on an apprenticeship model under the supervision of registered healthcare professionals.

An ageing trauma population: The Auckland experience

Lindsay M. Fairfax, Li Hsee, Ian Civil

As the population ages and yet at the same time older people retain their active lifestyles, they suffer injuries at an increasing rate. Despite being generally healthy underlying conditions relating to aging are more common and as a result older patients stay in hospital longer and have a higher mortality than younger patients. Some of these trends can be reversed if specific medical input related to both the injuries and the underlying conditions can be provided in a timely way. The health system needs to do more research to quantify the extent of trauma in the elderly and the resources necessary to optimise the outcome.

7-year retrospective review of quad bike injuries admitted to Starship Children’s Hospital

Rebecca Pearce, Fiona Miles

This was a study looking at children (aged under 16 years) presenting to Starship Children’s Hospital with injuries from a quad bike incident from 2007–2014 and to review whether current guidelines are sufficient to prevent injury. Twenty-seven patients had an injury from a quad bike incident. Over half (56%) had injuries affecting more than one area of the body. Injuries were more severe in those who were younger and lighter, those needing Paediatric Intensive Care treatment and those who sustained a head injury but did not wear a helmet. This study supports current published guidelines recommending limiting the use of quad bikes by children but also recommends legislation against children under 16 years riding quad bikes to prevent further injury and death.

A new surgical site infection improvement programme for New Zealand: early progress viewpoint

Arthur J Morris, Allan L Panting, Sally A Roberts, Carl Shuker, Alan F Merry

The Health Quality & Safety Commission has instituted New Zealand’s first national Surgical Site Infection Improvement Programme designed to reduce the pain and suffering and cost involved with infections at the sites of surgical wounds. The Programme has started with hip and knee replacements as these operations are so common in New Zealand, and because the results of an infection in a joint replacement are so disastrous to patients.
EDITORIAL

Leprosy in New Zealand
Stephen T. Chambers

The article published in this edition of the Journal serves as a welcome reminder that leprosy is not only of historic interest in New Zealand, but a persisting clinical challenge. From 2004 to 2013 there were 38 cases of confirmed or probable leprosy, all of which were imported. The major countries of origin were from the Pacific region, particularly Samoa and Kiribati, although there were cases from further afield, including the Philippines, India and Ethiopia. Recent figures from WHO (2012) demonstrate that there are about 250,000 cases reported each year, and three-quarters of these are in the Asian region, with Brazil and Nigeria contributing most cases from outside Asia. Unfortunately, the number of cases has remained at about this level over the past 10 years, after a rapid decline following the widespread adoption of multidrug therapy (MDT) in 1990s. Given the changing migration patterns into New Zealand, more cases can be expected in migrants from endemic countries. The epidemiology is slowly evolving. In 1991, WHO set a goal of eliminating leprosy as a public health problem by the year 2000. The target was that there should be a prevalence of less than one per 10,000 of the global population, and individual countries were encouraged to ensure this target was met. This proved to be an achievable goal and has led to the control of leprosy by this criterion. However, the reduction in numbers has meant that specialist leprosy programmes at the public health level are not sustainable and leprosy services have, by necessity, become integrated into the mainstream health systems. This raises the conundrum of how awareness, diagnostic and therapeutic skills for leprosy can be maintained. Where skills are lost a resurgence in cases may pass unnoticed for some time, as the incubation period is commonly 3–5 years, but may be as long as 20 years, and it has an insidious clinical onset. Governments and health providers find it difficult to provide an ongoing focus on a rare disease when there are epidemics of more pressing immediate concern—such as obesity, diabetes and heart disease. This led WHO to classify leprosy as a neglected tropical disease.

In New Zealand the main clinical issues are of early recognition, and the skills to treat the severe reactions often associated with treating leprosy. The cardinal clinical features of leprosy are non-itchy hypopigmented, erythematous or infiltrative lesion, with or without neurological signs or symptoms and peripheral nerve thickening. The clinical manifestations usually begin in the indeterminate phase with a single, or a few, ill-defined hypopigmented or faintly erythematous patches that are easily overlooked. They then may develop into paucibacillary disease (up to five lesions), lepromatous disease or persist in an indeterminate form of leprosy, depending on the immunological response of the host. It can thus present as a bewildering array of non-itchy lesions, ranging from a solitary hazy macule to inflamed large patches, scores of shiny nodules, or diffuse infiltration of cooler skin areas in the face and ears. It is difficult to believe that such varied and divergent manifestations are caused by the same organism. While the first signs are usually in the skin, and invasion of the peripheral nerves follows, occasionally neural disease is the first manifestation with enlarged painful peripheral nerves that may be accompanied by weakness, loss of sensation and sweating. The diagnosis can be confirmed by identification of Mycobacterium leprae in skin biopsies, split skin smears and PCR testing.
Management of severe reactions following treatment are common and challenging. Type 1 reactions usually occur in borderline leprosy. The existing lesions show signs of acute inflammation following a change in cell-mediated immunity and nerve swelling and paralysis may suddenly develop, causing long term disability.

Erythema nodosum leprosum or type 2 reactions tend to occur late in the course of lepromatous disease and are not located within existing lesions, but elsewhere on the body. These lesions may come in crops and appear as nodules or plaques and become vesicular, pustular or gangrenous and break down. Fever and malaise are common accompaniments. Nerve damage is less common, but joint pain, iritis, iridocyclitis, tibial pain and epididymo-orchitis may develop. The cornerstone of treatment is steroid therapy but clofazimine has an important role, as it has immune-modulatory effects aside from its antileprotic effects.

Fortunately international expertise is available for consultation in difficult cases through the Pacific Leprosy Foundation, as well as other consultative services.

In Pacific countries such as Kiribati, Federated States of Micronesia, Samoa, Solomon Islands and Papua New Guinea, there are not only limited diagnostic and treatment resources but social conditions favour spread. For example, crowding is a major problem in Kiribati for example, where 100,000 people live on an area of 726 square kilometres in extremely poor housing conditions. Spread is thought to be primarily from the nasal mucosa as untreated patients can produce ten organisms daily, which persist in the air for many hours. Infection is thought to be via inhalation and entry through the nasal mucosa and possibly through abraded skin. In addition, the stigma associated with leprosy may significantly reduce job prospects, family esteem, marriage opportunities and social interactions. This restricts the willingness of patients to seek help early and increases the risk of spread.

How then should the control and eradication of leprosy be approached? The primary strategies are early case identification, contact tracing and BCG vaccination. It is essential that these measures are carried out thoroughly and that there is an effective notification of cases to public health authorities in the relevant home countries, as the risk of leprosy is eight times higher among household members, and four times higher among neighbours of a case of leprosy compared with the general population. Among the contacts, leprosy is twice as likely to occur among blood relatives as non-blood relatives. Identification of contacts offers another control strategy. A single dose of rifampicin reduces the risk of the development of leprosy among contacts by 60-70%, especially among more remote contacts. Stigma of leprosy may limit use of chemoprophylaxis among the extended contact group, but there is some evidence that index cases often welcome this for family members. Consideration needs to be given to mass prophylaxis around hot spots without disclosure of the identity of cases. This approach promises to reduce not only cases, but subsequent transmission, breaking the infection chain.

Leprosy can have dreadful consequences and the control and eradication of leprosy in the Pacific region is in everyone's interest. There will be ongoing migration from Pacific nations into New Zealand, both for short term work and for settlement. Low-lying atolls, such as Kiribati, are at risk of inundation from rising sea levels and, should this occur, there may be quite large re-settlement programmes in which New Zealand will play a significant role. We should be looking beyond the elimination of leprosy as a public health problem, to complete eradication of leprosy from the population. Resourcing of leprosy programmes in partnership with NGOs would enhance New Zealand's foreign aid programme.
REFERENCES:

1. Reference paper (JB NOTE)
Leprosy in New Zealand: an epidemiological update
Richard Yu, Paul Jarrett, David Holland, Jill Sherwood, Catherine Pikholz

ABSTRACT
AIM: To examine the current epidemiological trends of leprosy in New Zealand and raise awareness of this disease in the health professional community.
METHOD: Epidemiological data of leprosy, a notifiable disease in New Zealand, was accessed for the 10 year time period 2004 to 2013. Using an illustrative case as an introduction, all 38 case reports from the study period are summarised.
RESULTS: Most cases of leprosy in New Zealand notified during the study period are immigrants from countries with endemic leprosy, reflecting the origin of disease. Delay to diagnosis is common.
Conclusion: Leprosy remains a clinical problem in New Zealand. Cases are more likely to arise in geographical areas with higher numbers of immigrants from endemic countries.

Introduction
Leprosy, although regarded predominantly as a disease of developing countries, continues to present in New Zealand as a result of migration. Endemic regions remain in many parts of the world, including Africa, Asia, South America and parts of the Pacific.

Depending on the type of disease, the patient can present with a wide spectrum of clinical signs. In the skin these include macules, papules, plaques, diffuse infiltration (sometimes showing symmetry) and hypopigmented anaesthetic patches. Peripheral nerves may be palpable and glove and stocking anaesthesia can be present. Diagnosis is by skin biopsy and PCR detection of M. leprae DNA in tissue. Treatment consists of multidrug therapy to minimise resistance, and achieving clinical cure may take months to years.

Practitioners need to be aware and reminded of its incidence in the community, especially in high-risk areas. There is an absence of recent publications about this disease in New Zealand. An illustrative case and an analysis of the demographic trends of leprosy between 2004 and 2013 in New Zealand are reported.

Illustrative case
A 39-year-old male Pacific Islander, who had migrated to New Zealand in 2008, was referred to the dermatology clinic at Counties Manukau District Health Board with a provisional diagnosis of leprosy. He gave a history of one to two years of slowly progressive thickening of his skin. On examination of his skin he was noted to have multiple, exclusive erythematous, indurated patches and plaques (Figure 1) with leonine facies.

There were no areas of hypopigmentation or dysesthesia. He was noted to have stertorous breathing.

Figure 1. Multiple indurated patches and plaques most noticeably on the left forearm. (Hyperpigmentation is a consequence of cutaneous inflammation).
Multiple skin biopsies were taken which showed non-caseating granulomatous inflammation with numerous acid fast bacilli consistent with lepromatous leprosy (Figures 2 & 3). DNA sequence analysis performed at LabPlus, Auckland, identified the presence of *Mycobacterium leprae*.

Ethics approval for this study was granted by the Health and Ethics Disability Committee and the Counties Manukau District Health Board Research Office prior to collection of case notification information. Consent for publication of information for the illustrative case was given by the patient.

Data from case reports of leprosy are stored in the EpiSurv national surveillance database, administered by the Institute of Environmental Science and Research (ESR). All cases notified to ESR that met the case definition for confirmed or probable leprosy in the 10-year period 2004 to 2013 were included in the analysis.

Anonymised data were collated by ESR staff, with another ESR staff member checking the accuracy of the information transcription and a spreadsheet with 34 data fields was constructed. Not all fields were completed for all cases as the clinical information entered into the EpiSurv database was seldom complete. The data fields included demographic, outcome, clinical type, travel history and source information. Information was obtained by interview with case (parent or guardian if a child) by the Public Health Unit officer investigating the case after notification.

Included in this study are both ‘confirmed’ and ‘probable’ cases. A confirmed case is defined as a case with a clinically compatible syndrome that is laboratory confirmed. Such cases require demonstration of acid-fast bacilli in biopsy tissue or slit-skin smears and/or a biopsy with characteristic pathological changes. A probable case is defined as a case with a clinically compatible syndrome that lacks laboratory confirmation.

**Results**

A total of 38 of cases of confirmed or probable leprosy were notified during the decade 2004-2013. Thirty cases were notified by hospital-based practitioners, four by general practitioners, one by laboratory notification, and three through other routes.

The majority of notified cases fitted the clinical description of leprosy (33 out of 38, or 86.8%); one case did not and four were unknown. More than half of these cases were reported to be confirmed in the laboratory (22 out of 38, or 57.9%). Dividing by clinical subtypes, there were 11 lepromatous, 11 tuberculoid and eight borderline cases.

The remaining eight cases did not report a specific subtype.

Every case of leprosy notified in New Zealand in the last decade lived, during the disease incubation period, in an overseas country, except for one which was reported as ‘unknown’. The majority reported living in the Western Pacific region followed by Asian countries, in particular in South and South East Asia (Tables 1 & 2).

The reported ethnicities of cases are consistent with the county of origin (Table 3), except one patient who came to New Zealand via Papua New Guinea whose reported ethnicity was ‘European or other’. It is unknown for how long this individual had stayed in Papua New Guinea.

The majority of the reported ethnicities were Pacific, and this group, as well as people of Asian ethnicities make up all but two of all the reported cases. The six main
Pacific groups in New Zealand, as of 2006, are listed in the first six rows of Table 4. Of these, only Samoa contributed a significant number of cases. On the other hand, Kiribati provided seven cases but is not a main Pacific group in New Zealand. The most recent accessible data on leprosy in specific Pacific countries from the WHO was from 2006, which is presented at the right of the table. As can be seen, different countries have very different prevalence rates, and there is a positive correlation between high prevalence and higher case report rates in New Zealand.

The burden of disease is not equal in all parts of New Zealand on a per capita basis (Table 5). The majority of cases in New Zealand in the last 10 years were reported from the Auckland region with the South Island only reporting one case.

Contacts with similar symptoms or were known to have had leprosy treatment were identified in nine of the 38 case reports. All were family members of the index case (Table 6). Some reports identified where the family contact resided, some do not. The family contacts represent possible sources of infection, although the reports do not

Table 1. Regional geographic source of leprosy cases in New Zealand 2004 – 2013

<table>
<thead>
<tr>
<th>Source region (last inhabited region prior to arrival in NZ)</th>
<th>Number of cases (% total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Pacific region</td>
<td>30 (78.9)</td>
</tr>
<tr>
<td>South East Asia</td>
<td>4 (10.5)</td>
</tr>
<tr>
<td>Africa</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Not stated</td>
<td>3 (7.9)</td>
</tr>
</tbody>
</table>

Table 2. Country of origin of leprosy cases in New Zealand 2004-2013

<table>
<thead>
<tr>
<th>Source country (last inhabited country prior to arrival in NZ)</th>
<th>Number of cases (% total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samoa</td>
<td>14 (36.8)</td>
</tr>
<tr>
<td>Kiribati</td>
<td>7 (18.4)</td>
</tr>
<tr>
<td>Fiji</td>
<td>2 (5.3)</td>
</tr>
<tr>
<td>Samoa, American</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Cook Islands</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Philippines</td>
<td>2 (5.3)</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Timor Leste</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>India</td>
<td>2 (5.3)</td>
</tr>
<tr>
<td>Nepal</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Not stated</td>
<td>3 (7.9)</td>
</tr>
</tbody>
</table>

Table 3. Reported ethnicity of leprosy cases in New Zealand 2004 - 2013

<table>
<thead>
<tr>
<th>Ethnicity reported</th>
<th>Number of cases (% total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>12 (31.6)</td>
</tr>
<tr>
<td>Pacific</td>
<td>24 (63.2)</td>
</tr>
<tr>
<td>Middle Eastern/Latin American/African</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>European or other</td>
<td>1 (2.6)</td>
</tr>
</tbody>
</table>

Table 4. Pacific populations in New Zealand and prevalence of leprosy in home countries in 2006

<table>
<thead>
<tr>
<th>Usual resident population in NZ 2006</th>
<th>Number of cases from country in current series</th>
<th>Prevalence rate in country end 2006 (per 10,000 population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samoa</td>
<td>131103</td>
<td>14</td>
</tr>
<tr>
<td>Cook Islands</td>
<td>58008</td>
<td>1</td>
</tr>
<tr>
<td>Tonga</td>
<td>50481</td>
<td>0</td>
</tr>
<tr>
<td>Niue</td>
<td>22476</td>
<td>0</td>
</tr>
<tr>
<td>Fiji</td>
<td>9861</td>
<td>2</td>
</tr>
<tr>
<td>Tokelau</td>
<td>6822</td>
<td>0</td>
</tr>
<tr>
<td>Kiribati</td>
<td>No data</td>
<td>7</td>
</tr>
<tr>
<td>American Samoa</td>
<td>No data</td>
<td>1</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>No data</td>
<td>1</td>
</tr>
</tbody>
</table>

# The prevalence rate in Kiribati was not reported, however the number of registered cases was 26 and the number of new cases detected was 41.
^ The prevalence rate in American Samoa was not reported, however the number of registered cases was 6 and the number of new cases detected was 6.
**Table 5. Distribution of leprosy cases geographically within New Zealand**

<table>
<thead>
<tr>
<th>DHB</th>
<th>Number of cases (% total)</th>
<th>Of Asian ethnicity</th>
<th>Of Pacific ethnicity</th>
<th>Percentage of NZ population in DHB (2006)</th>
<th>Incidence rate per 100,000 per year (based on 2006 population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland region</td>
<td>23 (60.5)</td>
<td>7</td>
<td>15</td>
<td>32.8%</td>
<td>0.174</td>
</tr>
<tr>
<td>Counties Manukau</td>
<td>16 (42.1)</td>
<td>3</td>
<td>13</td>
<td>10.8%</td>
<td>0.369</td>
</tr>
<tr>
<td>Auckland</td>
<td>5 (13.2)</td>
<td>3</td>
<td>1</td>
<td>10.0%</td>
<td>0.124</td>
</tr>
<tr>
<td>Waitemata</td>
<td>2 (5.3)</td>
<td>1</td>
<td>1</td>
<td>12.0%</td>
<td>0.042</td>
</tr>
<tr>
<td>Wellington Region</td>
<td>6 (15.8)</td>
<td>2</td>
<td>4</td>
<td>11.0%</td>
<td>0.136</td>
</tr>
<tr>
<td>Capital and Coast</td>
<td>4 (10.5)</td>
<td>2</td>
<td>2</td>
<td>6.6%</td>
<td>0.150</td>
</tr>
<tr>
<td>Hutt Valley</td>
<td>2 (5.3)</td>
<td>-</td>
<td>2</td>
<td>3.4%</td>
<td>0.147</td>
</tr>
<tr>
<td>Rest of North Island</td>
<td>8 (21.1)</td>
<td>3</td>
<td>5</td>
<td>32.3%</td>
<td>0.062</td>
</tr>
<tr>
<td>MidCentral</td>
<td>3 (7.9)</td>
<td>-</td>
<td>3</td>
<td>3.9%</td>
<td>0.189</td>
</tr>
<tr>
<td>Waikato</td>
<td>2 (5.3)</td>
<td>2</td>
<td>-</td>
<td>8.4%</td>
<td>0.059</td>
</tr>
<tr>
<td>Hawke's Bay</td>
<td>2 (5.3)</td>
<td>-</td>
<td>2</td>
<td>3.7%</td>
<td>0.135</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>1 (2.6)</td>
<td>1</td>
<td>-</td>
<td>4.8%</td>
<td>0.051</td>
</tr>
<tr>
<td>South Island</td>
<td>1 (2.6)</td>
<td>0</td>
<td>0</td>
<td>24.0%</td>
<td>0.010</td>
</tr>
<tr>
<td>Canterbury</td>
<td>1 (2.6)</td>
<td>-</td>
<td>-</td>
<td>11.6%</td>
<td>0.021</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>12</td>
<td>24</td>
<td>100%</td>
<td>0.094</td>
</tr>
</tbody>
</table>

Note: DHBs which are not listed in the table did not report any leprosy cases between 2004 and 2013.

**Table 6. Family contact of leprosy infection for nine reported cases**

<table>
<thead>
<tr>
<th>Infection status of reported case</th>
<th>Summary comment on family contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmed</td>
<td>“Family history” in Samoa</td>
</tr>
<tr>
<td>Confirmed</td>
<td>Grandfather and sisters in Kiribati</td>
</tr>
<tr>
<td>Confirmed</td>
<td>Grandfather in Fiji</td>
</tr>
<tr>
<td>Confirmed</td>
<td>Grandfather in Nepal</td>
</tr>
<tr>
<td>Confirmed</td>
<td>Father</td>
</tr>
<tr>
<td>Confirmed</td>
<td>Uncle and Aunt in Kiribati</td>
</tr>
<tr>
<td>Probable</td>
<td>Sister or other household member</td>
</tr>
<tr>
<td>Probable</td>
<td>Cousin</td>
</tr>
<tr>
<td>Probable</td>
<td>Mother</td>
</tr>
</tbody>
</table>

**Table 7. Age of cases at time of reporting**

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Number of cases (% total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-14</td>
<td>5 (13.2)</td>
</tr>
<tr>
<td>15-24</td>
<td>8 (21.1)</td>
</tr>
<tr>
<td>25-34</td>
<td>8 (21.1)</td>
</tr>
<tr>
<td>35-44</td>
<td>10 (26.3)</td>
</tr>
<tr>
<td>45-54</td>
<td>4 (10.5)</td>
</tr>
<tr>
<td>55-64</td>
<td>2 (5.3)</td>
</tr>
<tr>
<td>65+</td>
<td>1 (2.6)</td>
</tr>
</tbody>
</table>

**Table 8. Time from symptom onset to reporting of disease**

<table>
<thead>
<tr>
<th>Time from symptom onset to notification to Public Health (months)</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>1</td>
</tr>
<tr>
<td>1-6</td>
<td>5</td>
</tr>
<tr>
<td>6-12</td>
<td>3</td>
</tr>
<tr>
<td>12-24</td>
<td>3</td>
</tr>
<tr>
<td>24-60</td>
<td>3</td>
</tr>
<tr>
<td>&gt;60</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: The time difference for the 4 cases that had a delay in notification of more than 60 months was 65, 76, 76 and 201 months respectively.
state if the family member had developed the disease before the reported case, and if so, what the disease onset time difference was between the two.

The only cluster of cases reported to ESR was a family cluster in 2013. All three children (two confirmed and one probable case) had moved to New Zealand from a Pacific country with endemic disease and had been exposed to a grandfather who had apparently been diagnosed with leprosy in the past and quarantined on an island in Fiji. It was noted in the outbreak report that it was possible there had been spread between the three siblings, but it seemed more likely they had all been infected prior to their arrival in New Zealand (2010 for two, and 2011 for the other).

The age distribution of cases at time of report is described in Table 7. The 35 to 44 age group represents the single largest group of patients at time of reporting with 10 (26.3%) cases. A total of 21 (55.3%) cases were reported in individuals under the age of 35.

Nineteen of the total 38 cases had both a date of notification and a date of onset of disease, as self-recalled by the patient (hence approximate only in most cases). There was a wide variation between cases with respect to the delay from disease onset to report to public health (Table 8). Of these 19 cases, 11 also had a reported date of arrival in New Zealand. There was an even split of cases in this subgroup who had pre-existing leprosy on arrival in New Zealand (five cases) and who were already in New Zealand when symptoms developed (six cases). For the five patients who already had symptoms on arrival in New Zealand, the delay to notification was less than one, three, four, 17 and 23 months respectively. Altogether the time from disease onset in New Zealand or arrival in New Zealand with features of leprosy to notification to public health varied from less than one month to 201 months. Median time to diagnosis within New Zealand was 11 months for the 11 cases who had all three dates (date of notification, of onset of disease and of arrival in New Zealand) recorded.

**Discussion**

The early history of leprosy in New Zealand remains unclear. While some sources claimed that it was present among the Māori population prior to European colonisation, subsequent research has cast doubt upon the actual diagnosis as it appears that the doctors who identified these possible cases were not experienced at differentiating leprosy from other disorders with similar cutaneous signs. In the first decade of the 20th century, the Chief Health Officer and Minister of Health were able to confirm only a few cases from among many alleged (in the first instance two out of 40–50 cases, and in the second, three out of 30) cases. Up to the 1980s between five and 10 new cases of leprosy were reported to the Health Department each year. While the incidence rate of leprosy appears to have decreased since the 1980s, when data was last available, it is still rarely but regularly notified in New Zealand every year, as shown by this study.

In 1980 it was noted that, of the 89 leprosy patients in the preceding three decades, nearly all came from overseas. The same demographic pattern was reported by Cornwall et al. with the majority from the Pacific Islands, and minority from Asia. This review confirms that the countries of origin and the patient demographics of leprosy in New Zealand remain much the same. The falling incidence of new leprosy cases in New Zealand therefore does not come as a surprise in the context of better global treatment and reducing disease burden. Nevertheless, significant leprosy disease burden remains in many parts of the world, including many Asian and Pacific Island countries (4,596 new cases from the Western Pacific Region, and 126,913 new cases from India alone, reported to the WHO in 2013). As long as these sources of infection remain, New Zealand will have a continuing incidence of new leprosy cases.

The geographic locations of patients with leprosy in New Zealand reflect the mainly urban residence of the index migrant populations. For example, 68% of peoples of Pacific origin in 2006 who had been living overseas five years prior were living in the Auckland Region, and the Wellington Region received 12% of the same group. This distribution is almost exactly reflected by the distribution of new leprosy cases in different regions of New Zealand. Doctors working in these areas need to be aware...
of the greater likelihood of leprosy in these communities. It is of concern that there is frequently a considerable delay between onset of symptoms and notification of disease to public health authorities, even after arrival in New Zealand for those who have pre-existing symptoms on recall. Leprosy is slowly progressive so patients may be unaware of change over a long time period. The clinical signs may be subtle or excessive and the diagnosis can be easily missed if leprosy is not considered in the differential diagnosis.

New Zealand has an effective and comprehensive public health service and leprosy has well-established treatment options and is not highly infectious. Leprosy is a notifiable disease and effective management involves close collaboration between dermatologists, infectious diseases physicians, public health services, general practitioners and the laboratory. Patients diagnosed with leprosy may face profound stigmatisation in their community and be reluctant to accept the diagnosis. In addition, treatment needs to be continued for many months, sometimes years, and requires close supervision. Patients are regularly visited by public health nurses to provide support, education and to aid compliance with the treatment regimen.

Although leprosy is a disease of relatively low incidence in New Zealand communities, health practitioners need to remain alert to its diagnostic possibility, especially in high-risk communities in higher risk areas.

Competing interests: Nil

Further Reading:

Acknowledgements:
The authors acknowledge the assistance of staff at the Institute of Environmental Science & Research who helped to extract and collate data from EpiSurv case report forms.

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REFERENCES:
Implementation of the 2013 Psychoactive Substances Act and mental health harms from synthetic cannabinoids

Paul Glue, Julie Courts, Michelle MacDonald, Chris Gale, Evan Mason

ABSTRACT

AIMS: Use of synthetic cannabinoids is associated with a range of mental health harms. The 2013 Psychoactive Substances Act (PSA) was intended to limit retail availability of synthetic cannabinoids which had acceptable safety profiles. We evaluated numbers and clinical characteristics of patients presenting with mental health harms associated with use of synthetic cannabinoids for three months before and after implementation of the PSA on 18 July 2013.

METHODS: Retrospective audit of case notes of patients presenting to an emergency psychiatric service (EPS) in Dunedin.

RESULTS: In the three months post-PSA, there was a 42% reduction in EPS contacts and 52% reduction in patient presentations, compared with the three months pre-PSA. Patient demographics (predominantly young males with prior contact with mental health services), presenting symptoms (mood and psychotic symptoms and suicidality), and management and disposition were identical in both periods.

CONCLUSIONS: The decrease in mental health harms, as measured by frequency of EPS contacts, appeared to be due to reduced retail availability of synthetic cannabinoids rather than reduced toxicity of available products.

Introduction

Synthetic cannabinoids have been available in New Zealand since the mid-2000s and appear to have become progressively more widely used over time. Concerns about safety of certain of these (eg products containing JWH018) were initially raised by the New Zealand Ministry of Health in 2009. Between 2010 and 2013, there appeared to be a marked increase in frequency and severity of mental health harms reported from acute inpatient and forensic mental health settings associated with use of synthetic cannabinoids; 2-4 specifically, development or worsening of mood, psychotic or other behavioural symptoms. In mid-2013 the New Zealand Government announced the Psychoactive Substances Act (PSA) to regulate substances including synthetic cannabinoids.5 This legislation included the establishment of the Psychoactive Substances Regulatory Authority within Medsafe. Along with psychoactive products needing to meet adequate safety requirements, Medsafe restricted the sale of synthetic cannabinoids to 50 shops nationally, with entry restricted to 18 years or older, and with packaging less appealing to young people. Approximately one third of the synthetic cannabinoid products that had been available were not approved for sale or had approval revoked (PSA sections 39 and 40).6 Prior to this legislation, synthetic cannabinoids were widely available from dairies and from internet-based vendors, and did not have explicit age restrictions on sales.

Following implementation of the PSA, we saw reduced numbers of presentations to mental health services. To quantify this..
further we carried out a retrospective audit of case notes of patients presenting to an Emergency Psychiatric Service (EPS) associated with use of synthetic cannabinoids for the three months before and after implementation of the Psychoactive Substances Act on 18 July 2013.

**Methods**

This was a retrospective audit of clinical file data of patients evaluated at Dunedin's EPS whose presentations were associated with the effects of synthetic cannabinoids. Data were collected three months prior to and three months post the implementation of the PSA. At EPS, patients were routinely questioned about their use of substances, including synthetic cannabinoids, at time of assessment. The case files of those who reported synthetic cannabis use were reviewed. The following data were obtained: total number of EPS contacts related to synthetic cannabinoid use, total number of patients attending EPS, number of repeat presentations, demographics (age, gender), presenting symptoms, previous contact with mental health services, and management. Data were evaluated using summary statistics (means, SDs, counts and percentages).

**Results**

In the three months prior to implementation of the PSA there were 50 EPS assessments from 42 patients associated with use of synthetic cannabinoids. In the three months post-PSA there were 26 assessments from 20 patients (reductions of 48% and 52%, respectively). Seven patients had more than one assessment (range 2-7) over the total six-month period. There were no differences in patient demographics.

---

**Table 1: Demographic and clinical features of EPS attendees, three months prior to and three months post-implementation of the Psychoactive Substances Act (PSA)**

<table>
<thead>
<tr>
<th></th>
<th>Three months before PSA</th>
<th>Three months after PSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of EPS assessments</td>
<td>50</td>
<td>26</td>
</tr>
<tr>
<td>Number of pts presenting</td>
<td>42</td>
<td>20</td>
</tr>
<tr>
<td>Gender ratio (M/F)</td>
<td>31/11</td>
<td>15/5</td>
</tr>
<tr>
<td>Age (mean (SD); range)</td>
<td>26.6 (8.9); 16-48</td>
<td>27.4 (11.0); 15-56</td>
</tr>
<tr>
<td>Prior mental health service contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Substance use disorder</td>
<td>19%</td>
<td>25%</td>
</tr>
<tr>
<td>• Psychotic disorder</td>
<td>17%</td>
<td>10%</td>
</tr>
<tr>
<td>• Depressive disorder</td>
<td>19%</td>
<td>5%</td>
</tr>
<tr>
<td>• Anxiety disorder</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>• ADHD</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Most common presenting symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Depressed</td>
<td>67%</td>
<td>70%</td>
</tr>
<tr>
<td>• Anxious</td>
<td>67%</td>
<td>80%</td>
</tr>
<tr>
<td>• Agitated</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>• Aggressive</td>
<td>43%</td>
<td>60%</td>
</tr>
<tr>
<td>Suicidal thoughts/behaviour</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>65%</td>
</tr>
<tr>
<td>Psychotic symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Paranoid</td>
<td>31%</td>
<td>20%</td>
</tr>
<tr>
<td>• Disorganised</td>
<td>36%</td>
<td>40%</td>
</tr>
<tr>
<td>Disposition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sent home</td>
<td>58%</td>
<td>58%</td>
</tr>
<tr>
<td>Psychiatric hospital admission</td>
<td>26%</td>
<td>23%</td>
</tr>
<tr>
<td>ED (medical review)</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>Police</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>Medication prescribed (AP: anti-psychotic; BDZ: benzodiazepine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44%</td>
<td>46%</td>
</tr>
<tr>
<td></td>
<td>30% APs, 16% BDZs</td>
<td>38% APs, 8% BDZs</td>
</tr>
</tbody>
</table>
pre- and post-PSA, comprising mainly young males (Table 1). Over 75% of patients had had prior contact with mental health services for a range of disorders (Table 1).

During EPS assessment, reported or observed symptoms included affective changes (depression, anxiety, agitation, aggression), intense suicidal thinking and/or behaviour, and in about a third of attenders, psychotic symptoms (paranoia, disorganisation; Table 1). The frequency of these signs/symptoms was similar pre- and post-PSA.

Post-assessment disposition was similar pre- and post-PSA, with over half of the patients going home, and one quarter requiring psychiatric hospital admission. Medications were used in almost half of the patients for symptom management and were mainly antipsychotics, in particular low dose quetiapine, with a smaller number treated with benzodiazepines. A small number of patients required Emergency Department medical review or police involvement.

Discussion

Prior to the 2013 PSA, sale of synthetic cannabinoids was widespread. Following its implementation, the number of products available was restricted; sales were restricted to 50 shops nationally, with age-restricted entry, and with packaging less appealing to youth. Available products also had to meet certain safety requirements. The key finding from this audit is that post-PSA there was a ~50% reduction in the number of EPS assessments associated with use of synthetic cannabinoids. Implementation of the PSA had no effect on the demographics of patients attending EPS after use of synthetic cannabinoids (mainly young males with prior mental health service contact), their presenting symptoms, or their management.

There could be two explanations for the reduction in observed number of EPS assessments: (i) that the fewer products available post-PSA were less toxic than those available pre-PSA; or (ii) that this reflected reduced consumption because of reduced availability of synthetic cannabinoids. We believe the first explanation is unlikely, as patients had identical clinical presentations pre- and post-PSA. The second explanation appears to be more plausible, and fits with a body of literature showing a relationship between substance availability and frequency of substance-related harms, as a function of increased or decreased consumption. For example, alcohol-related harms are associated with density of alcohol outlets, and frequency of harms can be altered by altering their density (reviewed in Campbell, et al).7 A similar association has been seen with density of tobacco outlets and rates of smoking in adolescents (reviewed in Pacula, et al).8 The present study appears to show the same relationship for synthetic cannabinoids, with reduced availability post-PSA leading to reduced frequency of EPS presentations with drug-related harms.

The majority of patients attending EPS with harms from use of synthetic cannabinoids were young males, with a prior history of contact with mental health services. The age and gender characteristics are identical to the patients we described in early 2013, who required hospital admission after use of synthetic cannabinoids.4 Although legal highs are marketed to a youth demographic, those with pre-existing mental health problems may be particularly vulnerable to mental health harms from use of these substances.

These data provide a basis for calculating changes in District Health Board (DHB) costs associated with reduced clinical contact post-implementation of the PSA. The DHB charges out inpatient ward care at $1243/day, with an average stay after use of synthetic cannabinoids of 8.5 days.4 EPS and ED assessments are costed at $593 and $1547/visit, respectively. Based on these costs and the reduced clinical contacts (Table 1), the reduction in DHB costs was $87,000 over the three months post-PSA. If translated to a national population, this would represent cost savings of ~$3.1 million over the same time period. Pre-PSA, we estimate that the yearly national direct costs of synthetic cannabinoid use were ~$25 million.

The potential shortcomings of this audit should be acknowledged. This was a retrospective audit. Use of synthetic cannabinoids was established by self-report, and thus its role in EPS evaluations could be an
underestimate. Symptoms at presentation were based on clinical interviews and not by structured interviews. We did not obtain blood or urine samples to establish what cannabinoids had been ingested, and we could also not objectively quantify the amount or duration of synthetic cannabinoid use, which might also influence clinical presentation. Our cost-saving assumptions for Dunedin may not be broadly applicable nationally.

In conclusion, this retrospective audit has found that the number of EPS assessments for mental health harms associated with use of synthetic cannabinoids halved after implementation of the PSA. We suggest that this was associated with reduced availability of synthetic cannabinoids, rather than that the available products were less toxic. The sale of synthetic cannabinoids is now prohibited following passage of the Psychoactive Substances Amendment Bill in May 2014. Although there may little political or regulatory interest in resurrecting the PSA, two recent articles have reviewed approaches that might influence or reduce the potential for harms, if new psychoactive substances were to be introduced into New Zealand.8,11

Competing interests:
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REFERENCES:
GPs, community pharmacists and shifting professional boundaries

Susan Bidwell, Lee Thompson

ABSTRACT

AIMS: In the context of expectations regarding role evolution, including increased interprofessional working, this study aimed to gain insight into how GPs and pharmacists understood the professional role of the pharmacist and its expansion, extension and calls for increased collaboration.

METHODS: Qualitative interviews with 16 GPs and 17 pharmacists were conducted in the Canterbury region. Data were analysed using descriptive thematic analysis.

RESULTS: Both groups were generally supportive in principle of more collaborative forms of working. GPs seemed more comfortable with collaboration that involved pharmacists being under the umbrella of the general practice. Pharmacists welcomed greater meaningful collaboration with general practice. Pharmacists did not express any particular view about what types of collaboration they preferred. They did discuss tensions resulting from the need to contact doctors over minor prescribing errors.

Extension and/or expansion of pharmacist roles were met with caution by GPs, although there was greater acceptance of medicines management. Pharmacists had mixed views about role expansion. Most were keen on role extension, particularly in relation to medicines management.

CONCLUSIONS: Attempts to encourage one professional group to expand or extend their practice may be perceived as a threat by those adjacent. Mitigation strategies involve clear communication and acknowledgment that interprofessional trust takes time to establish.

Introduction

Interprofessional working, integration between agencies, disciplines and teams, and an environment in which health professionals are working at the top of their scopes of practice are key themes in New Zealand as the health system grapples with the challenge of rising health services demand in a context of resource constraints.1

Greater collaboration between general practitioners (GPs) and community pharmacists to better use the skills of the latter in caring for those on multiple medications has been seen as one partial solution to addressing the problem. The aim is to foster greater compliance, reduce wastage, and manage health conditions better both from the point of view of the patients and the health system as a whole.

Pharmacists are highly qualified health professionals, but now that nearly all medicines are mass produced and pre-packaged they have been described as “overtrained for what they do and under-employed in relation to what they know”.2

A number of countries have implemented initiatives to encourage greater collaboration between GPs and pharmacists in the care of patients.2-8 In essence this involves the pharmacist taking an extended and enhanced role in providing advice and monitoring patients where this is deemed appropriate by the pharmacist and relevant GP. National structural reforms have taken place in Britain that emphasise the role pharmacy can play in improving the health of people with long-term conditions.9 Pilot projects encouraging extended roles for pharmacists in collaboration with GPs were instituted by the
Department of Health in 1997 and supplementary prescribing by pharmacists from 2003. Successful collaboration between primary care practitioners and pharmacists, particularly for patients with diabetes, has also been reported in Canada, Australia, and the United States.

Changes to community pharmacy in New Zealand are broadly similar to those introduced elsewhere. They emphasise the need for close collaboration between GPs and pharmacists in a team approach to the monitoring and management of patients on multiple medicines. Role evolution in community pharmacy has involved many pharmacists becoming qualified to offer Medicines Management Services (MMS) (formerly Medicines Use Reviews). Other services such as INR (international normalised ratio, designed to measure the clotting tendency of the blood in order to assess an appropriate anti-coagulant dosage), testing, influenza vaccinations, and blood pressure and blood glucose monitoring by pharmacists have also been introduced in some places, with pharmacists still maintaining the traditional dispensing, advice, and retail functions.

In Canterbury, particularly, changes have been given extra impetus as a result of the Christchurch earthquakes of 2010 and 2011 which resulted in more strain being placed on health services of all types, but a specific need to keep people out of hospital due to reduced bed capacity. Extended MMS were expanded rapidly, initially using mobile pharmacists and in-home visits, to allow earlier discharge of patients from hospital. Canterbury also saw the first introduction in New Zealand of an electronic shared care record accessible by GPs, pharmacists, and community nursing services to support greater continuity of care for patients who relocated either temporarily or permanently.

In July 2012 a new funding model, The Pharmacy Services Agreement, was signed between community pharmacists and District Health Boards, changing the existing model which had operated for more than 60 years. Consistent with the above shift in philosophy, the new model was designed to encourage patient-centeredness and integration between prescribers and pharmacists, to incentivise pharmacists to better use their medicines management skills and to attempt to limit pharmacy dispensing costs. It is important to note that the funding model changes and the introduction of extended services have not been interdependent. Many pharmacies had already implemented some or all of the extended services and were carrying out in-home MMS well before the funding model changes.

While, at a political level, it may seem straightforward and even common-sense to argue that a range of practitioners should be working collaboratively and that they should be working at the top of their respective scopes of practice, how this is operationalised is less clear-cut. Not the least of the complexity surrounding this issue is the respective groups’ differential positioning within the healthcare arena, both in terms of power and employment structure.

The very need to argue that all professionals should be working at the top of their scopes of practice implies that some degree of role change is needed. Any discussion of role change raises questions about potential conflict between different groups of professionals. While Adams is at pains to point out that it should not be assumed that interprofessional conflict will occur, she does argue that jurisdictional conflict is more likely when “occupational groups are less evenly matched in terms of power, status, and organisation”. Interprofessionally, in this regard, issues arise around, for example, the perception that pharmacists are ‘shopkeepers’ with conflicts between their health care and business roles. This was identified by general practitioners in the UK as being a key reason they did not support the extension of prescribing rights and other extended services to pharmacists. Fears about conflicts of interest, particularly as this related to dispensing self-written prescriptions, was raised by some of those concerned about the extension of prescribing to some pharmacists in the New Zealand context.

Corporate involvement is evident in the financial interest that companies, such as Green Cross Health, have in some general practices and pharmacies, but community pharmacists and GPs in New Zealand work predominantly under a privately owned,
small business model. In both cases, the government provides co-funding alongside direct payments made by patients.

In the context of potential for unproductive tension, the objective of the study reported here was to gain an insight into how GPs and pharmacists understood the professional role of the pharmacist and its current expansion, and their views of the emphasis on increased collaboration and integration.

Methods

Approval was granted for the study by the University of Otago Human Ethics Committee. A qualitative approach was chosen as the most appropriate method to gain in-depth data addressing the areas of interest. We chose to use semi-structured interviews as they work well with an inductive approach when new and unknown information is being sought. They also make use of the flexibility of the qualitative research process as understandings that are developed early on, can then be carried forward into subsequent interviews, thus drawing out more detail as new issues come to light.22 A purposive sampling strategy was used to select a range of interviewees, acknowledging such factors as age, gender and ethnicity; geographical location; socio-economic area served; and full and part-time workers. Sixteen GPs and 17 pharmacists in the Canterbury region participated, most being interviewed individually; however a flexible approach was taken where time commitments made a joint interview more practical. The interviews took place between March and November 2012 and all participants received a $30 petrol voucher in recognition of their participation.

Interviews explored past and current interprofessional relationships between GPs and pharmacists, as well as their respective views on current and proposed changes related to pharmacy, and the emphasis on increased collaboration between the two disciplines. All interviews were recorded and transcribed verbatim. The data were coded and then analysed using a systematic iterative thematic approach to identify recurring patterns, following the method described by Pope and Mays and others.23,28 We were satisfied that we had attained ‘data saturation’ across the 16 GP and 17 pharmacist interviews.24 Data saturation occurs when no new themes are evident in the data. This can occur between 6-12 in-depth interviews depending upon sample homogeneity.24 The core theme discussed in this paper is to do with interprofessional understanding and the challenges of role change. Transcript data used in the following section are illustrative of the points being made and represent common points of view.

Results

Interprofessional understanding and the challenges of role change

Most GPs reported that they currently enjoyed cordial, even if not close, relationships with pharmacists and had developed smooth working arrangements. Some said they appreciated being contacted by pharmacists about potential interactions or safety issues and relied on pharmacists to be a back-stop for them in identifying inadvertent errors that came about through the drop-down menus in their prescribing software for example. Pharmacists were also highly valued in formulating medicines for patients who could not or would not take tablets and providing up-to-date advice on new medicines:

... pharmacology has just got so complicated that a good pharmacist is worth his weight in gold in peer support (GP)

Pharmacists reported a more complicated relationship with GPs. While most of them had built up a good rapport with the GPs whose prescriptions they most often dispensed, they treated the relationship cautiously and seldom appeared to feel on an equal professional footing. They particularly disliked their role in policing the regulations around prescriptions whereby they were required to check up on minor errors caused by the way the GP prescribing software was set up (for example, if the GP inadvertently selected 90 tubes instead of 90 tablets from the drop down menu). Pharmacists were very conscious that they risked annoying GPs by contacting them over small details and yet they were not legally able to make the change themselves:

... the interaction between a phar-
macist and a general practitioner would usually be on a problem basis with a piece of paper, which is not something that excites general practitioners. They really cannot understand why community pharmacists follow these up and there is a real professional disconnect between the pharmacist being able to convey why it’s an issue for them and the general practitioner understanding why they need to do something about it. (Pharmacist)

This situation was reported to create a great deal of frustrating and unproductive work for pharmacists. Where there was a long-standing and more personal relationship between a particular pharmacist and GP practice it appeared that an efficient arrangement had been worked out to minimise the burden on both, as both GPs and pharmacists dealt with many different pharmacies and practices. However, this was not possible in all cases. Moreover, any change in staff, either in the pharmacy or the practice, could mean that relationships had to be developed anew.

When looking ahead, most GPs had some positive comments about how relations between the two professions might change and develop. They recognised the expertise that pharmacists had and most welcomed the current approach that focused on a greater role for pharmacists in providing advice, particularly on medicines, to patients. Many were highly supportive of pharmacists’ efforts to encourage compliance and see that patients used their medicines properly. Some would have liked to have a pharmacist working within their practice:

> I would like to employ a pharmacist to be a clinical pharmacist – two or three tenths of the time, seeing patients and going over their medication with them. There is community medicines management which is pretty good, but it could be even better if it was in that role. (GP)

Many pharmacists commented that advising doctors about medicines should be a core part of their role, but their ability to do this was limited by time constraints:

> There’s a lot more scope for pharmacists to be involved in helping GPs manage their patients, in particular certain types of patients as well, in terms of reviewing medications that they’re on. Things that GPs just don’t get time to do. (Pharmacist)

GPs were considerably more divided about the increasing role of pharmacists in a range of areas, and for some this also included reviewing medicines through MMS encounters. Some were unreservedly enthusiastic, finding it saved time for them and benefitted their patient:

> I must say it’s been really excellent. ... my context is a largely immigrant population where English is a second language so the time and understanding required to explain the roles of the medications, their side effects, possible interactions, what to watch out for, what their roles are – we can’t generate that time for each patient. Forty-five minutes with three monthly follow up, so brilliant, brilliant idea. (GP)

Others were neutral though unconvinced they were either necessary or valuable, and a few GPs were directly negative, seeing the involvement of the pharmacist in managing their patients as an intrusion into the GP’s core role. Pharmacists, although they welcomed the opportunity to take an increasing part in medicines management were also keenly aware of GP sensitivities:

> You’re stepping into a more clinical report and we have to ... try and straddle that without stepping on too many toes. The service is still very new and there are some GPs that are very welcoming of the service and there are some that appear to be feeling threatened by it or haven’t perhaps have got as good a working relationship with the pharmacies and so they, for whatever reason, are not as open to receiving feedback. (Pharmacist)

One of the primary factors causing unease among GPs appeared to be that the MMS service could be initiated by the hospital discharge team, the pharmacist or the patient themselves without the GP’s involvement. The GP may then be unaware
that the review was happening until they received the results. This made some concerned that, not only had they been uninvolved, but rather than encouraging integrated care, it was more likely to risk disrupting continuity of care. GPs could themselves initiate the MMS process but it appeared that only a few had done so.

This concern of GPs about fragmentation of care was even more pronounced in relation to other expansions of pharmacy into services such as INR testing, and providing influenza vaccines, although for some GPs, anything that increased influenza immunisation coverage was seen positively. There was a strong feeling that such functions were better to be kept within the medical centre, which had traditionally always provided these services. Even those who were the most positive about it would prefer the pharmacist to be within their team:

*The pharmacist should be as part of the team in this centre and not just randomly doing it because they don't have all the information potentially of what's going on with them (the patient). (GP)*

Additionally, some GPs noted that they felt unfairly excluded from accessing the funding that had been made available to pharmacies to provide INR monitoring. Most of the GP participants were also aware that pharmacist prescribing may become a reality. All of them had reservations. Most were opposed; a few believed it may have some place in very limited circumstances. Fragmentation of care and the likelihood of deteriorating conditions being missed were the prime concerns cited:

*I can't be completely opposed because it's going to happen. But I want to make sure that we don't have people with significant illnesses missed and that doctors are allowed to keep a close eye on their elderly patients and not be seen as – oh, you don't really need to see us because the pharmacist can do it. And it's cheaper sort of thing. (GP)*

Some pharmacists expressed concern about new opportunities for providing extra services that required time away training, extra costs, and logistical implications about space within the pharmacy. Only a few were interested in providing vaccines and while there were some interviewees who were keen to do or who were already engaged in continuing education to become pharmacist prescribers, they did not see this as a core part of their professional roles:

*We're not doctors and whilst we can interpret things I think a lot of that should be left to doctors. ... basically managing people's medicine, I think is far more important than being able to prescribe. I think, do that, and do it well and prescribing on the more basic things. (Pharmacist)*

**Discussion**

Overall, there was considerable enthusiasm among some GPs and most of the pharmacists for more integration and collaborative working that went beyond interactions focused around problems with prescriptions. A few GPs were noticeably unenthusiastic about the need for or the benefit of closer relationships. As well as this, some members of both professional groups raised concerns about where the limits of their professional jurisdiction lay. GPs tended to be supportive of pharmacist involvement in the management of patients who were taking multiple medications. There was much more limited support for other non-medicines related services, including among pharmacists themselves. In contrast to the international literature, this limited support did not seem to reflect GP concerns about conflict between the dual retail and healthcare functions carried out by pharmacists. Many pharmacists were reluctant to explore areas outside their traditional scope of practice and invest considerable financial and personnel resources for an uncertain return. All participants, even those most positive about collaboration, shared the range of concerns about the uncertain impact of the developments in pharmacy on workload, reimbursement and professional boundaries. Concerns appeared to have been further exacerbated by the apparent lack of a coherent and integrated communication strategy to promote the various changes to both professions. This latter point was commented on by almost all participants.
These concerns are consistent with those expressed in other countries that have undergone the same sort of changes, and even in Britain where the changes are now relatively well established, sensitive issues with professional boundaries are still being reported.25,28,29 It does appear, however, that as the changes bed in they are likely to become more accepted. In Australia where the Home Medicines Reviews (equivalent to MMS in New Zealand) have been in place for some years, for example, they have been reported to be successful in engaging GPs and pharmacists and resolving most medication-related problems.30

Our data reveal some of the tensions that arise as different groups of professionals interact. These tensions are not inevitably negative and/or destructive but may be productive and result in new and improved ways of working.19 In the meantime, both professional groups are feeling their way through existing and new tensions. It is in the context of existing tensions that the new ones need to be negotiated. This was consistent with the mixed experience in Britain where interprofessional working was found to be “...a piecemeal process,”25 that had relied on goodwill and trust-based relationships that needed to be built up over time. As with this study, others have also noted collaboration tended to be person-dependent and could fade away if a key pharmacist or GP left their position.25 The greatest acceptance and support for collaboration in Britain has been in situations where a pharmacist has been fully integrated into the healthcare team and available for consultation by the GPs or assistance to patients as required.26,27

Although the employment models for GPs and pharmacists in New Zealand are different from those in the UK, some participants in this study also believed that this type of arrangement was the ideal solution. There are emerging examples of co-location and pharmacists being integrated into existing practice teams on a part-time basis.

A strength of this study was the opportunity to build on previous work in New Zealand and gather perceptions from both GPs and pharmacists at a unique time of change in the relationship between them. The study was of a small number of GPs and pharmacists in a limited area of New Zealand, so does not claim to be generalisable more broadly. The study was conducted relatively close to the earthquake sequence in Canterbury. It is difficult to tell how this may or may not have impacted on our findings. The findings are, however, consistent with reports in the international literature and the insights they provide may give direction to where and how future intervention might be focused to support the positive aspects of interprofessional relationships and avoid further undermining those areas that are relatively tense.

Conclusion

This study was able to provide a new contribution to the field by gaining an insight into the perceptions of both GPs and community pharmacists at a critical point in the relationship between the two professions. In a context of ageing populations, increasing rates of chronic disease and constraints on health funding, it was clear that there was broad overall acceptance of the increased contribution that community pharmacists can offer via role, evolution and increased collaboration and integration between community pharmacy and primary care. Some GPs and pharmacists in Canterbury are already developing more collaborative, if not yet fully integrated, working environments. Realising the full potential benefit appears to be some way off while the attitudinal and practical barriers remain for both professions, reinforced by regulations that add to workload and hinder relationship building, an apparently inadequate approach to communicating the changes, and a high level of uncertainty as to what the long-term implications of the changes will be. Even those most negative about the changes appeared to realise that change was being driven by the wider health system and they would eventually need to work with it in some way. It is important to recognise that any change that has implications for more than one profession has the potential to be construed as a threat. Building trusting interprofessional relationships takes time. Effective communication, discussion and negotiation must be carried out with this in mind.
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REFERENCES:


Medical Students and informed consent:
A consensus statement prepared by the Faculties of Medical and Health Science of the Universities of Auckland and Otago, Chief Medical Officers of District Health Boards, New Zealand Medical Students’ Association and the Medical Council of New Zealand

Warwick Bagg, John Adams, Lynley Anderson, Phillipa Malpas, Grant Pidgeon, Michael Thorn, David Tulloch, Cathy Zhong, Alan Merry

ABSTRACT
To develop a national consensus statement to promote a pragmatic, appropriate and unified approach to seeking consent for medical student involvement in patient care. A modified Delphi technique was used to develop the consensus statement involving stakeholders. Feedback from consultation and each stakeholder helped to shape the final consensus statement. The consensus statement is a nationally-agreed statement concerning medical student involvement in patient care, which will be useful for medical students, health care professionals and patients.

The Code of Rights establishes the rights of consumers, and the obligations and duties of providers to comply with the Code. It is a regulation under the Health and Disability Commissioner Act. Nevertheless, there is evidence that the practice of seeking consent for the involvement of medical students in patient care is presently very variable. This consensus statement is an attempt to promote a pragmatic, appropriate, and unified approach to seeking such consent.

The document aims to deal with the potential (and at times actual) tension between the fundamental requirement to respect patients and their rights, and the obligation on the health system and health professional educators to provide learning opportunities for students. While these two requirements are by no means mutually exclusive, thoughtful care is required on both sides. Medical students learn in clinical environments and are legitimate and integral members of healthcare teams. The student learning covers a continuum of experiences and responsibilities, ranging from directly providing care to an individual patient to being part of a team providing care. As medical students transition from novices to junior doctors, patient interaction becomes an increasingly important part of their learning. Senior students (Trainee Interns) are integral members of the healthcare team providing care in hospital and general practices, and consent requirements need to reflect this.

However, before becoming involved in any patient's care, the consent of the patient must be obtained. Such consent should be informed: ie the patient (or another person as legally appropriate) should understand what he or she is granting permission for. This implies a conversation and communication, which includes listening to patients as well as giving them information. It is important to be sensitive to perceived or real imbalances in power between patients and healthcare providers. The process can usually be simple, verbal and
informal, particularly when the student's involvement is limited. When the risks are higher or the student's involvement greater, more information will be required and in some instances it would be prudent for explicit consent to be documented, or even obtained in writing, with a signature from the patient.

It is the spirit of informed consent that matters most: the important thing is to demonstrate respect and compassion for patients (and their families), in the context of their values, interests and vulnerabilities. Gaining and maintaining the consent of a patient is not a one-off event or simply an exercise in ‘ticking boxes’. Rather, it is an ongoing process of communication and building trust, and patients must feel free to withdraw their consent at any time. Therefore, those involved (practitioners and students) should at all times remain sensitive to any change in each patient's sense of comfort over who is present or what is being done.

The aim of this consensus statement is to assist medical students, doctors and other registered health professionals responsible for supervising them to understand what is expected and required in relation to consent for students to be involved in patients’ care.

Background

Medical students learn in an apprenticeship model under the supervision of registered healthcare professionals. Contact with patients occurs early in the journey towards becoming a doctor. Initially, this may be as an observer in a general practice, or in a class when a patient consents to being interviewed during a lecture. As learning progresses, students will be observers in surgical theatres, participate in the administration of anaesthetics, learn to undertake sensitive examinations, assist in the delivery of babies, and participate in many aspects of patient care in primary, secondary and tertiary care settings. The boundaries between observation and participation are sometimes blurred. Underpinning all these interactions is the trust of patients in those involved in their medical treatment and care. This trust is precious and must be respected.

Medical students become involved with patients in different ways, contexts and settings (see Table 1), and at different stages of their training. There are settings and contexts in which gaining consent is straightforward, and others where it is not. The relevant principles are not dependent on the setting or the context, but the way in which they are applied. These may vary and will require judgement.

Table 1: Some of the diverse settings in which students may become involved with the care of patients

**Hospital care**
- Clinics
- Emergency departments
- Intensive care units
- Neonatal units
- Operating rooms – in a surgical or anaesthesia context
- Psychiatry units
- Wards, adult or paediatric

**Primary care or community care**
- After-hours community clinics
- Air ambulances
- Ambulances
- Audiology clinics
- Community nursing clinics
- General practices
- Health care trusts
- Hospice
- Patients' homes
- Pharmacies
- Podiatrist clinics
- Private specialist clinics
- Rest homes
- Retinal screening clinics

On the whole, most patients welcome medical student involvement and understand the importance of training doctors (and other health professionals) for the future. The majority of patients say “yes” when they are asked about such involvement, and complaints about students are very rare. Thus, the process by which consent is obtained can and should be proportional to the involvement of the medical student and the nature of the interaction and consequent risk or inconvenience to the patient. It is not appropriate
to overstate the implications of the simple involvement of students, particularly as observers, and to do so may even have the perverse consequence of adding unnecessarily to the stress felt by some patients. Verbal consent obtained simply, politely and in the context of the general interactions between practitioners and patients is both adequate and appropriate for most situations.

The interactions between patients and medical students often occur in very busy settings in which clinical staff are under pressure, turnover of patients is rapid, and the opportunities to ask for consent are limited. Pragmatic solutions will be helpful in ensuring that the consent process is not unsettling or arduous for patients nor unworkably onerous for staff, but in the end the need to gain consent cannot be set aside on the grounds of inadequate time or resource. Irrespective of the context of the interaction, or the workload, patients should never feel coerced or pressured into providing consent.

There are some common principles about how consent should be obtained and by whom. These are outlined in the next section, and illustrated by examples and lists in boxes and tables.

**Principles pertaining to informed consent for the presence of a medical student during the care of patients**

1. Consent for the involvement of students in patient care is required by the Health and Disability Commissioners’ (HDC) *Code of Health and Disability Services Consumers’ Rights* (‘the Code’—see Rights 5, 6, 7 and 9). It is also an important aspect of building rapport with patients, and of maintaining the trust and goodwill that exists between patients and the health professionals who care for them—including medical students.

2. Organisations that care for patients have a responsibility to ensure that appropriate consent is obtained for all aspects of patient management, including the involvement of medical students in the care of patients. Therefore, the workplace environment should facilitate the gaining of such consent. To this end, general measures should be implemented to promote awareness that the organisation is involved with teaching and that medical students might be involved in patient care (see Table 2).

Table 2. Some general measures to promote awareness that students might be involved in patients care. Some or all of these may apply in various settings, including (for example), hospital wards, general practices, and outpatient clinics.

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<th>Measure</th>
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<tr>
<td>Policies</td>
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<td>Signage</td>
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<tr>
<td>Pamphlets for patients (available or given on admission)</td>
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<tr>
<td>An appropriate section on forms for consent to anaesthesia and surgery</td>
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<tr>
<td>Informed in letters sent to patients about other matters, such as confirmation of outpatient visits</td>
</tr>
<tr>
<td>The practice, by doctors and nurses, of routinely mentioning to patients the possibility that students may be involved in their care (at least as observers) and of the possibility that patients can refuse student involvement</td>
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3. The primary responsibility for ensuring that consent is obtained for the involvement of a medical student in a patient’s care lies with the registered health professionals responsible for that patient at the time (see Box 1).

4. The HDC considers medical students who are providing care to be healthcare providers, and they are therefore also accountable for ensuring that consent has been given before they become involved in patients’ care.
Box 1. Patients on wards and the responsibility for seeking consent

On ward rounds, students should be introduced to patients as part of the team (explicitly as student members of the team) by the doctor conducting the round. Students may also initiate introducing themselves to patients where appropriate. Before students on wards seek out patients with educationally valuable presentations and take a history or perform an examination on them, they must seek permission from an appropriate member of that patient’s healthcare team (doctor, charge nurse or nurse caring for the patient) to approach the patient. Once permission has been obtained to approach the patient, the student should gain verbal consent from that patient for history taking and examination. It may be prudent for the student to record this in the patient notes with an entry such as: “Bill Smith, Year 4 medical student, examined Mrs Jones – verbal consent obtained”. An additional benefit of this approach is that the record would clearly indicate how many students had interacted with that patient, and be helpful in ensuring that a patient is not approached too often.

It should often be possible for a senior doctor, interested in teaching and keen to encourage students to see patients, to obtain permission from patients at a convenient time (eg, on a ward round) for students to seek consent to obtain histories or conduct examinations. Thus the burden of establishing which patients are open to such approaches need not be excessive.

5. Medical students should actively assess how comfortable patients and their family/whānau are with their involvement in care. If they perceive patients or their family/whānau to be uncomfortable, they should have a low threshold for disengaging. This is a matter of basic courtesy and ongoing sensitivity to the rights and comfort of patients.

6. Informed consent should be sought with respect and compassion for patients, taking into account their circumstances and vulnerabilities at the time (see Box 2).

Box 2. An example of a potentially difficult situation in seeking consent for a medical student’s involvement in the care of a patient

A patient is unclothed and surrounded by the healthcare team, and asked to consent to a student examining her abdomen, with the student in the room.

Patients differ in their assertiveness and in how empowered and robust they feel at any particular time. It might be quite difficult for a patient in this situation to decline in the presence of a student. It may be better for the consultant to ask the patient privately, if they consent to students being present and, if the patient consents, to then ask if one (or perhaps two) of them could examine her abdomen during the round.

7. Patients need to know that they do have a choice about the involvement of medical students, and that they are entitled to change their mind at any time about such involvement, without any negative consequences for their care. The patient’s right to refuse consent or withdraw consent takes precedence over the provision of training for students.

For many purposes, notably many instances of observation, it is appropriate to obtain (or confirm) consent verbally and informally; for other purposes it is prudent for the consent to be documented, or even obtained in writing, with a signature from the patient (see Point 16). Note that there is a legal requirement for signed consent for procedures under anaesthesia.

8. Language is key to communication: If a patient is not competent in English (eg, because this is not his or her first language) then a competent interpreter must be used to obtain consent for the involvement of medical students; this can often be done during the more general processes of patient care, which will also require an interpreter.

9. Patients need to understand clearly what a medical student is (see Box 3).
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Box 3. The need to explain what a medical student is

It may seem surprising, but many patients don’t seem to understand the term ‘medical student’ unless it is explained. The term ‘student doctor’ is probably even less well understood, so ‘medical student’ is probably preferable. A brief clarification should be included in general informational material provided to patients, and this should be reinforced during conversations about medical students’ involvement in patients’ care. Name badges clearly indicating that the wearer is a medical student are also important.

10. As far as reasonably possible, patients should be informed about the proposed extent and nature of student involvement. There are three ways in which students may become involved in patients’ care, although in reality the distinction is blurred, as any interaction with a student contributes to a patient's care (Box 4):

a. Students may observe patients, or examine them, or carry out or assist with procedures on them for their educational benefit as students, or

b. Bedside tutorials, when a senior doctor conducts a tutorial with a group of medical students, usually focused around examination of a patient the doctor may or may not be clinically involved with, or

c. Students may contribute to the care of patients, under supervision (eg by taking blood, holding a retractor during a surgical procedure, or performing bag-mask ventilation under anaesthesia).

11. Patients who are temporarily or permanently incompetent to make an informed decision are particularly vulnerable (see Table 3 and Boxes 5 and 6). In such circumstances, consent should be obtained from the patient’s legal representative if one exists and it is practical and possible. If no legal representative exists, then any views ascertained from the patient should be taken into account. If this is not possible, the views of other suitable, available persons who are interested in the patient’s welfare should be taken into account. When there is no practical opportunity to obtain permission, student involvement under supervision may entail observation, history taking and general examination, unless the treating doctor decides that greater student involvement remains in the best interests of the patient. Judgement and experience is needed in respect of children under 16 years old. The consent process with children is complex. In some situations, the child may be able to consent for themselves. In other cases, the child’s parent or guardian may need to make a decision for the child. Where this occurs, the assent of the child should also be obtained, as appropriate and possible. The principles remain the same, but in many cases eg, neonatal intensive care,

Box 4. Ways in which students may become involved with patients' care, and how they might explain this

An interaction with a patient on a ward might begin by a consultant saying something like “I have spoken with Mrs Jones in bed seven and she is willing to have one student listen to her heart and another student take some blood.”

In case a) a student might say something like, “Hello Mrs, Jones. My name is Helen. I am a medical student. That means I am training to be a doctor. I am in my fourth year of medical training. I understand from Dr Smith that you have a medically important heart condition. Would you mind if I listened to your heart with a stethoscope and examined your heart and a few other things that might be affected by your condition, so that I can learn about it? Please feel free to say no if you prefer.”

In case b) a student might say something like, “Hello Mrs, Jones. My name is Bill. I understand from Dr Smith that you need a blood test taken. I am a medical student. That means I am training to be a doctor. I am in my fifth year of medical training and have been taught how to take blood for blood tests. Do you mind if I take your blood sample, instead of the phlebotomist? In either case the student should make a brief entry in the patient’s notes documenting his or her involvement.
there may be a parental perception that their child is too vulnerable to be examined by anyone other than an expert. This requires particular sensitivity and reassurance. Often the consent will be for the teacher to examine the child in front of students, rather than hands on, and it is obviously important to invite the parents to be present if possible.

Table 3. Some examples in which a patient might not be competent to make a decision or give consent.

- Under anaesthesia
- On a ventilator under sedation in an Intensive Care Unit
- During sedation (including so called “conscious sedation”)
- Very young patients
- Mentally or cognitively impaired patients or patients who are semi-conscious
- Patients impaired with alcohol and drugs
- Patients in shock, extreme pain or extreme distress
- Patients who are dying

Box 5. Patients in intensive care under sedation and/or on ventilators

It is important for intensive care units to have information available in the form of signage and pamphlets explaining that students may be present and may be involved in the care of patients. Given that most patients in intensive care units are very vulnerable, this is a situation where principle 11 applies. Except where it is possible and appropriate to obtain explicit consent for greater involvement, the role of medical students in intensive care units should usually be restricted to observation.

12. Some circumstances require a particularly high level of sensitivity to the potential vulnerability of patients and their families (See Table 4); in such circumstances meticulous care is required in seeking and documenting consent for the involvement of medical students.

Table 4. Examples of circumstances in which the potential vulnerability of patients or their families is increased, and in which extra sensitivity is appropriate regarding the need for informed consent for student participation.

- Sensitive examinations (particularly under anaesthesia)
- Discussion of withdrawal of life support
- Discussion of organ donation
- The breaking of very bad news (which will be contextual for the patient)
- Catheterisation
- Patients with rare or particularly interesting conditions
- Patients who feel under obligation to their treating clinician
- Retrieval of patients from a referring hospital

13. Sensitive examinations (includes breast, rectal, vaginal examinations and those of the external genitalia) in competent awake patients require explicit consent. This can be verbal but should be documented in the patient's notes. It is essential that there should be no possibility for the consent to have any element of coercion (eg, it may make it harder for a patient to refuse if the patient is asked after undressing or in front of a student. See Box 2).

14. Sensitive examinations under anaesthesia require formal written consent obtained in advance and signed by the patient. It is essential that there should be no possibility for the consent to have any element of coercion (eg, asking in front of a student may make it harder for a patient to refuse). Without such consent a student cannot undertake such activity.

15. A section should be included on the forms used to document generic consent for the involvement of medical students in observing or contributing to surgery, anaesthesia and other basic procedures undertaken in operating theatres, under direct supervision of an appropriate
Table 5. Examples of things typically included (under direct supervision) and excluded from general consent for students to be involved in surgery and anaesthesia; the latter require explicit consent.

Included, basic procedures, such as:
- Observation
- Bag mask ventilation
- Holding a retractor
- Examining surgical pathology or normal anatomy

Excluded, more substantive procedures, such as:
- Any sensitive examination
- Endotracheal intubation (because there is a risk of damage to teeth or even of causing a sore throat)
- Insertion of an IV line or arterial line
- Closing wounds, including surgical incisions

Box 6. Some practical points about anaesthesia attachments

Students allocated to an anaesthetic run may anticipate attending a particular list with a particular anaesthetist, and that anaesthetist may obtain consent from the relevant patients. However, on the day there may be scheduling changes such that there is little educational value in this list, while a much more educationally rewarding list is occurring in one of the other theatres. In fact, the best utilisation of time may come from moving between lists during the day as opportunities present. Generic consent obtained from all patients at the time of their consent to surgery will facilitate this. Therefore it is ideal for such generic consent to be obtained at the same time as consent for anaesthesia and surgery, as a matter of routine.

It is important to recognise that some patients may decline permission for students to be present, and a system will be needed to ensure that these patients are clearly identified, and that students do not inadvertently transgress their wishes.

Box 7. An unexpected surgical finding

Where a student on a surgical run is observing a surgical procedure, there may be an unexpected finding that he or she would benefit from scrubbing in and examining. It would be reasonable for generic consent to cover such a situation in most instances. However, it wouldn’t be appropriate for multiple students to examine the finding in a single anaesthetised patient, and any examinations of a sensitive nature must be the subject of explicit consent, which must be in writing.

Box 8. Primary or community care

Health care providers in primary or community care settings agree to undertake student supervision through Clinical Access Agreements. In each case there will be a primary supervisor who has completed the Clinical Access Agreement and is responsible for ensuring appropriate consent is obtained for students to be involved in the care of patients.

As always, signage and pamphlets are important for informing patients about the likelihood that they will meet medical students in a particular practice or setting. For example, in general practice, a notice should be placed facing the patient waiting room, stating words to the effect that this is a teaching practice and students may be involved in the delivery of health care. A member of staff (such as the receptionist) should be expressly asked to draw the sign to the attention of patients when they arrive, and to check with them on each visit that they are comfortable with the presence of students.

Before the start of the consultation, the GP should ask the patient if he or she is comfortable for the medical student to be involved in the interview, observation or procedure. Opportunity for the patient to decline this request must be given, so this request should take place without the student present.

The principles of consent related to patients undergoing sedation or sensitive examinations are the same as for any other setting.
16. Generic consent obtained under 15 should be understood as limited to observation and basic procedures and should not be taken as consent to conduct sensitive examinations while under anaesthesia or procedures with any material risk (see Table 5). Such examinations or procedures require explicit, and in some cases, including sensitive examinations, written consent.

17. In primary care settings (see Table 1 and Box 8), where students might accompany registered health professionals on visits to patients’ homes or their rooms in a rest home, verbal consent for the student to enter the room or house should be sought from the patient and/or family/whānau who might be present. Where possible this should be done before the visit.

18. Patients’ medical records are confidential and medical students should only access such records in line with a purpose that has been notified to the patient at the point of collection. There must be a genuine educational reason to do so, and with the permission of the health professionals responsible for the patient’s care. It is reasonable to construe consent for a student to be involved in a patient’s care as including consent for that student to read relevant patient records, but it would usually be courteous to mention this point to patients.

19. Students must respect the confidentiality of all information acquired by them in connection with patients. Under no circumstances should students disclose any information whatsoever on any form of social media about the patients they have been involved with, even in the absence of specific identifying information.

The above text is a consensus statement that was agreed by multiple stakeholders, after careful and considered consultation to provide a guideline. The paper is not intended to set standards but rather to outline New Zealand’s existing legal and regulatory requirements in a practical way.

The paper is intended to provide guidance to medical students and supervising doctors in clinical settings. We have limited its scope to medical students for pragmatic reasons. Similarly, we have not attempted to cover every possible clinical situation where consent is required in relation to the training of medical students, but instead have chosen examples to illustrate the principles in some settings that we think may be particularly challenging. Notwithstanding these limitations, we hope this consensus statement will prove useful in clarifying expectations for informed consent in this context in New Zealand today.

We hope that this consensus statement will engender discussion within our hospitals and universities, and in the correspondence section of the Journal. This will inform a planned revision of the statement after it has been in use for a year. It may also be appropriate to expand its scope at that time.
Competing interests: Nil

Note:
The NZMA Ethics Committee, MCNZ Consumer Advisory Group and HDC have been consulted.

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REFERENCES:
ARTICLE

An ageing trauma population: The Auckland experience
Lindsay M. Fairfax, Li Hsee, Ian Civil

ABSTRACT

AIM: As the population ages, the number of elderly patients suffering injuries is increasing. Reports from North America have shown an increasing proportion of elderly admissions with a disproportionate number of deaths. However, this trend has not yet been examined in New Zealand. The aim of this study was to determine unique characteristics of geriatric patients as compared to the general trauma population.

METHOD: The trauma database at Auckland City Hospital (ACH) was queried for patients age 65 years and above admitted between 2005–2012. Demographics, mechanism of injury, length of stay, and disposition were recorded.

Results: 1644 patients were included. The proportion of elderly patient admissions increased from 15% to 20% over the study period (p=<0.001). There were 93 deaths (6%); mortality increased with age—9% for patients 85+ compared to 5% for age 65–84 (p=0.004). Elderly trauma patients accounted for 38% of all trauma deaths. Average length of stay for survivors was 9 +/- 10 days, with 63% discharged home (n=1042), 19% to rehabilitation (n=316) and 7% to rest home (n=111). Falls were the most common mechanism (n=1261, 76%), however these patients had lower mortality compared to road traffic collision (4% vs. 12%, p<0.001) and pedestrians struck (4% vs. 11%, p<0.001).

CONCLUSION: ACH has seen a significant increase in elderly trauma admissions without a change in catchment or referral pattern. These patients have a higher mortality than those under 65, longer length of stay, and are less likely to return home. Specific education on fall prevention should be increased to lessen the burden on the health system as a whole. Given the linear increase in mortality, specialised geriatric care should be considered starting at age 75.

Introduction

The population as a whole is ageing—older people (age ≥ 65 years) are projected to account for 16% of the New Zealand population in 2016 and as high as 26% in 2051.1 As the population not only ages, but also remains more active later in life, the proportion of older trauma patients is also increasing. This steady increase in geriatric trauma has been shown in numerous studies worldwide. In 2005, Biffl et al compared their trauma population a decade apart and found the average age to increase from 42.9 to 44.3, with non-survivors being older than survivors in both time periods.2 The American College of Surgeons National Trauma Database 2014 report showed 28% of patients age 65 and above accounting for 44% of overall mortality. Fatality rates were highest in patients over age 75.3 In a study of European trauma deaths, age also increased while injury severity decreased from 1996 to 2004.4

Care at a designated trauma centre has been shown to improve outcomes in older patients.5,6 In addition, lower mortality and complications rates have been shown in centres seeing higher volumes of geriatric trauma.7 We hypothesised that the ageing population has led to a higher volume of trauma in the elderly in the Auckland area. Therefore, we undertook this study to evaluate the volume and outcomes of geriatric trauma patients at Auckland City Hospital.
Method

The trauma database at Auckland City Hospital is a prospectively collected database of all admitted trauma patients. Patients are included if they have suffered an injury within one week prior to admission, and are admitted for primary treatment of this injury. Pathologic injuries, neck of femur fractures, hangings and drownings are excluded, as are patients admitted for general rehabilitation needs, rather than specific injury treatment.

This was a comparative study between two groups: patients age 15–64 and those 65 and older. The database was queried for patients over 65 years of age admitted between 2005–2012. Demographics, injury mechanism, length of stay, discharge disposition, and mortality were collected. Basic information was also retrieved for patients under age 65 including length of stay and mortality data. Patients were stratified by injury severity score (ISS) into mild (ISS ≤8), moderate (ISS 9–15), and severe (ISS ≥16) injury groups.

Means, medians, standard deviation, counts and percentages were calculated using Microsoft Excel. Fisher’s exact test or chi-square was used for nominal data. A p-value <0.05 was considered significant. As this was an audit of the trauma database for quality improvement purposes, formal ethics approval was not required.

Results

Over the study period, 1,644 trauma patients age 65 and older were admitted to Auckland City Hospital. During the same time period 8,407 patients age 15 to 64 were admitted (Figure 1). Elderly admissions increased at a rate higher than overall trauma admissions. The percentage of trauma patients age 65 and above increased from 15% in 2005 to 20% in 2012 (p≤0.001) (Figure 2).

The average age in the geriatric cohort was 76 ± 8 years. Over the study period, patients age 85+ increased more than the other geriatric age groups (Figure 3). Women accounted for 59% of these admissions (n=971), compared to only 29% of younger admissions (n=2,396). Eight-five percent of geriatric patients were European with only 3% Pacific Islander and 2% Māori. This is in contrast to younger patients, who reflected the overall ethnicity distribution of the New Zealand population with 60% European, 12% Pacific Islander, and 13% Māori.

The median ISS was 4 for both groups, reflecting a high percentage of mild severity injuries. The distribution of injury severity for geriatric patients included 61% admitted for mild injuries (n=1,005), 22% for moderate (n=364), and 17% for severe (n=276). This was similar to the younger group distribution of 60% mild (n=5,012) and 20%
moderate (n=1,710), however the younger group did have a higher proportion of patients with major trauma at 20% (n=1,685, p=0.002).

Injury mechanism is detailed in Table 1. Falls were the most common injury mechanism in both groups, however they accounted for a much higher proportion in the geriatric group (76% vs. 40%, p≤0.001). Percentage of falls also increased with age, at 74% for age 65–79 compared to 80% for age 80+ (p=0.007). However, when separated by ISS, the proportion of patients suffering falls decreased as ISS increased. For major trauma (ISS≥16), 20% of injuries were caused by road traffic collision (RTC), and 14% by pedestrian struck by vehicle (ped struck) (Table 2).

Average length of stay for geriatric survivors was 9±10 days, with 63% discharged home (n=1042), 19% to rehabilitation (n=316) and 7% to a rest home (n=111). Patients under 65 for the same time period had an average length of stay

### Table 1: Injury Mechanism

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>≤65, n=8407</th>
<th>≥65, n=1644</th>
<th>65-79, n=1053</th>
<th>≥80, n=591</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Blunt</td>
<td>7,778</td>
<td>93</td>
<td>1,616</td>
<td>98</td>
</tr>
<tr>
<td>Fall</td>
<td>3,322</td>
<td>40</td>
<td>1,251</td>
<td>76</td>
</tr>
<tr>
<td>RTC</td>
<td>1,647</td>
<td>20</td>
<td>163</td>
<td>10</td>
</tr>
<tr>
<td>Ped. Struck</td>
<td>336</td>
<td>4</td>
<td>114</td>
<td>7</td>
</tr>
<tr>
<td>Other Blunt</td>
<td>2,473*</td>
<td>29</td>
<td>89</td>
<td>5</td>
</tr>
<tr>
<td>Penetrating</td>
<td>629</td>
<td>7</td>
<td>28</td>
<td>2</td>
</tr>
</tbody>
</table>

* includes 781 (9%) assaults, 777 (9%) sports injuries, and 289 (3%) cycling injuries

### Table 2: Injury Severity Score by Mechanism

<table>
<thead>
<tr>
<th>ISS</th>
<th>≤8, n=1005</th>
<th>9-15, n=364</th>
<th>≥16, n=276</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Blunt</td>
<td>956</td>
<td>98</td>
<td>389</td>
</tr>
<tr>
<td>Fall</td>
<td>803</td>
<td>83</td>
<td>292</td>
</tr>
<tr>
<td>RTC</td>
<td>67</td>
<td>7</td>
<td>42</td>
</tr>
<tr>
<td>Ped. Struck</td>
<td>45</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>Other</td>
<td>41</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Penetrating</td>
<td>17</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

### Table 3: Discharge Disposition

<table>
<thead>
<tr>
<th>ISS</th>
<th>≤8, n=996</th>
<th>9-15, n=352</th>
<th>≥16, n=203</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Home</td>
<td>744</td>
<td>75</td>
<td>216</td>
</tr>
<tr>
<td>Rest Home</td>
<td>67</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>159</td>
<td>16</td>
<td>82</td>
</tr>
<tr>
<td>Other</td>
<td>26</td>
<td>3</td>
<td>22</td>
</tr>
</tbody>
</table>

### Table 4: Length of Stay

<table>
<thead>
<tr>
<th>ISS</th>
<th>Age (years)</th>
<th>N (%)</th>
<th>LOS (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤8</td>
<td>&lt;65</td>
<td>5,010 (61)</td>
<td>5±5</td>
</tr>
<tr>
<td></td>
<td>≥65</td>
<td>996 (64)</td>
<td>8±7</td>
</tr>
<tr>
<td>9-15</td>
<td>&lt;65</td>
<td>1,704 (21)</td>
<td>7±9</td>
</tr>
<tr>
<td></td>
<td>≥65</td>
<td>352 (23)</td>
<td>10±11</td>
</tr>
<tr>
<td>≥16</td>
<td>&lt;65</td>
<td>1,538 (20)</td>
<td>15±19</td>
</tr>
<tr>
<td></td>
<td>≥65</td>
<td>203 (13)</td>
<td>15±16</td>
</tr>
</tbody>
</table>
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of 7±11 with 83% discharged home. Length of stay and disposition also varied with ISS, with only 30% of geriatric major trauma patients discharged home (Table 3). Length of stay was longer for geriatric patients with lower injury severity scores, but showed no difference for major trauma (Table 4).

Overall mortality was 6% for the geriatric group, compared to 2% for patients under age 65. (p<0.001) Elderly trauma patients accounted for 38% of all trauma deaths. Mortality increased with age—9% for patients 85+ compared to 5% for age 65-84 (p=0.004) (Figure 4).

Although falls accounted for the vast majority of admissions, mortality was lower compared to road traffic collision (4% vs. 12%, p<0.001) and pedestrians struck (4% vs. 11%, p<0.001). Not surprisingly, mortality increased with increasing injury severity, with 26% mortality for major trauma in the geriatric group, and only 9% in the younger group. In addition, mortality for lower ISS scores was higher in the geriatric group compared to patients under 65 (Figure 5). This trend persisted across the three most common injury mechanisms.

Looking at injury pattern in the geriatric group, 59% of deaths (n=66) occurred in

<table>
<thead>
<tr>
<th>Primary Injury</th>
<th>ISS, N (%)</th>
<th>Additional Injuries</th>
<th>N (%)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>≤8</td>
<td>9-15</td>
<td>≥16</td>
</tr>
<tr>
<td>Traumatic Brain Injury</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=66, 60%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest Injury</td>
<td>1 (7)</td>
<td>4 (29)</td>
<td>9 (64)</td>
</tr>
<tr>
<td>n=14, 13%</td>
<td></td>
<td></td>
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<tr>
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<tr>
<td>Orthopaedic Injury</td>
<td>12 (86)</td>
<td>1 (7)</td>
<td>1 (7)</td>
</tr>
<tr>
<td>n=14, 13%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinal Cord Injury</td>
<td>3 (27)</td>
<td>3 (27)</td>
<td>5 (46)</td>
</tr>
<tr>
<td>n=11, 10%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal Injury</td>
<td>1 (20)</td>
<td>1 (20)</td>
<td>3 (60)</td>
</tr>
<tr>
<td>n=5, 5%</td>
<td></td>
<td></td>
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</table>

*3+ body regions

Figure 4: Mortality by Age Group

Figure 5: Mortality by Injury Severity
patients with traumatic brain injury. Of these, 88% (n=58), were major trauma, with 11% moderate injury (n=7), and only one patient with mild injury. Of the remaining patients, 18 (16%) suffered chest injury, 12 patients (11%) had isolated extremity injuries and 11 patients (9%) suffered spinal cord injuries, two of whom also had chest injuries (Table 5).

Discussion

It is not a new concept that elderly patients are quite different from their younger counterparts. Two decades ago, Scalea et al demonstrated a longer time in the emergency department for the elderly, and subsequent delays in appropriate care. Biffl et al discussed the importance of placing older trauma patients in higher level monitoring to improve outcomes.

The majority of younger trauma patients are male, with a broad representation of ethnic groups. In contrast, elderly patients in this study were overwhelmingly European, and more likely to be female. This is in agreement with other reports on geriatric trauma. In a large review of the National Trauma Data Bank in the United States, Zaurzar et al found only 49.5% of patients over age 55 to be male, compared to 64.8% of overall patients. European patients comprise over 80% of geriatric patients studied in multiple reports. Given these differences, data derived from general trauma studies may not be applicable to the elderly group.

Geriatric patients had a longer length of stay compared to younger patients. This is in agreement with other reports. Geriatric patients often require more physiotherapy, and management of comorbidities leading to longer time in hospital. In addition, disposition is a concern for the geriatric population, as a minor trauma can often signal the end of independence. While the elderly group were less likely to go home compared to younger patients in this study, the amount of patients returning home was higher than reported in the literature. In an analysis of 100 consecutive geriatric trauma patients by Joseph et al, only 42 returned home. Keller et al, looking at exclusively orthopaedic patients, found only 30% of patients were able to return home directly. In this study, 63% of patients returned home. This may be due to easier access to home help for trauma patients with coverage provided by the Accident Compensation Corporation system, a no fault insurance system provided to anyone who suffers injury in New Zealand.

However, even in patients discharged to home, functional status has often declined. Kelley-Quon et al found geriatric patients to lose independence for one activity of daily living on average in the year after trauma. This increases risk for further injury and decline. In a retrospective study by Criddle, hazard ratio for death within five years after trauma was 6.26 compared to matched controls.

The most common mechanism of injury seen in our patients was falls. The vast majority of these were low falls from the patient’s own height or less, with low to moderate ISS. Geriatric patients are more likely to require hospital admission after lower mechanism trauma. Wang et al showed age as an independent risk factor for c-spine injury after ground level fall. Peschman and colleagues found age to be an independent risk factor for trauma admission, with 86% of trauma patients age 65 and over requiring admission.

While falls were the most common mechanism, mortality was highest in injuries involving motor vehicles—whether motor vehicle collisions or pedestrians struck by a vehicle. Our mortality rate was higher than other reported values: Cevik et al out of Turkey reviewed almost 400 geriatric motor vehicle collision patients with a mortality of only 6.1%.

Mortality for our patients was significantly higher than younger patients, particularly in lower injury severity groups. In addition, mortality increased with age even amongst the elderly. This is similar to other geriatric trauma studies. Taylor et al examined 7,117 trauma patients over the age of 65 and also found a linear increase in mortality, with a 9.2% mortality rate for those older than 85. Hashmi and colleagues found mortality to be higher for patients 75 and above, compared to age 65-74. Higher injury severity and lower presenting systolic blood pressure were also independent predictors of mortality. Joseph et al found age and lactate to be
the only two independent predictors of mortality after trauma laparotomy—mortality for patients over age 55 was 23.3%.20

It has been recognised that traditional vital signs are not adequate to triage the geriatric patient, given their increased comorbidities, medication use, and unique physiology.11,21 In a retrospective study from Salottolo et al, venous lactate was found to predict mortality with an odds ratio of 2.62, while traditional vital signs were not an accurate predictor.21 Therefore, this group recommended early trauma surgeon involvement and lactate guided therapy for geriatric patients.22

The Eastern Association for the Surgery of Trauma (EAST) practice management guidelines for geriatric trauma, revised in 2011, recommend a lower threshold for trauma activation for patients over age 70 and ICU admission patients over 65 with a base deficit greater than -6.23 However, this only covers the most severely ill or injured elderly patient.

We did not have base deficit data available for our patients, however only 276 patients (17%) were classified as major trauma (ISS>15). Therefore, it is likely that a similarly small percentage of our patients would meet the EAST guidelines for ICU admission. In addition, concerns regarding resource allocation do not make it feasible to admit even all major trauma patients over 65 years old to this higher level of care.

Given the unique needs of the geriatric trauma patient, specific consult services or units have been developed and shown improvement in outcomes.24-26 Mangram et al in the United States developed a “G-60” unit where patients were seen by a multi-professional team of trauma surgeon, medical hospitalist, rehabilitation physician, physiotherapy, nutrition, pharmacy, social work, geriatric nurse supervision, and palliative care. This led to decreased mortality, complications and length of stay.24 Similarly, Lenartowicz et al in Canada showed improvements in delirium and less discharge to long-term care facilities with a dedicated geriatric trauma consult service.25

To this end, we have developed a mandatory consultation system for our elderly trauma patients. All patients admitted to the trauma service age 75 and above receive mandatory consultation from a physician specialising in geriatric and rehabilitation medicine. While age 65 has been shown to be an inflection point for changes in outcomes, age 75 was chosen due to resource issues with availability of geriatricians. This physician not only addresses acute trauma related needs, such as recommendations for pain control in the elderly, but also addresses possible medical aetiologies of trauma and reviews medications for interactions and appropriate indications. This has not yet expanded to trauma patients admitted to other services such as neurosurgery or orthopaedics. We hope to adopt this system to cover all geriatric trauma patients after further study.

While the trauma database is able to provide a fairly large sample size, the study is limited by its retrospective nature. In addition, patients were not matched in a case control fashion with their younger counterparts. However, describing our geriatric population is the first step towards determining more specific risk factors for morbidity and mortality, as well as treatment strategies tailored to those over 65 years of age.

Auckland is seeing an increasing number of trauma patients over age 65. Mortality increases with age, and length of stay is longer than those under 65. Given the unique needs of this population, we have implemented a protocol for mandatory geriatrician consultation for trauma patients. We believe that early, specialised care of geriatric trauma patients will decrease length of stay and improve outcomes in this population. While increased utilisation of geriatricians could have an initial increase in healthcare funding for this population, improvement in outcomes such as length of stay should offset this. Further work needs to be done to determine specific geriatric trauma protocols to improve the care of these patients.


Competing interests: Nil
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7-year retrospective review of quad bike injuries admitted to Starship Children’s Hospital

Rebecca Pearce, Fiona Miles

ABSTRACT

AIMS: To ascertain morbidity and mortality of children who presented to Starship Children’s Hospital with injuries from a quad bike incident from 2007 to 2014, and to review whether current guidelines are sufficient to prevent injury.

METHODS: A retrospective case note review of all children under the age of 16 years who presented to Starship Hospital with an injury sustained whilst riding a quad bike between January 2007 and July 2014.

RESULTS: Twenty-seven patients were identified through both the Starship Children’s Hospital Trauma and Paediatric Intensive Care databases with injuries resulting from a quad bike incident. Fifteen patients (56%) had multisystem injuries. The average injury severity score (ISS) was 14 (range 1-75). ISS was higher in those of younger age (<5 years), lower body weight (<20kg), requiring PICU admission and those sustaining head injuries with no helmet. Seven (25.9%) patients required PICU admission, two patients died (7.4%) and three patients (12%) survived to discharge with disability.

CONCLUSIONS: This study supports current published guidelines which recommend limiting the use of quad bikes by children. Current guidelines do not, however, prevent injury in the paediatric population.
strength and frequent weight adjustments is required to maintain stability, particularly when turning corners and to prevent rolling over on uneven terrain and slopes.7,8 Children lack the strength, weight and prerequisite skills required to handle quad bikes. Previous studies have demonstrated a disproportionate number of children involved in quad bike accidents sustain serious or fatal injuries.9

In New Zealand, quad bikes are involved in approximately 28% of all work-related farm deaths every year.10 The risk of injury due to quad bikes is 2.5 times higher in children than adults.10

There are multiple recommendations published by New Zealand advisory bodies (Safekids, the Accident Compensation Corporation (ACC), Federated Farmers and Worksafe NZ) and quad bike manufacturers which strongly advise against the use of quad bikes by those less than 16 years of age. All new quad bikes in New Zealand have prominent warning labels which state that children under the age of 16 years should not ride an adult-sized quad bike, and manufacturers warn riders never to carry passengers. Despite this, children continue to be injured in quad bike accidents and New Zealand has not passed legislation to ensure safety guidelines are adhered to, as countries such as the United States and Canada have done.11

Previous studies, including Anson et al,5 have demonstrated that the paediatric population is at higher risk of injuries from quad bike accidents and advocated for a change in legislation. Since publication of Anson’s paper, there have been changes to guidelines which recommend limiting the use of adult-sized quad bikes in children less than 16 years of age.1,8,12

The aim of this study was to provide ongoing and updated information regarding morbidity and mortality of children involved in quad bike incidents over the last seven years, when the previous review (by Anson et al) was completed. The intention of a further review of children admitted to Starship Hospital with quad bike related trauma is to inform those tasks with ensuring legislation is effective in promoting child safety and injury prevention.

Methods

Ethics approval was obtained from the Ethics department of the Auckland District Health Board Research Review Board. Starship Hospital’s Paediatric Intensive Care Database, Trauma Database and hospital records were used to identify cases coded for ATV or quad bike trauma, admitted to Starship hospital between January 2007 and July 2014 and a retrospective case note review was undertaken of children under the age of 16 years requiring admission to Starship Hospital with confirmed ATV injuries.

A standardised questionnaire was completed by a single investigator. Data collected comprised weight, gender, ethnicity, age at the time of incident, type of ATV incident and engine size of ATV (if available), type and severity of injury as measured by the Injury Severity Score (ISS), the need for surgical or procedural intervention, the need for admission to the Paediatric Intensive Care Unit (PICU) and length of hospital stay (LOS). Morbidity (including long term disability) and mortality were reviewed. Data relating to environmental factors included the location of the incident (farm/recreational) and the position of the injured patient on the quad bike (rider, passenger, pedestrian).

Patients were further divided into age groups to assess injury, ISS, helmet use, long-term morbidity and mortality. The use of helmets in prevention of head injuries in quad bike accidents was also analysed.

Differences between groups were analysed with the Chi-square test for proportions and the Wilcoxon rank-sum test for continuous measures. A p<0.05 was deemed significant. Analysis was performed using Stata 13.1.

Results

Thirty-nine patients under the age of 16 years were identified as having a traumatic injury secondary to a possible quad bike incident. After review of case notes, 27 patients were confirmed with injuries resulting from a quad bike incident and 12 patients excluded due to non-quad bike related injuries.
The average age was 9.7 years (range: 1.8–14.5 years) and average weight 38.6kg (range 14.7–68kg). 51.8% of patients were aged 10 years or younger and 22.2% were aged less than 5 years (Table 1). The majority of patients were New Zealand European (Caucasian) (Figure 1).

Table 1: Demographics

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18</td>
<td>67</td>
</tr>
<tr>
<td>Female</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Age</td>
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<tr>
<td>&lt;5y</td>
<td>6</td>
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<td>5-10y</td>
<td>8</td>
<td>29.6</td>
</tr>
<tr>
<td>&gt;10y</td>
<td>13</td>
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</tbody>
</table>

Documentation relating to the quad bikes was limited, with only 16 of the 27 (59.2%) patient notes recording details apart from wheel number, such as engine size. Of these 16 case notes, 10 (62.5%) had an adult-sized quad bike listed, six (37.5%) were described as a ‘children’s quad bike’ or ‘mini-quad bike.’ When compared to age, those in the <5 and >10 year groups were more likely to have sustained injuries on an adult-sized quad bike compared to those in the 5-10 year age group, with 67% of those in the under 5 year group on an adult-sized quad bike, 25% of those aged 5-10 years and 85% of those in the over 10 year group on an adult-sized quad bike, however, this result was not statistically significant (p=0.141, χ² = 3.91).

The average injury severity score tended to be higher in those aged under 5 years (22.3 compared with 10.5 in those 5-10 years and 13.1 in those over 10 years) (p=0.347). Weight was demonstrated to have an inverse relationship in terms of injury severity score, with those weighing under 20kg having a higher ISS (23.9) compared with those weighing >20kg (12.1) (20-50kg – 5.2 and >50kg 17.5). This was a trend only and not significant (p=0.116).

Figure 2 demonstrates the mechanisms of injury resulting from quad bike accidents in our data group. In two incidents (7.4%), there was more than one mechanism involved in the accident, involving a fall from the quad bike and being run over by a quad bike (either the quad bike the patient was on or another quad bike).

70.4% of patients were injured while driving the quad bike with six (22.2%) being injured whilst a passenger, and one patient (3.7%) sustaining injuries whilst a bystander and there was no documentation available for one patient (3.7%). In 29.6% of cases, there was more than one person on the quad bike.

The majority of incidents occurred on a farm or at home (85.2%) with two incidents (7.4%) occurring at a recreational area and two (7.4%) not having the location recorded. The majority of patients were local to where the incident occurred (67%). The majority of accidents occurred on an off-road location (88.9%); two accidents (7.4%) occurred on road and in one (3.7%) incident, the location was not documented.

Helmets were documented as being worn in 33% of cases, a further third of cases were not wearing a helmet and another third had no documentation of a helmet being worn. Of the seven patients who sustained a documented head injury (25.9%; average ISS 19.4 (range 5-43), only one was wearing a helmet (14.2%; ISS 5) (p=0.016, χ² =5.844). The other six not wearing a helmet had a demonstrated a higher average ISS of 21.8 (range 9-43) (p=0.13), although due to small patient numbers, this was not significant. 7.4% had documentation of other safety clothing being worn at the time of the incident.

Figure 1: Ethnicity distribution of patients admitted for quad-bike related injuries

Figure 2: Mechanism of injury in quad bike accidents
Twenty patients sustained multiple injuries (74%) with 15 patients (75% of this subset and 55.6% overall) having more than one body system injured. The average injury severity score was 14 (range 1-75) and average length of hospital stay was 8.9 days (range 1-46 days).

Table 2 indicates the types of injuries incurred.

Table 2: Anatomical distribution of injuries incurred in quad bike incidents

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>7</td>
<td>25.9</td>
</tr>
<tr>
<td>Face</td>
<td>3</td>
<td>11.1</td>
</tr>
<tr>
<td>Upper Limb</td>
<td>14</td>
<td>51.9</td>
</tr>
<tr>
<td>Chest</td>
<td>10</td>
<td>37</td>
</tr>
<tr>
<td>Abdomen/Pelvis/Genitalia</td>
<td>6</td>
<td>22.2</td>
</tr>
<tr>
<td>Lower limb</td>
<td>9</td>
<td>33.3</td>
</tr>
<tr>
<td>Back</td>
<td>10</td>
<td>37</td>
</tr>
</tbody>
</table>

Surgical or procedural interventions were required in 16 patients (59.2%). The most common operative intervention was orthopaedic (56%), followed by neurosurgical (25%) and general surgical (19%).

Seven patients (25.9%) required admission to the Paediatric Intensive Care Unit (PICU) of which two patients died, giving a mortality rate of 28.6% of PICU admissions due to quad bike injury and 7.4% of the patient group. Average length of PICU stay was 9.6 days (range 1–42 days) with one patient requiring readmission due to respiratory collapse. The length of hospital stay for patients requiring PICU admission was 21.4 days (range 5–42 days) compared with 4.5 days (range 1–46 days; median two days) for those not requiring PICU admission. The average injury severity score of PICU admissions due to quad bike injury was 33.8 (range 9–75). All patients admitted to PICU required intubation. The average length of intubation was 220 hours (range 18–923 hours). 57% of patients (14.8% of study group) admitted to PICU required inotropic support, with the average duration of inotropic support being 274 hours (range 24–732 hours).

Twenty-five (92.5%) patients survived to hospital discharge. Twenty-three patients (92%) were discharged directly home, and two patients (8%) were discharged to another care facility: one patient (4%) required discharge to a rehabilitation centre due to spinal injury and a further patient was transferred to another hospital for on-going care closer to the family home.

Of all 25 patients who survived to hospital discharge, three (12%) had ongoing disability. One patient had severe disability due to permanent spinal cord damage (4%), one patient had moderate disability with ongoing problems relating to balance and blank spells resulting from traumatic brain injury, and one had mild disability with concentration and fatigue issues from a traumatic brain injury.

Of those admitted to PICU, four (71.4%) survived to discharge, two of these patients were discharged home directly from Starship Hospital after a period out of PICU on the ward; one patient (14.3%) required rehabilitation and another was discharged to a peripheral hospital prior to going home.
Three (42.9%) patients requiring PICU admission had an ongoing disability and 28.6% died in PICU. One patient required in-patient rehabilitation due to a spinal cord injury, and two required outpatient occupational review and follow-up due to head injuries.

There were two in-hospital deaths in our study group. The first was a 12-year-old child with severe crush injuries, who had a prolonged PICU admission complicated by renal failure, rhabdomyolysis and resistant soft tissue fungal infection culminating in overwhelming sepsis. The second was a 4-year-old passenger who was garrotted by wire strung between two trees and died from high cervical spine injury.

**Discussion**

Despite recent changes to guidelines, this study highlights the need for ongoing focus on the use of quad bikes by children. As shown previously, this study demonstrates that most of the children injured in quad bike accidents were Caucasian boys under the age of 10, injured at home or on a farm in their familiar environment.

This study focused on injuries leading to hospital admission, which comprise only a fraction of the injuries and deaths that occur overall. Although injuries requiring hospitalisation result in significant morbidity and mortality, it does not take into account those who died prior to hospital admission.

New Zealand's Health Quality and Safety Commission's Child and Youth Mortality Review Committee (CYMRC) released a report in December 2014 which reviewed injuries and deaths in children aged 15 years and under, associated with off-road accidents involving quad bikes, motorcycles and motorised agricultural vehicles from 2002–2012.10 Twelve deaths associated with quad bike incidents were identified over this time.

Many international groups, including The American Academy of Pediatrics' Committee on Injury and Poison Prevention, the Canadian Pediatric Society's Injury Prevention Committee, and Farmsafe Australia, have recommended that children aged less than 16 years be prohibited from operating any quad bike, including those designed and marketed for children.15,16,17 This is in contrast to New Zealand, where the Accident Compensation Corporation (ACC), Ministry of Business, Innovation and Employment (MBIE) and Safekids Aotearoa have recommended children aged under 16 years should not ride adult-sized quad bikes (those with an engine capacity exceeding 90cc).1,8,12 Currently, in New Zealand, there is no formal recommendation that children should not ride smaller quad bikes. It is difficult to make categorical recommendations relating to smaller quad bikes, despite the findings of this study and that of the CYMRC due to the lack of documentation regarding engine size of the quad bikes involved in accidents. Improvement in data collection from all off-road vehicle crashes would allow an evidence-based decision to be made on this issue.10 However, in keeping with overseas recommendations and consistent with current New Zealand legal driving age for on-road vehicles, we would favour a more cautious approach, in which no child under the age of 16 years be allowed to ride a quad bike of any size.

New Zealand has a mandatory toy safety standard that applied for all toys sold for use which are designed for children up to the age of three.18 It protects against unintentionally giving young children products that can harm or kill them. In contrast, once a child turns four years of age, they can be given a child-sized quad bike to ride. This demonstrates a dangerous gap between the reality of what we know harms children and what children can manage and a perception of what is a safe toy for children over the age of three.

Safety standards do need to be mandated. Although there could be a focus on making quad bike design safer, this does not take into account that children lack the appropriate developmental ability to manage any form of quad bike. Children do not possess the skill-set required to handle quad bikes adequately and are unlikely to understand how to respond to specific situations, such as correcting driving errors and avoiding potential accidents. By allowing children to ride quad bikes, which are inherently unstable and powerful, children are at risk of significant injury or death, which occur despite the recommendations by multiple
groups including manufacturers, Federated Farmers, ACC and SafeKids. Although a positive step, current guidelines are not reducing morbidity and mortality for children. Legislation prohibiting the paediatric population riding quad bikes is the appropriate next step if we are to prevent ongoing injuries from quad bikes. Although difficult to enforce such legislation, particularly when off-road or on private property, there is increasing focus on the importance of this.\textsuperscript{11,19} In 2014, WorkSafe NZ took legal action against those who display risky behaviours on quad bikes, despite repeated warnings by regulatory bodies.\textsuperscript{20} Despite recommendations, children continue to ride adult-sized quad bikes.

Guidelines also preclude carrying passengers on quad bikes, but 22.2\% of our patients were passengers and 29.6\% were on a quad bike with one or more passengers. Many guidelines strongly state quad bikes are to be used for off-road purposes only and in our study 7.4\% were used on-road.

If current guidelines had been adhered to in our study group, such that no children aged less than 16 years of age were riding an adult quad bike (engine size >90cc), none were carrying passengers and all were off-road, there would have been a 56\% reduction in injury and a 71\% reduction in PICU admission. There would have been a 67\% reduction in long-term disability and a 100\% reduction in mortality. Although helpful, recommendations are simply not sufficient if we are to prevent ongoing injury to children due to the lack of adherence to guidelines by those supervising them.

There is no law requiring quad bike riders to wear helmets off-road, but a number of government agencies highly recommend that a helmet be worn at all times.\textsuperscript{1,4,7,8,12,21} This study (as in previous studies\textsuperscript{5,6,22}) supports the use of helmets to reduce head injury.

There are several limitations of this study. As a retrospective study of a single institution, it may not give a good representation of the admissions for quad bike injuries that occur nationally. However, Starship Hospital is a tertiary referral centre with the only Paediatric Intensive Care Unit in the country. It would therefore be anticipated that the most severely injured patients would present or be transferred to our institution. We, therefore, would expect to see the vast majority of the most severely injured patients from quad bike accidents. This study did not include pre-hospital deaths or deaths occurring at another hospital before transport to our PICU could be arranged and as such would underreport the paediatric mortality from quad bike accidents. The CYMRC reported that there were 12 deaths due to quad bikes in the paediatric population in New Zealand between 2002-2012.\textsuperscript{10} This included all pre- and in-hospital deaths, however they did not detail the percentage of deaths occurring in the pre-hospital setting.

\textbf{Conclusion}

A significant number of paediatric patients require hospitalisation due to preventable severe injuries sustained from quad bikes in New Zealand, with age and weight inversely related to severity of injury.

Current recommendations advocate against children under the age of 16 years driving or being passengers on quad bikes. Despite this, there has been no decrease in the numbers of children and adolescents riding quad bikes. This study provides support to the growing body of evidence to support legislation mandating against children under the age of 16 riding quad bikes to prevent further injury and deaths.

Enforcing such a mandate may be difficult, but legally defining age limits for quad bike use may in itself lead to decreased use of quad bikes by children in New Zealand. Until such a mandate is in place, it will be important to assess ongoing injury rates and advocate for our children’s safety.
Competing interests: Nil

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VIEWPOINT

A new surgical site infection improvement programme for New Zealand: early progress

Arthur J Morris, Allan L Panting, Sally A Roberts, Carl Shuker, Alan F Merry

ABSTRACT

Two to five percent of those who have an inpatient surgical procedure will experience a surgical site infection (SSI). The Health Quality & Safety Commission has instituted New Zealand's first national Surgical Site Infection Improvement Programme (the SSII Programme), delivered jointly by Auckland and Canterbury District Health Boards. Through a combined package of surveillance and improvement interventions the SSII Programme aims to reduce the incidence of SSIs in New Zealand hospitals, beginning initially with hip and knee arthroplasties. Within one year of the programme starting there has been a significant nationwide improvement in the timing of surgical antimicrobial prophylaxis (p<0.0001), and the administration of the correct dose (p<0.0001). National compliance with an alcohol-based skin preparation remains high at >95%. In this paper we describe the purpose, background, structure and rationale of the programme and provide results to date.

Two to five per cent of those who have an inpatient surgical procedure of any kind will experience an infection at the surgical site.1 Surgical site infections (SSIs) are the second most commonly reported healthcare associated infection, comprising 17 to 22% of healthcare associated infections in high and middle income countries.2-5 A patient with an SSI typically costs hospitals twice as much as a patient without an infection.6 SSIs can rapidly progress and treatment may be lengthy, expensive and difficult, especially in the case of infected joint arthroplasties, where management often involves extensive debridement, long courses of antibiotics, implant revision and rehabilitation.

In the US in the mid-1970s, the US Centers for Disease Control (CDC) Study on the Efficacy of Nosocomial Infection Control project (SENIC) established that, provided certain key components were in place, infection surveillance and control projects instituted in American hospitals in the 1960s reduced nosocomial infections, including SSIs, by 32%.7 Since then, reductions have been achieved globally by similar surveillance programmes (see below).

New Zealand’s Surgical Site Infection Improvement Programme, known as the SSII Programme, was instituted by the Health Quality & Safety Commission (the Commission) in 2012, with an initial focus on hip and knee arthroplasties. The SSII Programme is delivered jointly by Auckland and Canterbury District Health Boards (DHBs) and funded by the Commission.

The SSII Programme’s basic premise is that the incidence of SSI in New Zealand can be reduced by a quality improvement package consisting of national, co-ordinated, long-term surveillance of SSIs using a comprehensive programme of data collection and sharing, accompanied by institution and tracking of adherence to internationally recognised best clinical practices known to prevent SSIs.

In this paper we discuss the background, structure, aims and rationale of this new programme and provide a summary of results to date.
Surgical site infection in New Zealand

The SSII Programme commenced with hip and knee arthroplasties because of their high volume, relatively consistent surgical procedure, and the high cost and serious harm to patients when an SSI occurs.

The numbers

Hip and knee arthroplasties are two of the most commonly performed operations in the US. In 2012, more than 670,000 knee and 450,000 total or partial hip arthroplasties were performed in US hospitals, and these numbers are increasing. The CDC’s National Healthcare Safety Network (NHSN) reports SSI rates in hip arthroplasties of 0.67% to 2.4% in the period 2006-08, and in knee arthroplasties from 0.68% to 1.60%. It is estimated that annually between 6,000 and 20,000 patients in the US have an infected hip or knee arthroplasty.

In New Zealand these two procedures are also common, with the number of hips replaced per capita comparable with that of the US. The New Zealand National Joint Registry (NJR) has tracked hip and knee arthroplasties in public and private hospitals since 1999. In 2012, 7,481 primary hip arthroplasties and 6,346 primary knee arthroplasties were registered. These procedures are provided in every DHB and the numbers are increasing: from 2011 to 2012 the number of NJR-registered hip replacements increased 3.6%, knee replacements increased by 1.5%, and unicompartmental knee replacements (replacement of either the medial or lateral knee compartments) increased by 18%. The year-on-year rate of increase of registered joints from 2011 to 2012 has doubled to 2.7%.

Data reported by the SSII Programme show that of the 10,596 publicly funded hip and knee procedures from March 2013 to June 2014, 134 patients’ surgical sites became infected, an incidence of 1.3% (95% confidence interval 1.1–1.5). The infection was recognised either during the initial admission or resulted in readmission within 30 days for a superficial infection or 90 days for a deep infection.

The costs

Infection following hip and knee replacement is a serious complication. Treating these patients may cost three to four times as much as the original surgery, the length of the patient’s hospital stay (LOS) may be greatly increased, poorer long-term functional outcomes result, and mortality is increased. Treatment is usually complex, often requiring removal of the infected prosthesis, radical debridement of necrotic and infected tissue, insertion of a spacer implant, prolonged antibiotic treatment, and a return to surgery for a repeat arthroplasty more than six weeks later. Each additional procedure carries the potential for further complications, pain, impaired mobility and a long period of recuperation.

Recent studies from the US, England and Australia have highlighted the excess cost and length of stay associated with surgical site infections following hip and knee arthroplasties. An Australian study reported an average 27 day increase in the LOS attributable to hip and knee replacement infections, at a cost of AUS$4.6m for 126 infections—the total cost of the infections for the state of Victoria for a year was just over AUS$5m. Here in New Zealand published data are lacking, but recent work done at Auckland DHB found that when patients identified with an SSI after a primary procedure were matched on a 1:2 ratio with patients who did not get an infection, the mean excess cost of SSI was NZD$40,121 and excess LOS was 42 days. Northland DHB reported an average cost of $78,000 for an infected hip replacement. The cost for one single infected hip replacement in 2013, which involved four readmissions over five months, was $112,000.

In short, “Deep infection following an arthroplasty is a disaster for the patient and expensive to manage.”
The New Zealand Surgical Site Infection Improvement (SSII) Programme

Reducing SSIs in New Zealand—background

New Zealand’s first dedicated national health quality improvement body, the Quality Improvement Committee (QIC), a ministerial committee supported by the Ministry of Health, was founded in 2007 under Section 9 of the New Zealand Public Health and Disability Act 2000. QIC was funded for a specific suite of national quality improvement programmes known as NQIPs. One of these programmes was infection prevention and control, including catheter-related bloodstream infection prevention, the hand hygiene programme, and recommendations for a surgical site infection surveillance programme. In 2010, QIC’s successor, a crown agency, the Health Quality & Safety Commission, decided, after consultation with the sector, that it was vital to continue this important work. The Commission obtained an independent cost–benefit analysis that found surveillance was likely to lead to significant reductions in SSI rates and a strongly positive economic benefit overall. An automated system was estimated to cost a similar amount as a manual system but would provide ongoing cost savings and the potential for expansion. On the strength of this, the SSII Programme was developed.

How do we get better? Structuring the job of improving

The Commission formed a steering group with senior clinical leadership and jointly led by Auckland and Canterbury DHBs. The Programme settled on a multifaceted improvement approach consisting of:

1. A nationwide surveillance system and data warehouse called “National Monitor” hosted by Canterbury DHB, initially targeting hip and knee arthroplasties, and to be expanded in 2015 to include selected cardiac surgery procedures;

2. Promoting evidence-based practices proven to reduce SSI incidence, and encouraging clinicians to use them consistently, and

3. Measuring the implementation of these best practices, and reporting on adherence and results (see the SSI quality and safety marker, or QSM, below).

1. SSII: surveillance—how it works and who uses it

SSI surveillance involves the collection and provision of reliable data allowing clinicians to make meaningful comparisons between local incidence rates and national benchmarks and monitor changes in local rates over time. There is strong international evidence that the monitoring and reporting of SSIs leads to a mean reduction in their incidence, on the order of 8% per year (+/- 4%). The Dutch surveillance network PREZIES (Preventie van Ziekenhuisinfecties door Surveillance) reported a 31% reduction in infection rates four years following inception, which increased to 57% after five years. The German Krankenhaus Infektions Surveillance System (KISS) was associated with a 25% reduction in SSI incidence in three years, and the Northern France INCISO system contributed to a relative reduction of 50% in SSI incidence in over 150,440 surgical patients over six years (3.8% to 1.7%). Another French system, the eight-year national ISO-RAISIN system (Infection du Site Opératoire—Réseau Alerte Investigation Surveillance des Infections) was associated with a 36% reduction in hip SSI over 7 years. Similar results have been found in Brazil (a reduction in overall incidence from 8.8% to 3.3% in nine years).

In 2008 Krukowski and Bruce concluded in the BMJ, “it has been clear for almost three decades that the routine collection and dissemination of rates of surgical site infection results indirectly in a worthwhile reduction.”

International surveillance of surgical site infection

The basic model of large-scale SSI surveillance and improvement is:

- Local—infection data are collected, reported, and clinicians seeing their data are encouraged to seek ways to improve their practice and reduce the incidence of SSI.
- National—infection data are collected
and reported nationally. Hospitals and DHBs regularly review the data and encourage the adoption of effective national initiatives to secure a reduction in the incidence of SSI.

In the US the CDC has led the way in nosocomial infection surveillance. It has tracked HAIs via the National Nosocomial Infection Surveillance System (NNIS) since 1970. Updated to a web-based protocol in 2005, and now known as the National Healthcare Safety Network (NHSN), this surveillance system uses well-validated, internationally adopted definitions and data protocols designed to minimise the burden of collection and reporting.39,40

There are now SSI surveillance and improvement programmes active in England, Scotland, Wales, Northern Ireland, The Netherlands, Belgium, France, Japan, Denmark, and Germany.37,41–49 The European Centre for Disease Prevention and Control’s (ECDC) European Surveillance System (TESSy) surveils SSIs with the HAI-Net SSI protocol from, in 2011, 20 surveillance networks in 16 reporting European countries.50 Australia has surveillance programmes in several states including New South Wales, Victoria (the VICNISS programme),51 and Western Australia, though a 2008 national report concluded, “Standardised and strategic approaches to surveillance . . . is [sic] seriously lacking in most states and territories.”52

New Zealand SSI surveillance

Until recently, surveillance in most New Zealand hospitals was only carried out locally, without common methods of data collection, and with little sharing of the results. Southern Cross Hospitals have used a surveillance system covering 13 hospitals since 2004, but without public reporting. This was the only significant multi-site SSI monitoring programme in the country until the institution of the SSII Programme under the Commission in 2013.

National Monitor

The SSII Programme, New Zealand’s first national SSI improvement programme, utilises National Monitor from ICNet, software previously used with success for English, US, Australian and Scottish SSI surveillance programmes. This was trialled with eight DHBs in a development phase in early 2013. National Monitor was rolled out to the remaining DHBs in July 2013. Complete data collection methodology is available at the Commission website.13

2. SSII: Improvement—what we can do to prevent SSIs

Surveillance drives improvement, particularly alongside the adoption of standardised application of practices proven to reduce the incidence of SSIs. As always it is actions that result in improvement—measurement serves simply to inform and prompt the needed actions. Throughout New Zealand there has been inconsistent implementation of clinical practices associated with a reduction in SSI—eliminating unjustified variation in practice is a key element of quality improvement.53,54

The package of interventions

1. The right antibiotic in the right dose—since the introduction of the WHO Surgical Safety Checklist in 2008 there has been a requirement that during the Time Out phase, before the incision is made, the question is asked, “Has antibiotic prophylaxis been given within the last 60 minutes?” There is strong evidence to recommend cefazolin 2g I/V for routine antibiotic prophylaxis for hip and knee replacements.55 Prophylaxis should be administered as a single dose within 60 minutes before knife to skin.56 Data and clinical practice guidelines do not support continuing antimicrobial prophylaxis more than 24 hours after surgery.56 The post-operative administration of three doses of cefazolin (2g) eight-hourly is accepted, but antibiotics should be discontinued within 24 hours after surgery.55

2. Skin antisepsis—appropriate skin antisepsis before incision should always be based upon a preparation including at least 70% alcohol (eg, chlorhexidine gluconate/alcohol or povidone-iodine/alcohol solution).57

3. Clipping of hair overlying surgical wound sites (avoiding shaving, which increases epidermal micro-trauma and subsequent bacterial colonisation).58
3. Measurement—how do we know we’re doing the right thing? Process and outcome measures of the SSII Programme QSM

The Commission has instituted a set of quality and safety markers (QSMs) to monitor adherence to best practice. There is now a suite of five QSMs comprising 23 individual measures in place tracking the work and results of quality improvement in New Zealand.

The SSII Programme QSM is derived from the intervention guidelines and draws directly on data saved in National Monitor.

**Process markers**

1. **Right antibiotic in the right dose**—is cefazolin ≥2g being used? To allow for instances of beta-lactam allergy, the threshold for compliance is set at 95%.

2. **Correct timing for antibiotic prophylaxis**—is the antibiotic given within 60 minutes before knife to skin? This should happen in all primary procedures, so the target is 100%.

3. **Appropriate skin antisepsis**—has a 70% alcohol/chlorhexidine or 70% alcohol/povidone-iodine solution been used? This also should occur on all occasions, so the target is 100%.

**Outcome**

Rate of SSIs per 100 procedures for total hip and total knee arthroplasties, where the SSI is defined as superficial, deep incisional or joint space, occurring in hospital (in hospital refers to an infection occurring during the initial admission or requiring readmission within 30 days (superficial) or within 90 days (deep and organ space) post operation).

Results by DHB are published publicly.

**Timing:** This has improved from one DHB with 100% compliance in July-September 2013 to five DHBs in January-March 2014. Fourteen DHBs reported prophylaxis on time for more than 95% of primary procedures. The biggest factor resulting in non-compliance was the number of DHBs that had cases where timing wasn’t recorded. For April to June 2014, 12 DHBs had more than one procedure where timing wasn’t recorded; five of these had more than 10 such procedures. Only 2% of cases had antibiotic prophylaxis recorded as either early or late.

**Choice and dose of antibiotic prophylaxis:** There has been a significant increase in compliance with this measure each surveillance period. Ten DHBs now comply with this QSM with five more being at least 90% compliant. Most non-compliant DHBs reported the use of a 1g dose of cefazolin (5% in this quarter down from 13% in the first period 2014). One DHB continues to use cefuroxime for antibiotic prophylaxis. This accounts for approximately 5% of the non-compliance.

**Alcohol-based skin preparation:** Thirteen DHBs have reached 100% compliance (11 for the first time in the last quarter) and 18 DHBs are greater than 90% compliant. Only 1% of procedures receive aqueous povidone–iodine. Another 2% have ‘Other’ recorded as the skin preparation.

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**Table 1. Quality and safety marker (QSM) process measures and surgical site infection rate July 2013 to June 2014**

<table>
<thead>
<tr>
<th></th>
<th>July–Sept 2013 (a)</th>
<th>Oct–Dec 2013 (b)</th>
<th>Jan–March 2014 (c)</th>
<th>April–June 2014 (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On time (100% target)</strong> Primary procedures</td>
<td>89% (1475/1660)</td>
<td>90% (1859/2078)</td>
<td>92% (1974/2148)</td>
<td>94%** (2373/2528)</td>
</tr>
<tr>
<td><strong>Dose and choice of antibiotic (95% target) ≥2g cefazolin</strong></td>
<td>55% (1042/1887)</td>
<td>68% (1579/2323)</td>
<td>78% (1832/2350)</td>
<td>85%** (2322/2738)</td>
</tr>
<tr>
<td><strong>Alcohol-based skin preparation (100% target)</strong></td>
<td>97% (1827/1887)</td>
<td>96% (2234/2323)</td>
<td>98% (2295/2350)</td>
<td>97% (2664/2738)</td>
</tr>
<tr>
<td><strong>Surgical site infection rate (%)</strong></td>
<td>1.6% (30/1887)</td>
<td>1.3% (30/2323)</td>
<td>1.0% (24/2350)</td>
<td>1.2% (34/2738)</td>
</tr>
</tbody>
</table>

**change (a) to (d) significant at p<0.0001**
**Surgical site infections**: of the 9,298 publicly funded hip and knee procedures from July 2013 to June 2014, 118 patients’ surgical sites became infected. The infection occurred either during the initial admission or required readmission within 30 days for a superficial infection or 90 days for a deep infection. This is an incidence of 1.3% (95% confidence interval 1.1–1.5); 77 (0.75%) were deep or organ/space (ie involving deep tissues or the joint space) and 57 (0.55%) were superficial (involving skin and subcutaneous tissue).

**The future of SSI prevention**

The SSII Programme has only recently commenced, but the initial findings are encouraging and the international evidence suggests the programme will reduce the rate of SSIs given sufficient time. After extensive consultation with cardiac specialists, SSI surveillance and best practice interventions are in the process of extension to selected cardiac surgery procedures, including coronary artery bypass grafts.

The Armenian physician and ‘father of quality assurance’ Avedis Donabedian (known by his students as ‘Mr. Structure-Process-Outcome’) defined the paradigm of health care systems and delivery from which QSMs take their shape. “Things won’t improve,” wrote Donabedian, “until something is done about the design of the system.” Donabedian defined technical excellence as ‘doing the right thing’ (appropriate care based on the best available evidence) and ‘doing it right’ (delivering safe, timely care).

A reduction in the rates of SSIs in our hospitals can be achieved through adherence to best practice. The system is now changing and greater consistency is being achieved in key processes. The Commission is grateful for the contribution made by all DHBs and acknowledges the substantial commitment of many individuals, particularly the many clinicians, who have engaged with this national initiative to improve patient safety in New Zealand.

**Competing interests:**

Arthur J Morris received personal fees from Health Quality & Safety Commission, during the conduct of the study. Alan Merry is Chair of the Health Quality and Safety Commission. Carl Shuker is the principal advisor, publications, for the Health Quality & Safety Commission.

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An unusual cause of persistent dysphagia
Sujith V Cherian, Elena Thampy

A 72-year-old lady with recently diagnosed Non Hodgkin’s lymphoma was referred to our clinic. The patient on staging evaluation had a CT scan of her chest (Figures 1 and 2), and was found to have an abnormality.

On further questioning, the patient endorsed complaints of dysphagia to solids, which was intermittent in nature and had been present for the last two years. Physical examination did not reveal any significant clinical findings.

What is the diagnosis?

Answer and Discussion

The patient presented with dysphagia and was seen to have an aberrant right subclavian artery (red arrows from figures), which is sometimes referred to as arteria lusoria. Dysphagia secondary to vascular compression on esophagus is also known as dysphagia lusoria.¹

Dysphagia lusoria is a rare cause of dysphagia, first described by a British physician David Bayford in 1794. An aberrant right subclavian artery is the most common aortic arch anomaly, present in about 0.3 to 1.8% of the population. In about 80% of the cases, it runs posterior to the esophagus, between the trachea and esophagus in 15% of the cases and in the remaining 5%, it runs anterior to the trachea. The diagnosis is suggested by the barium esophagogram and confirmed with contrast enhanced Chest CT scans. In most patients, it is asymptomatic.

Generally, patients with mild to moderate symptoms are managed conservatively, and surgery is reserved for those with persistently severe symptoms.² Surgery generally involves removal of the aberrant vessel and its reconstruction in the appropriate position. Reconstruction can be done via anastomosis of the native vessel or by interposing a synthetic graft in its place.

There is no consensus to the best surgical approach with both median sternotomy and cervical approach being used. Options for poor surgical candidates include endoscopic dilatation, which may temporarily relieve symptoms of dysphagia.³

Figure 1: Chest Computed Tomography (CT) scan showing aberrant right subclavian artery from aorta (red arrow) and esophageal compression (blue arrow)
Figure 2: Coronal section on CT scan showing aberrant right subclavian artery (arrow) from aorta.

Competing interests: Nil

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Importance of blood cultures to aid the diagnosis of Lemierre’s syndrome

Maryam Nejat, Anja Werno

ABSTRACT
This is a case report of Lemierre's syndrome, a septic thrombophlebitis of the internal jugular vein (IJV) usually preceded by pharyngitis and bacteraemia with an anaerobic organism. Fusobacterium necrophorum is an anaerobic Gram-negative bacillus and is the most common organism reported to cause Lemierre's syndrome which usually occurs one to three weeks post pharyngitis or oropharyngeal surgery. A 21-year-old patient presented with signs of sepsis and a history of sore throat, fever, and tender cervical lymph nodes. Blood cultures grew F. necrophorum and Computed Tomography (CT) showed a filling defect in the left retromandibular vein and thrombosis in the left internal jugular vein (IJV) consistent with Lemierre's syndrome. This is an uncommon condition which normally occurs in young individuals and diagnosis is often delayed.

Introduction
Lemierre’s syndrome was described by Andre Lemierre in 1936 following a published case series of 20 patients with a primary oropharyngeal infection who developed bacteraemia and internal jugular vein (IJV) thrombosis caused by Fusobacterium necrophorum, and of whom 18 died.1 With increasing availability of antimicrobials since the 1940s the incidence of Lemierre's syndrome has dropped dramatically leading to the eponym of the ‘forgotten disease’,2 though sporadic cases do occur.3

Case report
A 21-year-old student presented to the emergency department with a week's history of malaise, worsening sore throat, and fevers. She had difficulty eating and drinking due to pain, and developed swelling over the left side of her neck. On examination, she was febrile and had moderate bilateral tonsillar enlargement with exudates, and tender anterior cervical lymph nodes. The primary diagnosis was tonsillitis and after taking a throat swab and blood samples including blood cultures, she was started on intravenous penicillin, fluids, and analgesia.

Laboratory findings included elevated inflammatory markers and a low platelet count. A heavy growth of Streptococcus group C was isolated from a throat swab culture. This pathogen could have accounted for the patient's tonsillitis. F. necrophorum was isolated from blood culture and led to the diagnosis of Lemierre's syndrome.

Intravenous penicillin was changed to amoxicillin and metronidazole. The patient deteriorated with worsening neck pain and persisting fevers. A contrast CT of the neck showed a filling defect in the left retromandibular vein and thrombosis in the left IJV consistent with Lemierre's syndrome [Figure 1], and a CT chest revealed septic pulmonary emboli. The patient underwent bilateral tonsillectomy and continued on one month of oral amoxicillin and metronidazole. The patient had an uncomplicated and full recovery.

Discussion
Lemierre's syndrome is rare with a low annual incidence of 3.6 cases per million people, which rises to 14.4 cases per million people in the age group of 14 to 24 years.4 There is no clear evidence of gender
predominance and overall increase in the incidence of this disease.\textsuperscript{5}

The pathogenesis is thought to be linked to antecedent viral infection. For example, Epstein Barr virus replication may alter the pharyngeal mucosa and facilitate bacterial penetration and local invasion.\textsuperscript{5,6} Several cases of Lemierre’s syndrome post-viral and bacterial infections have been reported.\textsuperscript{7} \textit{F. necrophorum} has strong endotoxic properties with increased leucotoxin production. It is thought that the organism invades the pharyngeal space and IVJ via the haematogenous route or via the lymphatic system causing thrombophlebitis.\textsuperscript{8} Direct spread of the infection from the tonsil into the loose connective tissue of the pharynx is another possibility.\textsuperscript{9} Serious complications are possible and include septic pulmonary emboli, infection of the large joints, and abscesses in various tissues, predominantly brain, liver and spleen.\textsuperscript{5,10}

Treatment involves abscess drainage and prolonged antimicrobial treatment, commonly metronidazole plus penicillin, due to the frequent involvement of mixed organism. The use of anticoagulants is controversial.\textsuperscript{5}

It is important to consider Lemierre’s syndrome in patients with persistent or worsening pharyngitis. In those circumstances, blood cultures are essential as they can direct patient management if an organism such as \textit{F. necrophorum} is detected. Radiologic imaging studies are necessary to demonstrate possible thrombosis.

\textbf{Figure 1.} CT scan with contrast of the neck showed a filling defect in the left internal jugular vein (IJV).

\textbf{Competing interests:} Nil

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\textbf{Acknowledgment:}
Thank you to all Canterbury Health Laboratories staff.

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New Zealand has always had a close association with the Cook Islands and Cook Islanders travel freely between the two countries. Whilst in New Zealand they may need to see a health professional—both in primary and secondary care. A significant number of Cook Islanders each year are transferred from the Cook Islands to New Zealand for medical or surgical treatment not available in the islands.

When Cook Islanders return home to the islands, many have been prescribed medicines in New Zealand that are either not available in the Cook Islands or not subsidised by the Ministry of Health, Cook Islands. This means, that medicines need to be changed to a subsidised pharmaceutical, or, if that person wishes to stay on the medicine prescribed, he or she will incur extra costs. These factors may lead to problems with the patient in obtaining a reliable supply, cause financial strain and non-compliance. It can also place a strain on the patient and clinician relationship.

The Cook Islands has a limited pharmaceutical budget and with a small population means that only a limited range of essential medicines can be funded. For example, Enalapril is the only ACE inhibitor subsidised.

The most recent revision of the Cook Islands Essential Medicines List (EML) is available for viewing or for download from the Ministry of Health website: www.health.gov.ck located under Staff Services.

We urge all New Zealand physicians to view this EML and share with colleagues. Choosing medicines from the EML would assist greatly in facilitating smoother and safer transition of care for the people who journey between our two countries and health care systems.

For essential medicines which are not on the list and for which no alternative prescription exists, we recommend that the Special Request for Drug Supply form identified within the EML on the Ministry website is downloaded, completed and faxed to the address provided on the form.

For specialised treatments used for rare conditions (eg many New Zealand Section 29 oncology medicines); the Chief Pharmacist should be contacted. In this way when Cook Islanders return home they can be assured, that, in the majority of cases, there will be a continuity of supply of their medicines.

I thank you in anticipation.

Yours sincerely,

Elizabeth Iro
Secretary of Health
Cook Islands
LETTERS

Time for the New Zealand health sector to divest all investment funds out of fossil fuels

Hayley Bennett, Nick Wilson, Alistair Woodward

In June last year the British Medical Association divested its investment funds out of the fossil fuel sector,1 and Norway’s state pension fund (the world’s biggest sovereign wealth fund), has recently adopted “new criterion to exclude companies whose conduct to an unacceptable degree entail greenhouse gas emissions”.2

The Guardian newspaper has also started a campaign asking the world’s largest health charities to divest from fossil fuels.3 4 The Guardian cites the disjunction between the aim of the charities to improve public health, and their support for climate-damaging fossil fuels that are harming human health and wellbeing.5 6

Given the growing momentum behind fossil fuel divestment – well supported by the scientific community4 – it seems timely to ask ourselves, as health professionals and members of health organisations, what is happening in our own backyard?

Burning all of the current proven fossil fuel reserves will result in carbon emissions much greater than the 2°C carbon budget for a ‘safe’ climate allows.7 8 Yet fossil fuel companies continue to search for new reserves to extract, including in New Zealand.9 This ‘business as usual’ approach of continued fossil fuel extraction and burning puts us on a path toward 4–7°C warming by the end of the century.8 10

The fifth Intergovernmental Panel on Climate Change (IPCC) report states that the health impacts of a 4°C temperature rise will be more than twice those of a +2°C rise. In such a climate, parts of the world may no longer be able to support human health because of extreme weather, limits on working outdoors, and severely reduced food.5

The rest of the world (including New Zealand) may face slightly lesser direct effects in a +4°C climate, but will potentially have to deal with enormous new health and social challenges from indirect effects (eg, population migration/displacement, conflict).11

Thus the urgent need to set the world on a low carbon pathway. The good news is that this can boost public health as well as protecting the climate. Decreased fossil fuel burning (especially coal) will also decrease health damaging air pollution, the cause of a large global burden of disease.12

If this is not convincing enough, then one can make the economic argument that keeping money invested in fossil fuels no longer makes financial sense given the risk of ‘stranded assets’ as the world transitions to a low carbon economy.7

Some will argue that continued burning of fossil fuels to aid economic development (and alleviate poverty) in poor countries is a more immediate and important concern for global health. However energy growth is not tightly coupled with human development, and the priority, in our view, is poverty alleviation (ie meeting basic human needs) rather than increasing consumption. In low– and high–income countries, there are many low–carbon routes to achieve both better living standards and improved health.13

So, as New Zealand health professionals, health charities, and members of health organisations and research bodies, we need to question our investment funds. That includes The Accident Compensation Corporation (ACC) investment fund, District Health Board Super Schemes, health professional insurer/lender/investment companies, and investments held
by universities. ACC alone has over $600 million invested in fossil fuel holdings (coal, oil and gas). It would not be the first time that health has acted ethically to remove financial support from health damaging products. The health profession also played a key role in the divestment from tobacco.

Of course, the New Zealand health sector also needs to transition away from burning fossil fuels to heat its hospitals and to adopt more energy conservation measures (as per the National Health Service in the United Kingdom). But the key responsibility is still with New Zealand's central government to: (i) show international leadership and set bolder emission reduction targets; (ii) to substantially upgrade the (near moribund) Emissions Trading Scheme; (iii) to cease subsidising oil and gas exploration; and (iv) to adopt more effective policies that maximise the health co-benefits of a lower carbon society (eg, home insulation and cycling infrastructure). Collectively, such actions will help to mitigate climate change, generate benefits for the health of New Zealanders, and return New Zealand to be a respected member of the international community.

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Occupational therapy intervention for residents with stroke related disabilities in UK care homes

Occupational therapy provided to survivors of stroke living at home has shown good evidence of benefit. This trial sets out to evaluate whether a similar intervention confers benefit to stroke patients who live in care.

Over 1,000 survivors of a stroke resident in 228 care homes in the UK participated. The treatment arm received standard care plus the intervention—a three month programme of occupational therapy targeting personal activities of daily living (for example, feeding, grooming, dressing, bathing, moving from bed to chair), delivered by qualified occupational therapists and assistants.

The activities of daily living in the treated patients and those with usual care were compared three months after randomisation. Unfortunately, the intervention has no impact on measures of functional activity, mobility, mood, or health related quality of life, at all observational time points.

BMJ 2015;350:h468

Association between vitamin B12 deficiency and long-term use of acid-lowering agents

Acid-lowering agents (ALA), such as proton pump inhibitors (PPI) and histamine 2-receptor antagonists (H2RA), are commonly used medications for gastrointestinal pathology relating to excessive acid secretion.

It has been suggested that the long term use of such agents might cause impairment of vitamin B12 absorption. Vitamin B12 is protein-bound in its natural state. Gastric acid and pepsin convert it to free vitamin B12, thus facilitating its absorption in the terminal ileum.

This meta-analysis reviewed this issue by reviewing data from four case-control studies and one observational study. The conclusion reached was that chronic use of ALA was significantly associated with the development of vitamin B12 deficiency.

Internal Medicine Journal 2015; 45:409-416

Everolimus-eluting stents or bypass surgery for coronary disease?

This report concerns a randomised noninferiority trial at 27 centres in east Asia. 880 patients with multivessel coronary artery disease were randomised to percutaneous coronary intervention (PCI) with everolimus-eluting stents or coronary artery bypass grafting (CABG). The primary end point was a composite of death, myocardial infraction, or target-vessel revascularisation at two years after randomisation.

The researchers report that there were no significant differences seen between the two groups in the occurrence of a composite safety end point of death, myocardial infraction, or stroke. However, the rates of any repeat revascularisation and spontaneous myocardial infraction were significantly higher after PCI than after CABG.


URL:
The Hospital Ship *Maheno*

The *Maheno*, in her own form of service, is well worthy of being associated with the heroic men who have won much distinction for New Zealand. We have had between three and four thousand sick and wounded through our hands. During the time we have been on the station.

I cannot adequately convey to you a picture of what goes on each time we get to the Front. It is something like this: We have discharged our last cargo of sick and wounded men at one or other of the base centres, after, at most, two days' sailing, during which we have a general clearing up of the ship—a process of absolute necessity and we are back again at our old anchorage in the bay, and just over there the same old game is being played. From ships and land batteries the shells are hurtling through the air, to which the enemy replies as vigorously as he can.

The din is sometimes awful, and is greatly intensified by the sound of rifle fire, machine guns, and the dreadful hand-bombs. Airships of various kinds float above the positions, doing useful scouting work. Torpedo boat destroyers and monitors are moving about; getting in their say at times very effectually. It is rather exciting to watch the attempts of the enemy to bring down or drive off our aircraft by their shrapnel fire, as, also, their efforts to sink or cripple our destroyers and monitors.

The shells fall to the right and left of the ships, but we have never seen any damage done, except, perhaps, to the fishes, when the shells burst in the water. When an attack is made, either by our people or the enemy, we know that our gruesome, though helpful work will soon begin, and all the necessary preparations are made to meet the great needs of the men who will soon be coming to us. Surgeons, chaplains, nurses, and hospital orderlies, and ships officers, too, are ready to do all they can to help the dear fellows, who will need all the help we can give to them.

We see a battle in progress during the late afternoon, and on into the evening, and in a short time the lighters draw up alongside the ship and pass over to us their loads of wounded and exhausted men, and this goes on during the night until the hospital ship can take no more; and, as soon as we get our sailing orders, we lose no time in getting to the specified base, where the "cases" are transferred from to be taken to the various hospitals at that particular base. The work is exceedingly trying to all engaged in it; the suffering and misery is so concentrated all about us. When one hospital ship leaves the Front for a base, another ship is ready to take its place.

When the full account of the inexpressibly valuable services which the *Maheno* has rendered to the sick and wounded at this "front" is told, the people of New Zealand will be more than thankful that they so
100 YEARS AGO

splendidly equipped her and sent her on this great mission. We left New Zealand as No. 1 Hospital Ship. Our official number on this station is No. 30, so, you see, we are one among many; but it is acknowledged by all who know her work that she is in most respects the most efficient ship on the station, and the expressions of gratitude we receive from those who have come under our care gladden our hearts more than I can tell.

We have had far more Australian and British patients on board this ship than New Zealanders. The wounded and sick are brought down to the dressing stations on the beach, and are sent off to the hospital ships as quickly as possible after they arrive. No discrimination can be made, and so it unavoidably happens that our New Zealand lads will sometimes find themselves on other ships; but, in any case; they are not long before they arrive at the base hospitals.

A word of praise ought to be added here of the splendid self-sacrificing work of the shore ambulance men. The stretcher-bearers, have done wonders, and, looking at the nature of the country over which the fighting takes place—high hills, and deep gullies, and very rough ground—one wonders how they manage to get the stretcher cases down to the beach. These noble men have paid a heavy toll in life and limb and health at the shrine of duty and humanity, and the fighting men are full of appreciation of their services.

(From a letter from Chaplain-Major Dutton.)

NZMJ December 1915:301-302

URL: