CONTENTS

This Issue in the Journal
3 A summary of the original articles featured in this issue

Editorial
6 Equity, education and health outcomes in Pacific people in New Zealand
Kiki Maoate, Frank Frizelle

Original Articles
9 Community experience of a Pacific Immersion Programme for medical students in New Zealand
Melbourne Mauiliu, Faafetai Sopoaga, Alec Ekeroma
19 HIV-related risk factors among black African migrants and refugees in Christchurch, New Zealand: results from the Mayisha-NZ survey
Gerida Birukila, Cheryl Brunton, Nigel Dickson
28 Survival from out-of-hospital cardiac arrest in Wellington in relation to socioeconomic status and arrest location
Aimee L Fake, Andrew H Swain, Peter D Larsen
38 How long do acute coronary syndrome patients wait for reperfusion, diagnostic coronary angiography and surgical revascularisation?
Jamie Voss, Andrew Martin, Imogen Caldwell, Mildred Lee, Andrew J Kerr
49 Vitamin D insufficiency and deficiency: New Zealand general practitioners’ perceptions of risk factors and clinical management
Anthony I Reeder, Janet A Jopson, Andrew R Gray
61 Pharmaceutical quality of “party pills” raises additional safety concerns in the use of illicit recreational drugs
Simon A Young, Thilini R Thrimawithana, Ushanta Antia, John D Fredatovich, Yonky Na, Peter T Neale, Amy F Roberts, Huanyi Zhou, Bruce Russell

Viewpoint
71 How are New Zealand’s District Health Boards funded and does it matter if we can’t tell?
Erin Penno, Robin Gauld
Clinical Correspondence

85 Peripartum cardiomyopathy  
    Fitzgerald T Zhanje

91 Dramatic hydronephrosis caused by pelvi-ureteric junction obstruction in a  
    morbidly obese man  
    Daniel Chou-yen Lin, Rowshan Khaleghian, Carl Horsley, Jamie Kendrick-Jones

93 Laparoscopic cholecystectomy: an unexpected and delayed complication  
    Nikola Lilic, Sergej Cicovic

97 Medical image. Pneumomediastinum—an unusual complication of diabetic  
    ketoacidosis  
    Venkata M R Katreddy, George I Varughese, Ananth U Nayak

Letters

99 Is censorship of films a useful solution to the problem of covert tobacco  
    advertising? (with response by Maubach et al)  
    Janine Paynter, Simon Chapman

105 Fat prejudice in health care: Anita Killeen considers whether physicians build  
    less rapport with obese patients  
    Anita Killeen

108 Response to Dr J Havill letter entitled Medically Assisted Dying  
    Sinead Donnelly, Murray Hunt

110 Neglecting the basics? Survey of water and soap availability in council-  
    operated public toilets in New Zealand  
    Nick Wilson, George Thomson

100 Years Ago in the NZMJ

115 Gonorrheal Arthritis

Methuselah

116 Selected excerpts from Methuselah
This Issue in the Journal

Community experience of a Pacific Immersion Programme for medical students in New Zealand
Melbourne Mauiliu, Faafetai Sopoaga, Alec Ekeroma

The Pacific Immersion Programme is run by the Dunedin School of Medicine where fourth-year medical students spend a weekend with a Pacific family to experience first-hand about their way of life. This paper presents the feedback from the Pacific families involved. Pacific families taught the medical students about themselves through storytelling, singing, dancing and making them a part of their family for the weekend. The Pacific families reported that the medical students influenced their children to look at going to University and the larger community about considering healthier lifestyle choices. Overall the community together felt this was a very positive and useful experience and are considering ways to improve the cultural learning for the medical students.

HIV-related risk factors among black African migrants and refugees in Christchurch, New Zealand: results from the Mayisha-NZ survey
Gerida Birukila, Cheryl Brunton, Nigel Dickson

This study was a survey of black African migrants and refugees in Christchurch. We collected data on demographic characteristics (e.g. age and sex), previous HIV (human immunodeficiency virus) testing, HIV risk perception, previous STI (sexually transmitted infection) diagnosis, use of health services and sexual behaviours. There were 245 people who took part (150 men and 95 women) with an average age of 28 years (range 16 to 58). Risk factors for HIV identified in this study included: low condom use, low HIV risk perception, having more than one sexual partner, previous STI diagnosis and lack of voluntary testing for HIV. Our findings support the need for HIV prevention efforts among black Africans in NZ to consider the influence of culture in understanding and responding to HIV risk, condom use and sexual behaviours.
Survival from out-of-hospital cardiac arrest in Wellington in relation to socioeconomic status and arrest location
Aimee L Fake, Andrew H Swain, Peter D Larsen

For patients who suffer an out-of-hospital cardiac arrest in the Wellington region, survival to discharge from hospital is influenced by location, and is more favourable with those arrests occurring in public places. This study found that this is because public cardiac arrests are more likely to be witnessed and the patient is more likely to be experiencing a cardiac arrest responsive to defibrillation, when first attended by emergency medical services. Within the residential cardiac arrests, socioeconomic status did not influence bystander CPR rates, the initial presenting rhythm, or ambulance response times, and survival was not correlated with socioeconomic status. This study found that there is no evidence that any socioeconomic group requiring community and ambulance resuscitation in the Wellington region is disadvantaged.

How long do acute coronary syndrome patients wait for reperfusion, diagnostic coronary angiography and surgical revascularisation?
Jamie Voss, Andrew Martin, Imogen Caldwell, Mildred Lee, Andrew J Kerr

This paper examines the relevant waiting times and delays to appropriate investigation and management for patients presenting to Middlemore Hospital with a heart attack or angina. The main results are (1) that emergency angiography (a dye test to look for heart artery blockages) with a view to stent implantation occur in a timely fashion for patients presenting with a large heart attack during working hours, but delays occur after hours where this treatment is offered via transfer to Auckland City Hospital, (2) that high rates of angiography are being undertaken in the heart attack and angina population in a timely fashion but that having advanced kidney disease or presenting to hospital late in the working week are associated with a longer delays for this test, and (3) the waiting time for bypass cardiac surgery for these patients is unacceptably long. Continuing audit and quality improvement projects are underway to address these delays.

Vitamin D insufficiency and deficiency: New Zealand general practitioners’ perceptions of risk factors and clinical management
Anthony I Reeder, Janet A Jopson, Andrew R Gray

To help inform possible educational resources to optimise vitamin D and sun-exposure advice, this paper reports survey findings from 1,089 NZ GPs of their perceptions regarding vitamin D sources; risk factors, prevention and management of vitamin D deficiency and insufficiency; supplement prescribing practices; related patient enquiries. Sun exposure was considered the main vitamin D source in summer (85%), but in winter (47%) supplements (13%) and food sources were more commonly mentioned. Daily sunlight exposure at low UV times (79%) was identified as the main factor preventing deficiency, followed by high-dose supplements and fortified foods (54% each), winter sun-protection relaxation (48%), daily low-dose supplements (47%), daily sunlight exposure at peak UV times (35%) and relaxation of sun protection, year-round. Patient characteristics prompting alertness to vitamin D
status included being housebound or institutionalised (96%), wearing concealing clothing (88%), past history of bone fractures (87%), age over 65 years (84%), poor nutrition (71%) and current bone disease (69%). Insufficiency and deficiency were managed primarily through high-dose supplementation and advice to receive more sunlight. Almost half (47%) had received patient requests for vitamin D testing, and 40% requests for prescribed vitamin D.

Pharmaceutical quality of “party pills” raises additional safety concerns in the use of illicit recreational drugs
Simon A Young, Thilini R Thrimawithana, Ushtana Antia, John D Fredatovich, Yonky Na, Peter T Neale, Amy F Roberts, Huanyi Zhou, Bruce Russell

Until reclassification as controlled drugs in April 2008, “party pills” containing 1-benzylpiperazine (BZP) either alone or, more usually, in combination with 1-(3-trifluoromethylphenyl)piperazine (TFMPP) were legally manufactured, marketed and consumed by adults in New Zealand. This study aimed to evaluate the amount of BZP and TFMPP in selected party pill formulations and the rate of release of BZP/TFMPP from 5 different party pill formulations. Study results showed that many party pill formulations contained considerably high concentrations of BZP and TFMPP than the amounts stated on the label. Whilst the delayed onset of neurological effects experienced by the party pill users may also result from the lack of rapid release of BZP/TFMPP following ingestion.

How are New Zealand's District Health Boards funded and does it matter if we can’t tell? ((viewpoint article))
Erin Penno, Robin Gauld

The Population Based Funding Formula (PBFF) is used to distribute around $9 billion annually among the 20 District Health Boards (DHB), representing over two-thirds of the total public health spend. However, there is minimal public information available regarding the methods used in the PBFF and, consequently, the process of determining DHB allocations. We sought to investigate how the PBFF works and found that no comprehensive description of the process in its entirety has ever been produced. In light of this, based on information we obtained from the Ministry of Health, we have we have compiled our own version of how we believe the PBFF allocations are determined. This article summarises our findings and includes an example calculation of the inpatient cost weights to illustrate our understanding of the process. Our hope is that this article will improve understanding and stimulate debate on the PBFF as well as highlight the need for greater transparency around the funding process.
Equity, education and health outcomes in Pacific peoples in New Zealand

Kiki Maoate, Frank Frizelle

In this issue of the Journal Mauiliu et al’s qualitative article—on the experience of Pacific Immersion Programme at University of Otago’s Dunedin Medical School campus—is consistent with some of the changes required to improve the health of Pacific peoples in New Zealand.

The Pacific Immersion Programme is a partnership between Otago University and the Dunedin Pacific community where medical students are invited to become part of the community by living with Pacific families over a weekend. Eighty medical students in their fourth year of study are divided into four groups and hosted by one of four community groups—either Cook Island, Samoan, Tongan, or a mixture of smaller minority ethnic groups.

The Programme looks at the feedback from 64 community members who took part in focus groups about this aspect of medical training. Unsurprisingly the study shows that the participating groups thought that this was a worthwhile experience, more importantly this educational experience could lead to wider implications for the training of the health professionals to increase their understanding and responsiveness to the needs of the Pacific communities.

This Programme—along with other programmes targeting schools and communities—aligns with the government strategies to improve the health and wellbeing of Pacific peoples through innovation. The intended outcomes of these programmes will become evident over the next 10–15 years provided there is a robust monitoring and evaluation process in place. The long-term investment by the institutions and communities into the programmes will be required to contribute to reducing the disparities in the health outcomes for Pacific peoples.

Pacific peoples make up about 7% of New Zealand’s population and their life experience and health outcomes are inferior to many other ethnic groups in New Zealand. For instance, in 2006, the estimated life expectancy for Pacific men was 73.9 years and 78.9 years for Pacific women, more than 4 years less than for the total New Zealand population. Furthermore, between 2002 and 2006, Pacific children were 1.5 times as likely to be admitted to hospital for gastroenteritis and 4.5 times as likely as European children to be admitted to hospital for serious skin infections.

Pacific children and young people (aged 0–24 years) are also nearly 50 times more likely than European children (and twice as likely as Māori) to be admitted to hospital with acute rheumatic fever and are approximately twice as likely to have depression, anxiety issues, or to make suicide attempts compared to the rest of the population.

From 2006 to 2007, 10% of Pacific peoples aged over 15 years were diagnosed with diabetes—approximately three times the diagnosis rate for the total New Zealand population. Moreover, between 2002 and 2004, the rate for new cases of stroke in
Pacific adults was 318 per 100,000, compared with 179 per 100,000 for the total population.\(^5\)

The incidence and mortality rates for cancer in Pacific peoples in New Zealand were not published for 2007 because it was considered that the data would not produce meaningful rates because of the small number of events.\(^6\) In 2004, the incidence of cancer among Pacific peoples was 286.1 per 100,000, 10% lower than non-Māori, non-Pacific peoples.\(^7\) However, the age-standardised cancer mortality rates were higher for Pacific peoples—168.1 per 100,000 (50% greater than that for non-Māori, non-Pacific peoples).\(^8\) Sadly, the inequalities in survival rates for Pacific peoples increased between the 3-year periods of 1981–84 and 2001–04.\(^9\)

A recent Ministry of Health report stated:

“Unless preventative measures and treatment are tailored so that they are more effective for Pacific peoples, the incidence and impact of chronic diseases in Pacific populations will continue to grow. This places serious financial burdens on families and communities and puts pressure on the support systems these groups provide. Pacific peoples are often more exposed to disease risk factors.

To improve Pacific peoples’ health outcomes these factors need to be addressed through effective prevention and health-care interventions. Current interventions have been more successful in improving health outcomes among the European population. This indicates that the health system is responding inadequately to the health needs of Pacific peoples.”\(^7\)

Previous reports on equity in New Zealand healthcare has stated that ethnic disparities in socioeconomic status and in other social and environmental determinants of health result from the entrenched unequal power relations that underpin and sustain a racialised society.\(^10\)

Health outcomes can be significantly improved through mechanisms that improve access to health and disability services\(^10\) along with better understanding by health practitioners of the Pacific Island cultures.

Every system, policy, service, process and health professional plays a role in the active reduction of these disparities. A small part of achieving this is increasing knowledge of Pacific peoples by our future doctors.

**Competing interests:** Nil.

**Author information:** Kiki Maoate, Paediatric Surgeon and Urologist; Frank Frizelle, Head of the Department of Academic Surgery; University of Otago and Christchurch Hospital, Christchurch

**Correspondence:** Mr Kiki Maoate, Department of Paediatric Surgery, Christchurch Hospital, PO Box 4345, Christchurch, New Zealand. Email: Kiki.Maoate@cdhb.health.nz

**References:**


Community experience of a Pacific Immersion Programme for medical students in New Zealand

Melbourne Mauiliu, Faafetai Sopoaga, Alec Ekeroma

Abstract

Aim To obtain the views of the Pacific community about their involvement in a Pacific Immersion Programme, to determine the programme’s viability as a resource for medical education.

Method The Pacific Immersion Programme run by the Dunedin School of Medicine had four attachments (March, April, June and September) with local Pacific communities in 2011. Community focus groups were held the week immediately after each attachment. There were two focus group sessions for each attachment, one obtained the views of adults and the other of young people. Focus groups consisted of eight participants recruited through community coordinators and were facilitated by trained research assistants. Sessions were audio recorded and analysed using a thematic framework.

Results Sixty-four members of the community participated in the focus groups. Eight themes emerged from the discussions. The community agreed the Pacific Immersion Programme strengthened community cohesion through efforts to engage the students. There was shared learning and created opportunities for engagement between medical students and the community’s younger generation. The Pacific families shared with the students about their health and context through storytelling, dancing and singing and cultural ceremonies. Participants hoped students achieved what they wanted from the programme and the experience was useful for their work in the future.

Conclusion Community based medical education is a unique and useful approach for teaching medical students about the health of a minority community. The purpose of the paper is to highlight the impacts on participating communities. Nurturing established relationships and providing mutual benefits for both partners will ensure this opportunity will be available as a learning resource for future medical students.

Many medical schools have incorporated cultural competency training into their curriculum in recognition of the increasingly diverse and multi-ethnic communities health professionals will work in.1–6

Research has shown that the provision of culturally competent care can promote better health outcomes.7–10 The delivery of cross-cultural competency training varies across medical schools from lectures, workshops, case studies to immersion programmes based in communities and others.11–17

Community-based medical education is being recognised as an important component of medical school curricula and many community attachments place students in a clinical setting;4,18,19 this is especially important in underserved communities where
there is a recognition of the need to work alongside them in an effort to improve health outcomes.20

Pacific peoples make up approximately 7% of the total New Zealand population and are over-represented in poor health statistics and low socioeconomic status compared to the total population.21,22 The government in its efforts to improve Pacific health has developed through the Ministry of Health and the Ministry of Pacific Island Affairs ‘Ala Mo’ui, a strategic document outlining pathways to health and wellbeing.23 The New Zealand Medical Council has published guidelines on Best Practice when working with Pacific peoples.24

In alignment with these efforts to improve Pacific health outcomes, the University of Otago Dunedin School of Medicine partnered with the local Pacific community to trial a Pacific Immersion Programme. The University had previous experience with a successful immersion programme for Māori, the indigenous people of New Zealand.4

Those who wish to enter medical school at the University of Otago through the undergraduate pathway, are required to do a compulsory health sciences first year course. Selection into medicine is based on achieving an aptitude and academic threshold. Training in Medicine consists of an Early Learning in Medicine (ELM) component (Years 2 & 3), and Advanced Learning in Medicine (ALM) component (Years 4, 5 & 6).

The teaching of Pacific Health in the curriculum consists of whole class lecture series in the ELM. The Pacific Immersion Programme was introduced in Year 4. Pacific Health teaching in Year 5 provides students with the opportunity to conduct public health and primary care clinics in the local Pacific community (under supervision). In the final year of training, medical students have the opportunity to do their medical electives in one of the Pacific Islands, or conduct a research project that engages Pacific communities.

The Pacific Immersion Programme was piloted in 2010 to explore whether it could be a useful method for teaching medical students about the health of Pacific peoples in New Zealand. Some detail about the Pacific Immersion Programme and its development was reported in an earlier publication.25

The Pacific Immersion Programme

The Pacific Immersion Programme is a collaborative initiative between the University and the community where medical students are invited to be part of the community over a week-end. There are four attachments during the year. Eighty medical students from the ALM Year 4 class were divided equally into four groups.

The Pacific community organized four Pacific groups, each hosting students once only during the year. These groups were Samoans, Cook Islanders, Tongans and a mixture of small minority ethnic groups. Each Pacific group nominated a community leader (coordinator) to assist the University programme coordinator. Pacific community meetings were held to explain the purpose of the programme, requirements, expectations, and to provide the opportunity for people to ask questions.

The University programme coordinator attended all meetings with the community coordinator. The University coordinator, a Pacific health professional was a member
of the local community with well-established community relationships. This link assisted the process and the successful negotiation of a buy-in from the community. Families who wished to participate would approach the community coordinator, who was responsible for selecting participating families. Families involved in the programme completed a consent form. Information sheets about the programme and its requirements were provided to all participating families. Each Pacific group received a gift from the University for their contribution. The distribution of the gift provided was determined by each Pacific group.

Cultural processes, protocols and expectations were explained to students. Leaders from each community group met with students at the University a day prior to each attachment to brief them on what to expect. This provided students with the opportunity to ask questions they may have about their host families, cultural protocols or other issues. Medical students were briefed about the objectives of the programme. These were to:

- Experience Pacific family life in New Zealand
- Observe how culture, religion and socio-economic environment influence health
- Practise and observe cross cultural communication
- Provide opportunities for the community to teach them about their health and how best to engage with them in the clinical setting and
- Determine from observation and information shared, what could be useful for their own practice in the future

The University coordinator had overall responsibility for the program. Safety protocols were in place if there were concerns from either students or community participants. The University coordinator worked together with each community coordinator to match students to host families. These were sometimes determined by student needs (for example, a student may be allergic to animals) or by a request from a family (for example, a family with young children may request a medical student of the same gender).

Initial informal feedback about the programme from students, staff and the local Pacific community was affirmative. This resulted in the medical school’s decision to incorporate the Pacific Immersion Programme as a required part of learning for all medical students at the Dunedin School of Medicine starting from 2011. It was important however, to explore further the views of medical students and the Pacific community about the programme.

For the students, whether the programme was useful as a teaching method, and for the community their views about the programme and whether they were happy to participate in future programmes.

The views of students were captured through reflective essays they were asked to complete after the programme. These results have been reported. Feedback from students was provided to the community through community coordinators. This paper outlines specific feedback from the Pacific community about their experiences and views of the Pacific Immersion Programme.
The aim of this study was to obtain the Pacific community’s views about their involvement and experience in a Pacific Immersion Programme, to determine its viability as a resource for medical education.

Method

The Pacific Immersion Programme in 2011 consisted of four attachments within the Pacific community. Community focus groups were conducted one week following each attachment at a venue nominated by each community group. Two focus group sessions were conducted for each attachment. One group obtained the views of adults and the other the views from the youth. There were eight participants in each focus group recruited by the community coordinator. Consent for involvement in the focus groups was obtained from all participants.

All focus groups were facilitated and audio recorded by trained research assistants. A question schedule (Table 1) was provided to guide the discussions and aid the exploration of emerging topics during the focus groups. The sessions took approximately two hours and refreshments were provided. Grocery vouchers were given to community coordinators and participants in acknowledgement of their time and contribution.

The focus group discussions were audio recorded and transcribed into verbatim script. A mixture of deductive and inductive approaches were used to identify themes consistent with the question schedule embedded in the data. The data was coded and emerging themes were used to build a thematic framework, to which the participant responses were categorised.27 Analysis and interpretation of the results were carried out by all authors.

Description of the most important themes are presented in the results. Ethics approval for the research was obtained through the University of Otago Human Ethics Committee, at the departmental level.

Table 1. Pacific Immersion Programme Community Focus Group Question Schedule

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please explain or outline your experience of the Pacific Immersion Programme.</td>
<td></td>
</tr>
<tr>
<td>What parts of the Pacific Immersion Programme did you enjoy/like?</td>
<td></td>
</tr>
<tr>
<td>What parts did you not enjoy/dislike?</td>
<td></td>
</tr>
<tr>
<td>Did your family feel comfortable having the student in your home? Please explain.</td>
<td></td>
</tr>
<tr>
<td>How did the student fit in with your family?</td>
<td></td>
</tr>
<tr>
<td>What influence (if any) did the student have on your family?</td>
<td></td>
</tr>
<tr>
<td>What did you do to enhance the student’s learning of our Pacific culture? (e.g., Pacific meal, Pacific dance, language lessons etc.)</td>
<td></td>
</tr>
<tr>
<td>What do you hope the student learnt from you during the Pacific Immersion Programme?</td>
<td></td>
</tr>
<tr>
<td>Do you have any suggestions on how the current programme could be improved?</td>
<td></td>
</tr>
<tr>
<td>Would you be interested in being involved again in this teaching programme?</td>
<td></td>
</tr>
<tr>
<td>Any other comments please.</td>
<td></td>
</tr>
</tbody>
</table>

Results

There were 64 members from the Pacific community who attended focus group meetings. Some were involved in the programme because it provided the opportunity for community gatherings. Others felt the programme would benefit them or others in
the future by helping future doctors to have a better understanding of the Pacific worldview. The programme strengthened community relationships and enlarged networks for participants. All participants reported satisfaction and a willingness to be involved in future programmes.

Eight themes emerged from the focus groups and are outlined below:

**Theme 1: Strengthening Communities**—Families wanted to be part of the programme because hosting the students provided them with an opportunity to meet as a community. In the process they enjoyed conveying to the students their values and the importance of family and community networks.

“What I enjoyed too was the dancing and the performances, and the food and just the whole sense of family. Not individualism but the tightness of families, getting students to realise how important families and family values are.” (Participant No.1, Female Adult)

“I enjoyed everybody being together really, it’s a real thing with our people—togetherness and we can make it very special to see all the students as well that have never had a taste of our cultures but we sort of bring it to them and share it with them.” (Participant No.2, Female Adult)

**Theme 2: Shared Learning**—People felt very happy that students took an interest in their Pacific culture and also noted that they themselves learnt about the different cultures of their students. The community felt that the experience and the exchange of cultural knowledge have enabled them and the students to be comfortable in different cultural settings.

“Their interest in our culture and traditions … I was very happy especially when she would ask why we did this and that.” (Participant No.3, Male Adult)

“The best part I liked … was the diversity and multiculturalism in terms that we also learnt the culture of the student. Finding out many similarities in our cultures was very good.” (Participant No.4, Male Adult)

“… accepting her into our home makes her feel comfortable to go into a different culture, and there were three cultures under the same roof, it was very special. We enjoyed it.” (Participant No.5, Female Adult)

**Theme 3: Engagement**—Participants felt the students fitted in well with their families. Most families were nervous initially but as they got to know the students they became comfortable, and noted that the students got along very well with the younger children. The community highlighted that the success of the programme also depended on the students’ willingness to participate and become involved in their family activities.

“For me and my family I wasn’t really quite sure how it would be like but just after the Saturday morning we were allowed to take them home, I saw her mixing around with my small children and with my little girl sitting on her lap chatting away. At that moment I felt she will be easy so when we got home she was like a part of our family that just came over for a week. We sat around and we talked, there was no big hassle we really felt comfortable when she was around at home.” (Participant No.6, Female Adult)

“[Student] really fitted in well with our family because there wasn’t big of an age difference between her and my daughter … when we arrived home we just sat there and started talking away … I asked my daughter to make a cup of coffee for her but [student] said “No, I’ll get up and do it myself”. My daughter had netball trials that afternoon so I went shopping with my student so it was like she was my daughter, pushing the trolley along. She fitted in well with us.” (Participant No.7, Female Adult)
Theme 4: Impact on families—Participants reported the medical students appeared to have a positive influence on the community and younger generation. Feedback from the youth included being encouraged by the medical students to aim for higher education. Some felt motivated and considered ways to adapt healthier and more active lifestyles after engagement with the medical students.

“The most interesting part of the weekend to me is the time my kids had … with [student]. They were talking after breakfast on Sunday, one of my kids always wanted to be a doctor and he loved to ask questions from [student]. On Sunday night when we went back home he was crying and couldn’t get to sleep because he missed [student], that is the influence she had on us especially for my children.” (Participant No.8, Female Adult)

“My experience is really about my daughter engaging with the students from things like going to University and personal goals … really this programme was for my daughter’s sake … my billet talked more to my daughter … which I was happy about because my daughter is the future. Their conversation with my daughter changed her attitude about hard work.” (Participant No.9, Female Adult)

“I can’t believe the food she loved … simple vegetarian food … we asked her what we are going to cook for her and she said vegetarian food so we got some vegetables and made a curry for her. So it was a first time for us to have a vegetarian meal and had no meat and we found that it was good. We feel good and … our bodies feel good. Now our family want to start eating a lot of vegetables.” (Participant No.10, Male Adult)

“For someone to … study and had a good relationship with her family … helping out with the family business … that’s influenced me in a sense that you can do things for yourself as well as be involved with your family … and she influenced me in … getting on with outdoor activities, going for long walks ….” (Participant No.11, Female Adult)

“She (student) kind of influenced me to stick to one thing, she wants to study to become a doctor which takes thirteen years and this is her fourth year and she hasn’t given up. If that was me, first year I’m out! But she actually told me if you keep doing it it’ll just flow real easily”(Participant No.12, Female Youth)

Theme 5: Community Based Learning—The community told stories about themselves, their Pacific heritage and their journeys in New Zealand. Many shared about their culture, screened cultural footages and showcased handicrafts and traditional attire. Learning was further enhanced by cooking traditional meals, singing and dancing, and for one community the students experienced a talent show.

“There were stories to the decorations in my house, each thing told a story about where I have been, whom I have met and more stories.” (Participant No.13, Female Adult)

“We did the lotu (evening prayers) and then it was dinner, mum told him that in our culture usually the parents eat first and kids eat afterwards … the kids do the apa fagago (bowl of water to wash hands) while the parents are eating.” (Participant No.14, Female Youth)

“… I cooked curry … I explained to her how Fijians when we have our meal the men eat first while we women wait … when the men all finish we dish our food and we sit down, when we pass somebody we say “Tulou” … that afternoon three students came together and we showed them how kava is mixed and how you clap your hands before you receive the bowl of kava.” (Participant No.15, Female Adult)

Theme 6: Challenges associated with creating reality—A discussion emerged from one of the focus groups where participants reflected that they could be better teachers by following their “normal routines”. It was a complicated issue given that Pacific families in their hospitable culture go out of their way to cater for guests. People felt that by continuing with their everyday practices the students will have a better understanding of the reality for Pacific families.
“I think that with all the things that we are doing, it’s not our normal daily life, and when the student comes we change, but I think the programme is for the student to come and learn from what we do daily. Now we shift and do something else and when they go back they say these people eat healthy but that’s not the case. What we need to do is live our normal way – the pig heads? Yes! The real way so we paint the right picture.” (Participant No.16, Male Adult)

“It’s like that on Sunday when we had [student], I said “I’m going to cook the pig’s head” and my wife said “Don’t do that!” “Why not?” “She’s going to look at what we are eating!” So I have to put it back and cook something else.” (Participant No.17, Male Adult)

**Theme 7: Value for Learning**—All members of the community strongly hoped that the students learnt knowledge about Pacific health, beliefs and culture that will assist them in their career when treating Pacific patients. These included factors associated with access to healthcare, the use of traditional healers, the role of food in the Pacific culture, the importance of putting the needs of the family before an individual and the high regard given to medical practitioners. They hoped the experience might result in a doctor-patient partnership where a Pacific patient will feel comfortable to interact, feel understood and supported by health care professionals.

“…we live as a family … that means extended family all living under one roof, also that going to the doctors would be the last thing on people’s mind … when there are so many of you the most important thing is feeding the family and paying the bills. From our student’s reactions he saw that addressing these issues was going to be something that would not happen overnight but rather a long process. Also when dealing with Pacific people they would have to do it within a community … because that is how we handle things, together as a community.” (Participant No.18, Female Youth)

“…to know about our background instead of trying to make us cut down on what we eat … try to understand our upbringing and our situation. Work with us rather than demand things of us.” (Participant No.19, Male Youth)

“… for many of our Pacific people they do not say anything because they assume that the doctors know what they are doing … sometimes I am not happy with the way … that myself and my family are treated it is not what I want. A lot of our … families are very shy and I feel they should be asking more questions. My experiences gave them the opportunity to learn … understand and value other people’s cultures.” (Participant No.20, Female Adult)

**Theme 8: Time allocation**—Insufficient time spent with the students as well as the option of not spending the Saturday night with families was a major issue across the focus groups. Participants felt the weekend was not long enough to form good relationships with the students and learn about each other; in addition if the student did not spend the night, then they will not be able to fully appreciate the experience.

“Suggest that the students stay for two nights rather than the one night as it’s not enough to get to know the families, students and culture.” (Participant No.21, Female Adult)

“There is a need to spend more time with them to learn and see our culture.” (Participant No.22, Male Youth)

“… there is not enough time … a lot of time is good to explain more … we know more and they learn lots more from us…” (Participant No.23, Male Adult)

**Discussion**

Pacific families felt the Pacific Immersion Programme was a worthwhile event. Some families were unsure about the programme initially because it was a new concept and uncertain whether students would “fit in”, but all enjoyed the experience.

Everyone felt the students fitted in well and helped them to consider healthier meal choices and initiated discussions in the community about ways to improve health.
Many believed the programme also had a positive influence on the younger generation. Families reported their young people enquired more about further education and pathways to tertiary institutions. They believed also the medical students were good role models for their children.

The families used different methods to enhance the cultural experience for the students. Students were welcomed using traditional ceremonies such as the kava ceremonies, singing and dancing. They shared stories about their homelands, journeys to New Zealand, use of traditional medicine and the influence of their own beliefs on the use of health services. There was a general consensus however that more time was needed for the programme to enhance the learning experience for the students.

A couple of similar studies exploring participants’ views on a Clinical Community Based Medical programme emerged with similar themes, the development of a closer relationship between the University, the Health system and the community, the opportunity to contribute to the education of future doctors, creating awareness of health issues, encouraging favourable health behaviours, overall satisfaction and a general desire to become a part of the programme on an on-going basis. This study however builds upon these findings to specifically obtain views from the community about their participation and pathways forward.

In improving the experience for medical students one of the communities discussed ways to improve cultural learning such as a Questions and Answers panel, language and dance workshops and timing of community events to coincide with the attachments. Participants were also very interested in obtaining more information and feedback from the University so they can reflect on how to improve the cultural learning experience of New Zealand’s future doctors.

The elements that made the establishment of the programme successful were support from senior leaders in the institution, having a Pacific staff in the University and good relationships between the institution and the community. The presence of Pacific academic leadership/personnel within the institution was a vital link in the process. Connection with diverse communities requires diversity within training institutions.

The continuation of the Pacific Immersion Programme is dependent on maintaining the good relationship between the University and the community. Feedback from students and the community on areas that need improvement will help improve the programme. The allocation of students to different families is the role of the community coordinators with assistance from the University programme coordinator.

The University is dependent on their knowledge of the families and who would be suitable for the programme. There are safety issues to be considered on both sides and careful attention is given to this. The community coordinator’s knowledge of all participating families, and the University coordinator’s assessment of student’s needs is vital in this process. Trust is established between two parties and every effort is made to ensure the best outcome for all involved.

**Conclusion**

The Pacific Immersion Programme is an innovative way to teach Pacific Health to future health professionals in New Zealand. Pacific families involved found the programme to be an enjoyable and useful experience. To ensure its continuity, careful
attention is needed to maintain good relationships and communication between the University and the Pacific community. This method for teaching culture and health can enhance the training of health professionals in other institutions.

**Competing interests:** Nil.

**Author information:** Melbourne Mauiliu, Department of Preventive and Social Medicine, University of Otago, Dunedin; Faafetai Sopoaga, Senior Lecturer – Pacific Health, Department Preventive and Social Medicine, University of Otago, Dunedin; Alec Ekeroma, Senior Lecturer – O & G, University of Auckland

**Acknowledgements:** We acknowledge Pacific community members involved in this research as well as Dr Sarah Lovell for training the community research assistants.

**Correspondence:** Dr Faafetai Sopoaga, Department Preventive and Social Medicine, University of Otago, Dunedin. PO Box 913, New Zealand. Email: tai.sopoaga@otago.ac.nz

**References:**

HIV-related risk factors among black African migrants and refugees in Christchurch, New Zealand: results from the Mayisha-NZ survey

Gerida Birukila, Cheryl Brunton, Nigel Dickson

Abstract

Aim To describe the demographic characteristics of, and HIV-related risk behaviours among, black African migrants and refugees in Christchurch.

Methods A cross-sectional survey of black African migrants and refugees in Christchurch was carried out. Ten trained African community researchers recruited study participants in social venues and events frequented by Africans. A short self-completed questionnaire collected data on demographic characteristics, previous HIV testing, HIV risk perception, previous STI diagnosis, utilization of health services and sexual behaviours.

Results Valid questionnaires were obtained from 245 respondents (150 men and 95 women) with a mean age of 28 years (range 16 to 58). Participants came from 13 different African countries. Risk factors for HIV identified in this study included: low condom use, low HIV risk perception, having more than one sexual partner, previous STI diagnosis and lack of voluntary testing for HIV.

Conclusions Our findings justify the need for developing an HIV prevention strategy for black Africans in New Zealand that is informed by local evidence. This strategy should also address sexual health needs of Africans including barriers to condom use, the availability of HIV/STI screening services and targeting sexual behaviours that increase vulnerability to HIV infection.

Black Africans in New Zealand carry a disproportionate burden of HIV/AIDS and are the second group most affected after men who have sex with men (MSM).

Despite making up less than 0.4% of the total New Zealand population, surveillance data show that about 19% of the 2643 people diagnosed with HIV since 1996 (when data on ethnicity began being collected) were African.\(^1\)

In addition, Africans account for just over half (51.2% of 490 women and 51.5% of 480 men) of all heterosexually-acquired HIV infections diagnosed in New Zealand, and nearly two-thirds (64.7%) of the 51 children diagnosed with HIV (pers comm AIDS Epidemiology Group).

Although the majority of Africans who have been diagnosed with HIV in New Zealand (96% of men and 91% of women) are believed to have been infected in Africa, there is evidence to suggest that some Africans are being infected in New Zealand.
In 2009, when the numbers of heterosexually-acquired HIV cases infected in New Zealand peaked, 7 of the 19 people diagnosed with heterosexually-acquired HIV infected in New Zealand were African.³

Although the New Zealand Immigration Service (NZIS) introduced mandatory HIV testing in November 2005 for people applying to live in New Zealand for 12 months or longer⁴ it is likely that some HIV-infected Africans who became residents before then may still not know their HIV status.

There is concern therefore both that there will be further new infections within African communities in New Zealand and that on-going sexual mixing across ethnic groups within New Zealand may result in HIV infection spreading from groups with higher prevalence to the general population.

Overseas, in many resource rich countries, the same pattern has been observed with a higher incidence of heterosexually-acquired HIV among sub-Saharan Africans than the local heterosexual population.⁵⁻⁷

Studies show that risk factors for HIV among black Africans in the contemporary diaspora include: low rates of condom use, multiple sexual partners including concurrent partnerships, low HIV risk perception, frequent travels to their countries of origin, previous sexually transmitted infection (STI) diagnosis, late HIV diagnosis, lack of in-depth knowledge about HIV/AIDS and discrimination and stigma.⁸⁻¹³

While there has been a concerted effort to monitor HIV risks among MSM in New Zealand, including periodic sexual behaviour surveys from 2002 to 2008,¹⁴ there has been no previous research on sexual behaviours and attitudes among black Africans in New Zealand.

Since HIV acquisition and spread is largely determined by sexual behaviours, primary preventive interventions currently offered to these communities are largely concerned with HIV/AIDS education and condom use. Unfortunately, there are no baseline data on HIV risk behaviours or attitudes in these communities so it is difficult to know whether these interventions are appropriate and effectively targeting specific risk factors.

As such, service planners and providers who are responsible for the allocation of primary and secondary HIV prevention resources in New Zealand have little evidence on which to base decisions about targeted prevention strategies for black Africans in New Zealand.

In this article we present the key findings on sexual behaviours and other HIV risk factors from a community-based survey of black Africans in a large New Zealand city, and discuss the relevance of those findings to the control of further HIV spread in New Zealand within and beyond this section of the community.

**Methods**

This study adopted the methodology used in the Mayisha I UK study that investigated sexual behaviours of black Africans living in the London, United Kingdom in 2000.¹⁴ It was conducted in Christchurch, the second largest city in New Zealand. Community participation was a key component and key African community leaders and community organisations were identified and invited to participate in the study.
African leaders and community-based organisations nominated 10 Africans who represented a wide range of nationalities, ages, religious faiths and backgrounds to work on the study as community researchers. All 10 community researchers were trained to recruit participants for the study and were supervised by the study coordinator (GB). They conducted a social mapping exercise to identify social venues and events frequented by black Africans, such as weddings, beauty pageants, cultural festivals, ethnic soccer, churches, mosques, universities, colleges, night clubs, hair salons and baby showers. Venue owners and event organizers, most of them black Africans, were approached by the study coordinator and all agreed that their venues could be used as sites of recruitment. A short (22-item) self-completion questionnaire was developed based on the Mayisha I UK study and modified in consultation with the community researchers to suit the New Zealand context.

The questionnaire collected data on demographic characteristics, number of sexual partners, previous HIV testing, condom use, HIV risk perception, previous STI diagnosis, utilisation of health services and other sexual behaviours.

Field work started in September 2008 and continued to February 2009. This time frame was able to include most of the cultural festivals and events identified in the social mapping exercise. Within each venue, community researchers approached eligible individuals and explained the aim of the survey, the nature of the questionnaire and assured confidentiality and anonymity.

An information sheet containing information about the study and how to contact HIV/AIDS and sexual health services in Christchurch was given to eligible individuals before they were invited to participate. Those who agreed to take part were given a questionnaire, a pen and an unmarked envelope. After completing the questionnaire, the participants placed their completed questionnaire in the envelope, sealed the envelope and placed it in the community researcher’s collection bag. The envelopes were returned to the study coordinator.

The completed questionnaires were coded and data entered into SPSS version 19 for analysis. Descriptive analyses were performed by calculating simple frequencies and carrying out cross-tabulations. Associations between categorical variables were tested for significance using the Chi-squared test. For categories with expected values less than five, Fisher’s exact test was used. Individual exposure categories for several responses were also aggregated before further analysis since the number of participants was small.

A stratified Mantel-Haenszel analysis was used to control for potential confounding as the sample size in several categories was too small to use multivariate analysis to control for potential confounding. Non-responses were excluded from the analysis.

**Results**

A total of 250 participants completed the questionnaire and 245 (98%) were included in the analysis, as 5 participants did not state their gender. The community researchers reported that no-one who was approached to participate refused to do so, thus giving a response rate of 100%.

Table 1 presents the demographic characteristics of the participants. Of the 245 eligible participants, 150 (61.2%) were male and 95 (38.8%) were female. The participants’ ages ranged from 16 to 58 years with a mean age of 28.1 years.

Women participants being more likely to be married than men (45.7% vs 30.8% p=0.010) and over half (55.5%) of the men were unmarried. Most (93.3%) of the participants had completed secondary or higher qualifications. Almost half (43.5%) were employed and just over a third (35.4%) were students, and the proportions of men and women in these categories were similar.

Participants came from 13 different Sub-Saharan African countries which were grouped according to the region of birth, namely: East Africa (Kenya and Tanzania); the Horn of Africa (Ethiopia, Eritrea, Sudan and Somalia); Southern Africa
(Botswana, Malawi, South Africa, Zambia and Zimbabwe); and West Africa (Ghana and Nigeria).

Women were also more likely to have come from the Southern African region than men (32.5% vs 20.1%, \(p<0.001\)) and men more likely to have come from the Horn of Africa compared with women (39.6% vs 16.9, \(p<0.001\)).

The majority of participants (74%) identified as Christian with most of the rest (22%) identifying as Muslim. Overall, just under half the participants (45%) had lived in New Zealand for over 5 years, with a further 28% having lived in New Zealand for 3–5 years and 27% for less than 3 years.

### Table 1. Demographic characteristics of the participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Percentage of participants (n/N)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-29</td>
<td>Female 65.2 (58/89) Male 59.6 (84/141)</td>
<td>0.395</td>
</tr>
<tr>
<td>30+</td>
<td>Female 34.8 (31/89) Male 40.4 (57/141)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>Female 45.7 (43/94) Male 30.8 (45/146)</td>
<td>0.010</td>
</tr>
<tr>
<td>Single</td>
<td>Female 34.1 (32/94) Male 55.5 (81/146)</td>
<td></td>
</tr>
<tr>
<td>In relationship</td>
<td>Female 13.8 (13/94) Male 6.2 (9/146)</td>
<td></td>
</tr>
<tr>
<td>Living with partner</td>
<td>Female 6.4 (6/94) Male 6.8 (10/146)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>Female 0.0 (0/94) Male 0.7 (1/146)</td>
<td></td>
</tr>
<tr>
<td><strong>Education attainment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Female 1.1 (1/91) Male 2.7 (4/146)</td>
<td>0.108</td>
</tr>
<tr>
<td>Primary</td>
<td>Female 0.0 (0/91) Male 6.2 (9/146)</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>Female 37.4 (34/91) Male 43.2 (63/146)</td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>Female 34.0 (31/91) Male 30.1 (44/146)</td>
<td></td>
</tr>
<tr>
<td>Professional Qualifications</td>
<td>Female 25.3 (23/91) Male 16.4 (24/146)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Female 2.2 (2/91) Male 1.4 (2/146)</td>
<td></td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>Female 42.7 (38/84) Male 42.4 (59/139)</td>
<td>0.139</td>
</tr>
<tr>
<td>Unemployed</td>
<td>Female 10.1 (9/84) Male 6.5 (9/139)</td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>Female 38.2 (34/84) Male 32.4 (45/139)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Female 9.0 (8/84) Male 18.7 (26/139)</td>
<td></td>
</tr>
<tr>
<td><strong>Region of birth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Africa</td>
<td>Female 6.0 (5/83) Male 12.7 (17/134)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Horn of Africa</td>
<td>Female 16.9 (14/83) Male 39.6 (53/134)</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>Female 14.5 (12/83) Male 13.4 (18/134)</td>
<td></td>
</tr>
<tr>
<td>Southern Africa</td>
<td>Female 32.5 (27/83) Male 20.1 (27/134)</td>
<td></td>
</tr>
<tr>
<td>West Africa</td>
<td>Female 22.9 (19/83) Male 13.4 (18/134)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Female 7.2 (6/83) Male 0.8 (1/134)</td>
<td></td>
</tr>
<tr>
<td><strong>Religious affiliation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>Female 78.3 (72/92) Male 72.2 (104/144)</td>
<td>0.692</td>
</tr>
<tr>
<td>Islam</td>
<td>Female 19.5 (18/92) Male 22.9 (33/144)</td>
<td></td>
</tr>
<tr>
<td>No religion</td>
<td>Female 1.1 (1/92) Male 2.8 (4/144)</td>
<td></td>
</tr>
<tr>
<td>Other religions</td>
<td>Female 1.1 (1/92) Male 2.1 (3/144)</td>
<td></td>
</tr>
<tr>
<td><strong>Length of residence in New Zealand</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3 years</td>
<td>Female 20.2 (17/84) Male 30.8 (41/133)</td>
<td>0.170</td>
</tr>
<tr>
<td>3–5 years</td>
<td>Female 33.3 (28/84) Male 24.8 (33/133)</td>
<td></td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>Female 46.5 (39/84) Male 44.4 (59/133)</td>
<td></td>
</tr>
</tbody>
</table>
The distribution of key sexual behaviours and other factors that increase vulnerability to HIV infection is shown in Table 2. Most participants (50.6% women and 42.0% men) reported having just one sexual partner in the past 12 months though 10.8% of women and 21.9% of men reported having more than one sexual partner.

Just 4.9% of the women and 2.2% of the men reported having had partners of the same sex. Women were more likely to have a partner who was African than men (82.5% vs 60.0%, p= 0.001) and men were more likely to report having a white partner than women (21.5% vs 2.5%, p=0.001).

Half of women (50%) and 41.2% of men did not use condoms at last sexual intercourse. A previous STI diagnosis was reported by 12.6% of women and 20.7% of men.

The majority of participants (81.8% of women and 75.9% of men) reported having had a previous HIV test. Men were more likely to have been tested at a hospital than women (54.1% vs 37.5%) and women were more likely to have been tested at their general practitioner than men (34.7% vs 23.9%).

Table 3 shows the proportion of participants reporting a previous HIV test according to time spent in New Zealand. A higher proportion of participants who had come to New Zealand since November 2005 had had an HIV test compared to those arriving before that. This difference was statistically significant for women (p<0.001) though not for men.

The introduction of mandatory HIV testing in 2005\textsuperscript{4} is likely to explain the higher proportion of more recent arrivals reporting having been tested.

Most participants (91.4% of women and 87.7% of men) felt that they were not at risk of HIV infection.

Table 2. Participants’ sexual behaviours and other selected risk factors for HIV

<table>
<thead>
<tr>
<th>Variable</th>
<th>% Participants (n/N)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td><strong>Number of sexual partners in past 12 months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>38.6 (32/83)</td>
<td>36.1 (43/119)</td>
</tr>
<tr>
<td>1</td>
<td>50.6 (42/83)</td>
<td>42.0 (50/119)</td>
</tr>
<tr>
<td>2+</td>
<td>10.8 (9/83)</td>
<td>21.9 (26/119)</td>
</tr>
<tr>
<td><strong>Gender of sexual partner(s)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>88.9 (72/81)</td>
<td>2.2 (3/135)</td>
</tr>
<tr>
<td>Female</td>
<td>4.9 (4/81)</td>
<td>94.8 (128/135)</td>
</tr>
<tr>
<td>Both Male and Female</td>
<td>6.2 (5/81)</td>
<td>3.0 (4/135)</td>
</tr>
<tr>
<td><strong>Ethnicity of sexual partner(s)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black African</td>
<td>82.5 (66/80)</td>
<td>60.0 (81/135)</td>
</tr>
<tr>
<td>White</td>
<td>2.5 (2/80)</td>
<td>21.5 (29/135)</td>
</tr>
<tr>
<td>Asian</td>
<td>1.2 (1/80)</td>
<td>3.0 (4/135)</td>
</tr>
<tr>
<td>Mixed Race (Black and White)</td>
<td>8.8 (7/80)</td>
<td>8.1 (11/135)</td>
</tr>
<tr>
<td>Māori</td>
<td>0.0 (0)</td>
<td>1.4 (2/135)</td>
</tr>
<tr>
<td>Pacific</td>
<td>1.2 (1/80)</td>
<td>3.0 (4/135)</td>
</tr>
<tr>
<td>Other</td>
<td>3.8 (3/80)</td>
<td>3.0 (4/135)</td>
</tr>
<tr>
<td>Variable</td>
<td>% Participants (n/N)</td>
<td>P value</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>----------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>Condom use at last sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>50.0 (38/76)</td>
<td>58.8 (80/136)</td>
</tr>
<tr>
<td>No</td>
<td>50.0 (38/76)</td>
<td>41.2 (56/136)</td>
</tr>
<tr>
<td>Reasons for using condoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy prevention</td>
<td>14.6 (6/41)</td>
<td>19.8 (17/86)</td>
</tr>
<tr>
<td>STI/HIV prevention</td>
<td>7.3 (3/41)</td>
<td>9.3 (8/86)</td>
</tr>
<tr>
<td>Both pregnancy and HIV/STI prevention</td>
<td>73.2 (30/41)</td>
<td>68.6 (59/86)</td>
</tr>
<tr>
<td>Other</td>
<td>4.9 (2/41)</td>
<td>2.3 (2/86)</td>
</tr>
<tr>
<td>Previous STI diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12.6 (12/95)</td>
<td>20.7 (31/150)</td>
</tr>
<tr>
<td>No</td>
<td>87.4 (83/95)</td>
<td>79.3 (119/150)</td>
</tr>
<tr>
<td>Previous HIV test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>81.8 (72/88)</td>
<td>75.9 (107/141)</td>
</tr>
<tr>
<td>No</td>
<td>18.2 (16/88)</td>
<td>24.1 (34/141)</td>
</tr>
<tr>
<td>Site of HIV test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Practitioner (GP)</td>
<td>34.7 (25/72)</td>
<td>23.9 (26/109)</td>
</tr>
<tr>
<td>Sexual Health Clinic</td>
<td>13.8 (10/72)</td>
<td>13.8 (15/109)</td>
</tr>
<tr>
<td>Antenatal Clinic</td>
<td>5.6 (4/72)</td>
<td>0.0 (0/109)</td>
</tr>
<tr>
<td>Hospital</td>
<td>37.5 (27/72)</td>
<td>54.1 (59/109)</td>
</tr>
<tr>
<td>Asylum Centre</td>
<td>2.8 (2/72)</td>
<td>0.9 (1/109)</td>
</tr>
<tr>
<td>Refugee Centre (Mangere)</td>
<td>5.6 (4/72)</td>
<td>7.3 (8/109)</td>
</tr>
<tr>
<td>I feel at risk of HIV infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>8.6 (7/81)</td>
<td>12.3 (17/138)</td>
</tr>
<tr>
<td>Disagree</td>
<td>91.4 (74/81)</td>
<td>87.7 (121/138)</td>
</tr>
</tbody>
</table>

Table 3. Participants’ history of HIV Testing and date of arrival in New Zealand

<table>
<thead>
<tr>
<th>Date of arrival in New Zealand</th>
<th>Previous HIV Test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After Nov 2005</td>
<td>14.3 (6/42)</td>
<td>85.7 (36/42)</td>
</tr>
<tr>
<td>Before Nov 2005</td>
<td>22.7 (10/44)</td>
<td>77.3 (34/44)</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After Nov 2005</td>
<td>8.1 (5/62)</td>
<td>91.9 (57/62)</td>
</tr>
<tr>
<td>Before Nov 2005</td>
<td>38.2 (29/79)</td>
<td>61.8 (47/79)</td>
</tr>
</tbody>
</table>

**Discussion**

This is the first community-based survey of HIV-related sexual behaviours and other risk factors among black African migrants and refugees in New Zealand. Most survey participants were relatively young with the majority (61.7%) being under thirty years of age. In addition, 83.1% of men aged under thirty were not married or did not live with their sexual partner. Participants were also relatively highly educated and likely to be in work or studying.

In this study population, we found clear evidence of risk behaviours that increase the vulnerability to HIV acquisition and transmission within the New Zealand African community and beyond. They include: a significant minority reporting having sex with more than one partner in the past year, low use of condoms, previous STI diagnosis, low HIV risk perception, and non-universal HIV testing.
Heterosexual spread of HIV within this community remains more likely than in many others in New Zealand as the prevalence of HIV among Africans is likely to be higher than in the general population, reflecting the higher prevalence in their countries of origin in Sub-Saharan Africa.

Due to the small numbers in the New Zealand African community and higher HIV prevalence, it is more likely that an African will meet an infected black African partner compared with other ethnicities.

This study provides evidence of cross-cultural sexual mixing which suggests that African men may be more likely to pass on HIV to non-African women. By contrast, African women were more likely to have African sexual partners. Compounding these issues is the fact that most participants in this study considered themselves not to be at risk of HIV.

The promotion of condom use has been one of the major HIV prevention interventions among African migrants and refugees in New Zealand. The results of this survey suggest that more effort is needed to increase condom use among black Africans as 50% of women and 41.2% of men reported that they did not use condoms at their last sexual encounter. This is in contrast with surveys of MSM in New Zealand which have found that their rate of condom use was around 80%.

Patterns of HIV testing can make a difference in a small population at risk of HIV such as black African migrants and refugees in New Zealand. Freely available voluntary testing for HIV for those at risk of HIV can potentially identify those infected and hence decrease on-going transmission to others. However, although most participants (81.8% women and 75.9% men) in this study reported having a previous HIV test, the higher uptake of HIV testing in more recent arrivals will have been influenced more by the requirements of the New Zealand Immigration Service than by voluntary testing.

The concern here is the possibility of still undiagnosed HIV among Africans who came to New Zealand before November 2005 and those who may have become be infected after a negative mandatory HIV test for immigration purposes. Individual benefits from early HIV diagnosis include reduced mortality and morbidity, improved life expectancy, prevention of primary and secondary HIV infections and behavioural change following a positive diagnosis.

The higher prevalence of a previous STI diagnosis reported by participants in this study also suggests that this group has wider sexual health needs, and that meeting these could be combined with HIV prevention activities.

This study has a number of limitations meaning that care is needed in attempting to generalise its findings to other black Africans in New Zealand. The recruitment method could have had both potential selection and participation bias. Those who attended the venues and events where participants were recruited could be different from those who did not attend. This study also did not reach non-English speakers, as the questionnaire and study information was only provided in English and it was limited to one city (Christchurch).

The questionnaire also asked intimate questions related to sexual behaviours of the participants and their answers may not reflect their actual sexual behaviours, for
example the reporting of same sex partnerships. In addition, the black African community in Christchurch is small and since respondents knew the community researchers, it is possible that concern for confidentiality may have affected how they responded to the questionnaire, despite the researchers’ reassurances.

Despite its potential limitations, this survey provides critical information about individuals at continued risk of HIV infection or transmission among black Africans in Christchurch. Similar findings have also been reported by studies of black African refugees and migrants in other countries outside Africa.5–7,9,12–14,17–20

There is a clear need to promote voluntary HIV testing among black Africans especially to those who were in New Zealand before 2005 and those arriving since who may be at risk. That a previous STI diagnosis was reported by around one fifth of the participants in this study also suggests that there may be wider sexual health benefits from enhanced HIV prevention activities.

Our findings justify the need for developing an HIV prevention strategy for black Africans that is led and developed by black Africans themselves and based on evidence of their specific needs. This strategy should also address comprehensive sexual health needs including barriers to condom use, the availability of HIV/STI screening services and targeting sexual behaviours that increase vulnerability to HIV infection, including multiple concurrent partnerships.

Above all, black Africans should be reminded that they have not left HIV/AIDS behind in Africa but are still at risk of acquiring HIV in New Zealand.

Competing interests: Nil.

Author information: Gerida Birukila, PhD Student, Department of Public Health and General Practice, University of Otago, Christchurch; Cheryl Brunton, Senior Lecturer in Public Health, Department of Public Health and General Practice, University of Otago, Christchurch; Nigel Dickson, Director of AIDS Epidemiology Group, Department of Preventive and Social Medicine, University of Otago, Dunedin

Acknowledgements: We thank the African community in Christchurch, especially community leaders and community researchers, for their support of this study. Gerida Birukila carried out this project as part of her PhD study at the University of Otago, Christchurch. She received financial support from a Dunbar Scholarship in 2008 and 2009. The authors also acknowledge the important contribution of Associate Professor Oliver Davidson who died in 2009. He was Gerida’s original PhD supervisor and co-investigator of the Mayisha UK and NZ studies.

Correspondence: Dr Cheryl Brunton, Department of Public Health and General Practice, University of Otago, Christchurch. PO Box 4345, Christchurch, New Zealand. Fax: +64 (0)3 3643614; email: cheryl.brunton@otago.ac.nz

References:
Survival from out-of-hospital cardiac arrest in Wellington in relation to socioeconomic status and arrest location

Aimee L Fake, Andrew H Swain, Peter D Larsen

Abstract

Aims The study examined the influence of physical location on survival from out-of-hospital cardiac arrest (OHCA). Firstly, OHCAs occurring in residential settings were compared to those occurring in public locations. Secondly, the residential OHCAs were classified according to socioeconomic status and the relationship between socioeconomic status and outcome from OHCA was examined.

Methods For all OHCAs that occurred between 1 July 2007 and 30 June 2010, we compared OHCA characteristics and outcomes between public and residential locations, and for residential locations examined across deciles of socioeconomic status.

Results Of the 445 arrests that occurred during the study period, 413 met the inclusion criteria. Survival from OHCA in public locations was approximately twice that for residential OHCA (19.8% vs 10.7%, p=0.021). We found no association between survival from residential OHCA and socioeconomic status. Similarly, we found no association between socioeconomic status and witnessing of the event, bystander cardiopulmonary resuscitation, the initial presenting rhythm, and ambulance response time.

Conclusion Residential OHCA in the Wellington region has a much poorer prognosis than OHCA in public locations. There is no evidence to suggest that any socioeconomic group in the Wellington region is disadvantaged when a community and ambulance response is required for an OHCA.

Survival from an out-of-hospital cardiac arrest (OHCA) is dependent on many factors including whether the event was witnessed or bystander CPR was performed, the initial presenting rhythm, and the ambulance response time. However the extent to which the physical location of the OHCA influences these factors and overall survival is not clear.

Previous studies have reported that the majority of OHCA occur in residential locations, and that these events are less likely to be witnessed, may be associated with longer ambulance response times and are less likely to be VT/VF cardiac arrests. All of these factors contribute to lower survival in a residential setting. In addition, it is possible that residential locations are not all equal, with at least some studies reporting that socioeconomic status (SES) influences bystander CPR rates with higher mortality following OHCA associated with lower SES.

Although pre-hospital cardiac arrests in the Wellington region have been the subject of a previous report, the relationship between location of cardiac arrest, SES and outcome from OHCA has not been previously examined in New Zealand.
In this study we examined differences between public and residential cardiac arrests, and in the residential cases also examined the relationship between SES measured using the NZDep2006\textsuperscript{14} and outcome from OHCA.

Methods

Population and data collection—The Wellington region with a population of 473,000 and a land area of approximately 4000 square kilometres\textsuperscript{15} receives emergency medical services exclusively from Wellington Free Ambulance. Between 1 July 2007 and 30 June 2010, data from all OHCAs in the Wellington region that were attended by paramedics were examined.

Patients aged 16 years or older on whom any form of resuscitation was commenced were included but those who suffered cardiac arrest following drowning, trauma or attempted suicide, or did so in the presence of paramedics, were excluded from the study. Cardiac arrests occurring at a medically equipped facility (e.g. nursing home or doctors’ surgery) were also excluded. For each case, demographic data was collected retrospectively from the patient report form and the New Zealand Resuscitation Council registry.

All data was collected in accordance with standard Utstein definitions.\textsuperscript{16} The impact of demographic factors such as age, gender, witnessing of the arrest, bystander CPR, the initial presenting rhythm and the average ambulance response time on return of spontaneous circulation (ROSC) and survival to discharge from hospital was studied.

Endpoints—The primary end point was survival to discharge from hospital. The secondary end point was return of spontaneous circulation.

Location and socioeconomic scoring—The location of each cardiac arrest was examined and classified as public if it occurred in commercial or industrial premises or in the street. Events that occurred within a residential structure were classified as residential.

Data from the residential and public groups were compared. Each residential event was then mapped to a meshblock, a small geographical unit containing approximately 90 people, using software available from Statistics New Zealand.\textsuperscript{17}

Each meshblock was allocated a SES score using NZDep2006. NZDep2006 is an index of deprivation (NZDep) based on an ordinal scale of 1 to 10, with 1 representing the least deprived and 10 representing the most deprived.

Using information from the 2006 New Zealand census, the NZDep is derived from nine variables of deprivation; these being income from benefit, employment, household income, communication, transport, support, qualifications, living space and home ownership. On the basis of these, the scale links small geographical units to deciles of SES.\textsuperscript{14}

Definitions—A cardiac arrest was defined as witnessed if it was seen or heard by another person. Bystander CPR was recorded if the paramedic believed that CPR was performed prior to arrival by a member of the public, because either this was occurring on arrival or it was said that CPR had been performed. The presenting rhythm was the first monitored cardiac rhythm when a defibrillator was attached to the patient. The ambulance response time was defined as the difference between the time the ambulance dispatcher received the 111 call and the time the crew reported arrival at the scene. Both of these times were rounded to the nearest minute.

Statistical analysis—The relationship between location (residential vs. public) and witnessed arrest, bystander CPR, AED use, response time, initial rhythm, ROSC and survival to discharge were examined using Chi-squared testing.

Logistic regression was used to examine the relationship between NZDep decile and ROSC, survival to discharge, witnessed arrest, bystander CPR, response time and initial rhythm. In addition, we examined these relationships using NZDep quintiles formed by combining consecutive deciles, comparing 9 and 10 with deciles 1-8 using Chi-Squared testing.

Where univariate factors were associated significantly with outcomes, multinomial logistic regression was performed using all univariate predictors of outcome as independent variables. All statistical analysis was performed using PASW 18.0 (IBM, New York).

Ethics—Ethical approval for this research was obtained from the Central Regional Ethics Committee of New Zealand (CEN/12/EXP/031).
Results

Demographics—During the study period, 445 OHCAs occurred in the Wellington region. Of these a total of 413 were included in this study. Data that was incomplete (n=16) and cardiac arrests that occurred in medically equipped facilities (n=16) were excluded (Figure 1).

Figure 1. Cardiac arrests in the Wellington region from 1 July 2007 to 30 June 2010 reported in the Utstein style

![Cardiac Arrests Diagram]

Note: (VF/VT = ventricular fibrillation/ventricular tachycardia).
A summary of the cases is provided in Table 1. The average age of the patient was 64 years and 286 were Male (69.2%). Bystander CPR was performed in 208 cases (50.4%) and an automated external defibrillator (AED) was used on 16 patients (3.9%).

ROSC was achieved in 172 instances (41.6%) and in 52 cases (12.6%) the patient survived. 200 patients (48.4%) were found in an initial rhythm of VF/VT, with the remaining 213 patients (51.6%) presenting with a non-VF/VT rhythm. The average ambulance response time was 9.5 minutes.

Table 1. Demographics by location: residential vs public

<table>
<thead>
<tr>
<th>N (%)</th>
<th>Total (%)</th>
<th>Residential (%)</th>
<th>Public (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (s.d)</td>
<td>413</td>
<td>327 (79.2)</td>
<td>86 (20.8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male gender (%)</td>
<td>286 (69.2)</td>
<td>216 (66.1)</td>
<td>70 (81.4)</td>
<td>0.006</td>
</tr>
<tr>
<td>Witnessed event (%)</td>
<td>241 (58.4)</td>
<td>187 (57.2)</td>
<td>55 (64.0)</td>
<td>0.27</td>
</tr>
<tr>
<td>Bystander CPR (%)</td>
<td>208 (50.4)</td>
<td>145 (44.3)</td>
<td>63 (73.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>AED (%)</td>
<td>16 (3.9)</td>
<td>9 (2.8)</td>
<td>7 (8.1)</td>
<td>0.021</td>
</tr>
<tr>
<td>Initial rhythm:VF/VT (%)</td>
<td>200 (28.4)</td>
<td>140 (42.8)</td>
<td>60 (67.2)</td>
<td>–</td>
</tr>
<tr>
<td>Asystole (%)</td>
<td>149 (36.1)</td>
<td>136 (41.6)</td>
<td>13 (15.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PEA (%)</td>
<td>64 (15.5)</td>
<td>51 (15.6)</td>
<td>13 (15.1)</td>
<td>–</td>
</tr>
<tr>
<td>ROSC (%)</td>
<td>172 (41.6)</td>
<td>130 (39.8)</td>
<td>42 (48.8)</td>
<td>0.088</td>
</tr>
<tr>
<td>STD (%)</td>
<td>52 (12.6)</td>
<td>35 (10.7)</td>
<td>17 (19.8)</td>
<td>0.021</td>
</tr>
<tr>
<td>Average response time (min) (s.d)</td>
<td>9.5 (4.9)</td>
<td>9.6 (4.8)</td>
<td>9.3 (5.3)</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Note: CPR=cardiopulmonary resuscitation; AED=automated external defibrillator; ROSC=return of spontaneous circulation; STD=survival to hospital discharge; VF/VT=ventricular fibrillation/ventricular tachycardia; PEA=pulseless electrical activity.

Location: Residential vs Public—The data was analysed to compare OHCAs that occurred at residential and public locations (Table 1). A large proportion of OHCAs occurred at residential dwellings; 327 cases (79.2%) compared with 86 cases (20.8%) at a public address (p=0.001, chi-squared test).

A further six factors were found to be significantly different when the two cohorts were compared. Individuals in the public group were more likely to be male (public 81.4% versus residential 66.1%, p = 0.006, chi-squared test) and younger (public mean age 58 years versus residential 66 years, p = 0.001, chi-squared test).

The bystander CPR rate was higher in the public group than in the residential group (public 73.3% versus residential 44.3%, p = 0.001, chi-squared test), as was AED use (public 8.1% versus residential 2.8%, p = 0.021, chi-squared test), an initial rhythm of VF/VT (public 69.8% versus residential 42.8%, p = 0.001, chi-squared test) and survival to discharge (public 19.8% versus residential 10.7%, p = 0.021, chi-squared test).

In the public cohort, the incidence of asystole and pulseless electrical activity (PEA) was the same at 15.1%, compared with 41.6% for asystole and 15.6% for PEA in the residential group.
<table>
<thead>
<tr>
<th>NZ Dep</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Residential arrests (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37 (11.4)</td>
<td>29 (8.9)</td>
<td>18 (5.5)</td>
<td>45 (13.8)</td>
<td>37 (11.4)</td>
<td>23 (7.1)</td>
<td>20 (6.2)</td>
<td>32 (9.8)</td>
<td>34 (10.5)</td>
<td>50 (15.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Witnessed event (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23 (32.2)</td>
<td>17 (59.6)</td>
<td>9 (50)</td>
<td>26 (57.8)</td>
<td>22 (59.5)</td>
<td>14 (60.9)</td>
<td>10 (50.0)</td>
<td>17 (53.1)</td>
<td>22 (64.7)</td>
<td>27 (54.0)</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>Bystander CPR (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24 (64.9)</td>
<td>14 (48.3)</td>
<td>4 (22.2)</td>
<td>17 (37.8)</td>
<td>46 (43.2)</td>
<td>7 (30.4)</td>
<td>8 (40.0)</td>
<td>18 (56.3)</td>
<td>13 (38.2)</td>
<td>24 (48.0)</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>Initial rhythm VF/VT (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22 (59.5)</td>
<td>10 (34.5)</td>
<td>5 (27.8)</td>
<td>18 (40.0)</td>
<td>20 (54.1)</td>
<td>8 (34.8)</td>
<td>7 (35.0)</td>
<td>14 (43.8)</td>
<td>16 (47.1)</td>
<td>19 (38.0)</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>ROSC (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 (37.8)</td>
<td>8 (27.6)</td>
<td>5 (27.8)</td>
<td>21 (46.7)</td>
<td>16 (43.2)</td>
<td>9 (39.1)</td>
<td>7 (35.0)</td>
<td>14 (43.8)</td>
<td>16 (47.1)</td>
<td>21 (42.0)</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>STD (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (10.8)</td>
<td>3 (10.3)</td>
<td>1 (5.6)</td>
<td>6 (13.3)</td>
<td>3 (8.1)</td>
<td>4 (17.4)</td>
<td>0 (12.5)</td>
<td>4 (17.6)</td>
<td>6 (8.0)</td>
<td>4 (8.0)</td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Response time (min)</td>
<td>9.7± 3.7</td>
<td>9.1± 4.0</td>
<td>9.6± 4.6</td>
<td>10.5± 6.7</td>
<td>10.3± 4.6</td>
<td>9.7± 6.3</td>
<td>11.0± 8.0</td>
<td>9.0± 3.4</td>
<td>8.6± 4.8</td>
<td>8.9± 3.1</td>
</tr>
</tbody>
</table>

Note: CPR = cardiopulmonary resuscitation; ROSC= return of spontaneous circulation; STD = survival to hospital discharge; VF/VT = ventricular fibrillation/ventricular tachycardia.
In univariate analysis, presenting rhythm (p<0.001), witnessed cardiac arrest (p<0.001), location (p=0.02), age (mean 65±15 years in the non survivors versus 58±17 years in the survivors, p=0.02) and response time (mean 9.6±4.9 minutes in the non-survivors versus 8.1±3.7 minutes in the survivors, p=0.03) were all predictors of survival.

Multinomial logistic regression analysis using these factors, (with age categorised into under 65 and over 65 and response time into 9 minutes or less and greater than 9 minutes) found that only witnessed arrest (p=0.001) and initial presenting rhythm (p=0.001) were independent predictors of survival.

Socioeconomic status—The number of cardiac arrests occurring in each NZDep category can be seen in Table 2. Category 10, which is associated with the lowest SES, experienced the highest number of cardiac arrests, which was 50 (15.4%). Category 3 experienced the lowest number of cardiac arrests, which was 18 (5.5%), and the distribution of cardiac arrests across each decile was not equal (p=0.001).

Logistic regression was used to analyse whether resuscitative factors differed according to NZDep code and therefore SES. Overall, there were no significant differences across SES deciles with respect to any of the factors examined (Table 2).

A limitation here is that dividing 325 events (SES score was not available for 2 residential addresses) into 10 categories resulted in relatively small numbers of patients within each group. To address this concern, we also examined SES by quintile, comparing deciles 9 and 10 with the remaining eight categories.

Using both approaches, there was no significant difference in bystander CPR rates, ambulance response times, ROSC or survival to discharge across the SES range.

Discussion

While location of cardiac arrest did influence outcome from OHCA, it was not an independent predictor of survival. Survival from public cardiac arrests was due to a greater proportion of witnessed cardiac arrests and the presenting rhythm. In the cardiac arrests occurring in a residential setting we did not observe any relationship between survival from OHCA and SES.

In the Greater Wellington Region, 79% of OHCA occurred at residential dwellings and 21% occurred in public environments, a finding consistent with studies from other locations where 65% to 80% of OHCA occur in residential locations.\textsuperscript{3,5–9}

When the residential and the public cardiac arrest data were compared, six factors were found to be significantly different. Firstly, 73% of patients who suffered a cardiac arrest in a public environment received bystander CPR whilst only 44% of patients did so in a residential environment. This pattern, showing an increased rate of bystander CPR in the public or commercial arena, has been well documented.\textsuperscript{7–9}

Secondly, the initial presenting rhythm was found to be significantly different between the two groups. A high number of patients (70%) were found in VF/VT in the public group compared to the residential group (43%).

In the public group, this finding may be attributed to an increased rate of bystander CPR which tends to prolong the length of time an individual is in VF/VT.\textsuperscript{18} Despite
this, the rate of VF/VT in our residential group was considerably higher than the 22% reported by Weisfeldt et al.\textsuperscript{19} or the 12.8% and 6.2% quoted by Folke et al.\textsuperscript{6} and Iwami et al.\textsuperscript{20} respectively in their residential cohorts.

More patients in the residential group presented in asystole (42%, versus 15% in the public sector) and this may be attributed to fewer witnessed arrests and decreased bystander CPR. It is not known if there are differences in the aetiology of cardiac arrest between residential and public locations.

Thirdly, we observed that the survival to discharge rate for residential cardiac arrests was approximately half that for arrests at a public address (10.7% vs. 19.8% respectively) and multivariate analysis suggests that this was primarily related to whether the cardiac arrest was witnessed and the initial presenting rhythm.

Individuals who suffered a cardiac arrest in a public location were more likely to be male (81% versus 66% in residential location) and younger (mean age 58 years versus 66 years in residential location); these demographic findings are consistent with the international literature.\textsuperscript{5, 6, 19}

Lastly, AED use in the public cohort was found to be significantly higher when compared to the residential cohort (8.1% versus 2.8% respectively), however it is difficult to evaluate the impact of this result as the origin of each AED was not identifiable (i.e public access defibrillator, personally owned AED or New Zealand Fire Service AED).

Our findings suggest that in New Zealand, new strategies are needed to address residential cardiac arrests as these are the majority of events, yet they yield a much poorer survival rate. Survival from public cardiac arrests may be further enhanced by the use of public access defibrillators. However this measure would only address the minority of cardiac arrests and would therefore have little impact on overall survival rates in Wellington.

Previous research has reported inconsistent findings regarding the effects of SES on OHCA. Two studies found no link between SES and outcome from OHCA, consistent with our findings. One of these was conducted in Michigan\textsuperscript{21} and the other in Oregon,\textsuperscript{22} and both derived measures of SES from income data.

In South Korea, a measure of SES based upon living space, employment, and transportation demonstrated that lower SES was associated with higher mortality.\textsuperscript{10} A similar result was reported from Washington State where land value was used as a measure of SES.\textsuperscript{12} In contrast, an Ontario study found that higher property values were associated with higher mortality.\textsuperscript{11}

The different conclusions in these studies may be explained by variations in local health care systems, first aid training, and ambulance response times between neighbourhoods. In Wellington, we found no relationship between SES and witnessing of the arrest, bystander CPR, initial presenting rhythm, or ambulance response time.

Like ours, some studies of bystander CPR have shown no difference in CPR rates with respect to SES,\textsuperscript{22, 23} while others have found higher SES groups to be associated with a higher bystander CPR rate.\textsuperscript{10, 11, 24, 25} In most of the latter studies, it is recommended that CPR training should be targeted at lower SES groups. This is
unnecessary in the Wellington region as our results illustrate that bystander CPR rates and ambulance response times are equitable across all SES groups.

Some of the differences between the studies may relate to how SES is measured. We have used an area based assessment of SES as the factors examined pertain to the environment in which the event took place. Ahn et al. also used an area based assessment dividing the country into 250 districts.\textsuperscript{10}

We have used a much smaller zone containing 90-100 people as this approach allows greater accuracy in assigning individual residences to SES groups.

In addition, our SES measure is derived from a number of different indicators of SES, while some of the other studies used a single indicator such as income\textsuperscript{21, 22, 25} or property value.\textsuperscript{11, 12} Again, the advantage offered by the NZDep measure of SES is a greater degree of accuracy and more robust index.

In our three year study, survival to discharge was found to be associated with witnessing of the arrest and the initial presenting rhythm. These results are in line with the findings of others.\textsuperscript{4, 26-30} However, bystander CPR was not found to be associated with survival and this differs from a number of previous reports.\textsuperscript{8, 18, 31}

Although our overall bystander CPR rate (50.4\%) is high when compared to international literature (31-36\%),\textsuperscript{3, 8, 32} we do not know how well this was being performed. A high rate of ineffective bystander CPR may negate the benefit reported in other studies.

\textbf{Limitations}—The accuracy of the data depended to some degree on the quality of ambulance reports and the paramedics’ understanding of Utstein definitions.

We cannot confirm that the location of each residential arrest was always the patient’s home address. The SES findings are only applicable to defined geographical areas within Wellington region. However, we believe that the geographical SES is representative of the SES of patients encountered at that address.

The distribution of cardiac arrests across the SES groups was not uniform in this study. We could not demonstrate any association between the incidence of cardiac arrest and SES decile within the Wellington region.

\textbf{Conclusion}

For patients who suffer an out-of-hospital cardiac arrest in the Wellington region, survival to discharge from hospital is influenced by location, with those arrests occurring in public places more likely to be witnessed and to be in VT or VF when first attended by emergency medical services. However, within the residential cardiac arrests SES did not influence bystander CPR rates, the initial presenting rhythm, or ambulance response times, and survival was not correlated with SES.

Using a robust measurement of SES we conclude that there is no evidence that any socioeconomic group requiring community resuscitation in the Wellington region is disadvantaged.
Competing interests: Nil.

Author information: Aimee L Fake, Research Assistant, Department of Surgery, Anaesthesia & Emergency Medicine; Andrew H Swain, Senior Lecturer Emergency Medicine, Department of Surgery, Anaesthesia & Emergency Medicine, Medical Director Wellington Free Ambulance; Peter D Larsen, Associate Professor, Director of Research Occupational and Aviation Medicine Unit; University of Otago, Wellington

Acknowledgements: This study was funded by a University of Otago Research Grant. We also thank Hayley Cameron (Data Analyst of Wellington Free Ambulance) for assistance with data collection.

Correspondence: Aimee Fake, University of Otago, Wellington, Department of Surgery, Anaesthesia & Emergency Medicine, PO Box 7343, Wellington 6242, New Zealand. Fax: +64-4-389-5318; email: aimee.fake@otago.ac.nz

References:
http://www.otago.ac.nz/wellington/otago020348.pdf


How long do acute coronary syndrome patients wait for reperfusion, diagnostic coronary angiography and surgical revascularisation?

Jamie Voss, Andrew Martin, Imogen Caldwell, Mildred Lee, Andrew J Kerr

Abstract

Aim To describe the components of in-hospital waiting time to investigation and management in patients with acute coronary syndromes (ACS) admitted to the Middlemore Hospital (MMH) Coronary Care Unit.

Method We examined the time to (1) reperfusion therapy in ST-elevation myocardial infarction (STEMI), (2) coronary angiography in ACS, and (3) surgical revascularisation. Data was collected prospectively for consecutive patients via the Acute PREDICT ACS registry.

Results Of 280 STEMI admissions in 2009 and 2010, 101 underwent primary percutaneous coronary intervention. The median door-to-balloon time when performed on site at MMH was 83 minutes (IQR 69–101 minutes) compared with 135 minutes (IQR 112-165 minutes) for those transferred after hours to Auckland City Hospital (ACH).

Of 2115 ACS admissions between 2007 and 2010 84% underwent inpatient coronary angiography and 69% of these underwent this within 3 days. The strongest predictors of a >3 day delay were advanced chronic kidney disease (odds ratio 3.68, 95% CI 2.08-6.51) and presenting late in the week (odds ratio 2.85, 95% CI 2.30-3.54).

329 patients (16%) underwent coronary artery bypass graft surgery (CABG). The median time from admission to inpatient CABG was 13 days and from discharge to outpatient CABG was 155 days. Of ACS patients referred for outpatient surgery in the public sector 38% were readmitted with further ACS whilst waiting.

Conclusion Important delays were identified across the spectrum of post-admission care for ACS patients potentially impacting on both patient outcomes and the cost of care. Active quality improvement programmes to reduce delays are required.

The outcome for patients with acute coronary syndromes (ACS) is critically time dependent and adversely affected by delays to appropriate therapy. These delays can be subdivided into pre-hospital and in-hospital components. The distribution and determinants of the pre-hospital delay for Middlemore Hospital (MMH) area ACS patients has recently been described. The aim of the current paper is to explore the in-hospital waiting times for a similar population.

For both ST elevation myocardial infarction (STEMI) and non ST elevation ACS (NSTEACS) delays to coronary angiography and reperfusion are associated with poorer outcomes. The prognosis in STEMI is clearly inversely related to the delay to reperfusion and in NSTEACS delay to coronary angiography and potential
intervention is associated with both (a) prolonged hospitalisation with its attendant financial costs as well as (b) increased risk of adverse events.

International and local guidelines recommend ACS patients referred for coronary angiography should have this undertaken within 72 hours of presentation. In New Zealand the Ministry of Health working with the Midlands and Northern Cardiac Clinical Network (NCCN) have endorsed a three day target and set a goal for this to be achieved in a minimum of 70% of ACS patients.

The international and local targets for reperfusion in STEMI are a door-to-balloon (DTB) time of less than 90 minutes for primary PCI and a door-to-needle (DTN) time of less than 30 min for thrombolysis.

The specific in-hospital waiting times examined in this paper are:

- The time to acute reperfusion in STEMI
- The time to diagnostic coronary angiography in all ACS patients and
- The time to surgical revascularisation with coronary artery bypass graft (CABG) surgery in ACS patients referred for this. In addition (a) the predictors of delay to coronary angiography in ACS patients and (b) the ACS readmission rate for those referred for outpatient surgical revascularisation are specifically evaluated and reported.

**Method**

**Setting**—Middlemore Hospital is the base hospital for nearly 500,000 people in the Counties Manukau District Health Board area and receives virtually all hospitalised ACS patients for the region. The three acute reperfusion strategies currently available at MMH for STEMI are (1) thrombolysis, (2) on site primary percutaneous coronary intervention (PCI) – a service available during 8am to 5pm Monday to Friday (business hours) and (3) transfer to Auckland City Hospital (ACH) for primary PCI outside of these hours (after hours). During this audit after hours transfer for primary PCI was limited to clinically high risk STEMI patients only. CABG when required for MMH area patients is undertaken at ACH.

**Acute predict**—Starting in 2007 Acute Predict, a clinician-led electronic registry and management support tool, has been used to collect clinical data on consecutive ACS patients admitted to the MMH Coronary Care Unit (CCU). The role of Acute Predict in the ACS population has previously been described. Data collected includes patient demographics, prognostic factors, specialised investigations / therapy undertaken and the results thereof, as well as in-hospital complications.

**Time to reperfusion in STEMI**—Patients admitted from 1 Jan 2009 to 31 Dec 2010 with STEMI were identified using Acute Predict. DTB times were verified using admission and cardiac catheterisation laboratory records. The “balloon” time was defined as the time of the first coronary intervention (commonly thrombus aspiration or balloon angioplasty). The DTN times for thrombolysis were extracted directly from Acute Predict with only unusual or incongruous times verified using paper records. The proportions of STEMI patients being treated within target time frames are reported.

**Time to coronary angiography in ACS**—Patients admitted from 28 July 2007 to 10 November 2010 with ACS were identified using Acute Predict. All ACS diagnostic subgroups were included in this analysis – STEMI, non ST elevation myocardial infarction myocardial infarction (NSTEMI) and unstable angina (USA). The waiting time was calculated as the difference between the dates of presentation and cardiac catheterisation and was measured in whole days only. Patients with unusual or incongruous delays had their data verified using the electronic records. The predictors of a delay of more than 3 days from presentation to coronary angiography were examined (see statistics below).

**Time to CABG in ACS**—Patients admitted from 28 July 2007 to 10 November 2010 with ACS and referred for CABG surgery at the time of their admission were identified using Acute Predict. The date of surgery was obtained using electronic records. Patients included in the analysis were only those
managed under the jurisdiction of local Cardiologists (including both public and private surgery) and excludes patients returned to other District Health Boards to undertake surgery.

Definitions—Ethnicity was categorised into the following subgroups: European and Other (combined), New Zealand Māori, Pacific Island and Indian. Advanced chronic kidney disease (CKD) was defined as an eGFR < 30 mL/minute. Presenting “late in the week” was defined as a presenting to hospital on Thursday or Friday.

Statistics/Ethics—For the time to coronary angiography in ACS analysis pre-specified variables were analysed for their association with time to diagnostic coronary angiography. Where appropriate those variables were dichotomised. Unadjusted odds ratios (OR) for waiting past day three for coronary angiography were calculated along with 95% confidence intervals (CI).

All P-values reported were two tailed and a P-value < 0.05 was considered significant. Data was analysed using SAS statistical package software, version 9.2 (SAS Institute, Cary, NC). Data collection processes for this study have been approved by the New Zealand Multi-Region ethic committee MEC/07/19/EXP.

Results

Time to acute reperfusion in STEMI—During 2009 and 2010 there were 280 STEMI admissions to the MMH CCU of which 209 (75%) were treated with an acute reperfusion strategy. 101 (48%) underwent primary PCI and 108 (52%) underwent thrombolysis.

Of the 101 patients treated with primary PCI 64 patients (63%) were treated on site at MMH, and 37 patients (37%) were transferred after hours to ACH for this. The number of patients transferred to ACH increased from 8 in 2009 to 29 in 2010 (representing 8% and 29% of the total referred for acute reperfusion each year respectively).

The median DTB time for patients undergoing primary PCI at MMH was 83min (IQR 69 to 101min) compared to 135min for those patients transferred to ACH (IQR 112 to 165min). 62% of patients treated at MMH and 12% of patients transferred to ACH were treated with PCI within the DTB target of less than 90 minutes. 87% and 30% were the corresponding percentages of patients treated within 120 minutes. Figure 1 shows the percentiles of patients treated by DTN time by either strategy.

The median DTN time for patients undergoing thrombolysis was 39min (IQR 25 to 64min). 40% of patients received their treatment within the target of 30 minutes and 73% received it within 60 minutes. Of the 108 patients undergoing thrombolysis 21 patients (19%) failed to reperfuse on clinical grounds. 1 patient (1%) suffered intracranial haemorrhage.
Figure 1. Door to balloon times for patients treated with primary PCI on site at Middlemore Hospital (MMH) during working hours or after transfer to Auckland City Hospital (ACH) after hours

**Time to coronary angiography in ACS**—Over the period 28 July 2007 to 10 November 2010 which included 2115 consecutive ACS admissions, 1774 (84%) patients underwent inpatient coronary angiography. The mean and median times to coronary angiography were 2.8 days and 2 days (IQR 1 to 4 days) respectively. The trend in proportion of patients catheterised within 3 days of admission by quarter is shown in Figure 2.

Over the study period 69% of those referred for coronary angiography underwent this test within 3 days of presentation. In addition 52% underwent this test within 2 days and 30% within 1 day of presentation.

The dichotomised variables associated with a >3 day delay to coronary angiography are shown in Figure 3 and include advanced CKD (OR 3.68, CI 2.08 to 6.51), presenting late in the week (OR 2.85, CI 2.30 to 3.54), female sex (OR 1.56, CI 1.25–1.94), diabetes (1.33, CI 1.06–1.68), prior cardiovascular disease (OR 1.39, CI 1.11–1.74) and unstable angina (USA) when compared to other types of ACS (OR 2.06, CI 1.48–2.88).
Figure 2. Percentage of ACS patients undergoing catheterisation within 3 days of admission by quarter

Figure 3. Odds ratios and 95% confidence intervals showing the predictors of waiting more than 3 days for coronary angiography from ACS admission
Incrementally advancing age by bracket was also associated with > 3 day delay with 21.1% of patients <50 years waiting >3 days, compared with 29.5% aged 50–59 years, 31.2% aged 60-69 years, 39.5% aged 70–79 years, and 40.2% aged >80 years respectively (p value <0.0001). The mean time to coronary angiography for patients aged <50 years was 2.3 days compared 3.7 days for those aged >80 years (p value <0.0001).

The proportion of patients waiting for more than 3 days did not vary by ethnicity (p=0.3509).

The correlation between time to coronary angiography and total length of hospital stay is shown in Figure 4. In months with a mean time to angiography less than 2 days the mean total length of stay was 4.5 days or less. In contrast months with a mean time of more than 4 days the mean total length of stay exceeded 6 days.

**Figure 4. Scatter plot showing monthly reported mean time from admission to cardiac catheterisation vs mean total length of stay for ACS patients (excluding patients referred for inpatient CABG)**

(Time to CABG in ACS—Of the 2115 ACS patients admitted over the study period 329 patients (16%) underwent surgical revascularisation with CABG. During index hospitalisation 264 patients (80%) underwent inpatient surgery and the remaining 65 patients (20%) were planned for outpatient surgery. Only 45 of these 65 patients intended for outpatient surgery actually underwent outpatient surgery (16 privately funded and 29 publicly funded) as 20 patients were re-admitted and re-
prioritised to inpatient surgery (19 patients re-admitted with NSTEACS and 1 patient re-admitted with bleeding).

Of the patients deemed appropriate for discharge and outpatient surgery (and after excluding those planned for privately funded surgery) the ACS re-admission rate was 38% (18 of 48 patients).

The median time to re-admission in the group discharged for outpatient surgery was 44 days (IQR 9.5–68 days).

The median time to publically funded outpatient surgery was 155 days (IQR 97-234 days) excluding a single patient who repeatedly deferred outpatient surgery. The median time from ACS to inpatient surgery was 13 days (IQR 9-20 days).

**Discussion**

This audit of in-hospital waiting times in ACS management has identified several key areas for improvement which are now the focus of on-going initiatives.

**Time to acute reperfusion in STEMI**—Acute reperfusion in patients with STEMI is associated with significant short and long term benefits.3,11-13 When considering only those treated with primary PCI on site at MMH (and therefore only during working hours) 87% were treated with DTB times less than 120 minutes, however only 62% were treated within the more optimal 90 minute target indicating there is still significant room for improvement. Also of concern are the lengthier DTB times in those transferred after hours for primary PCI to ACH, with only 30% and 12% being treated within 120 minutes and 90 minutes respectively.

In our series the decision to transfer the patient the 17km road distance from MMH to ACH for primary PCI comes at the cost of around a further 52 minutes of myocardial ischaemia (based on the median DTB times of 83 minutes and 135 minutes for those treated on site or after transfer). A swift transfer however is possible with the shortest DTB time for a transferred patient of 73min.

During the period of this audit only clinically high risk STEMI patients were considered for after-hours primary PCI, those not fulfilling this criteria were considered for thrombolysis. One potential contributor to the delay to definitive treatment is introduced by this front door uncertainty regarding whether to proceed with thrombolysis or transfer for PCI. Other significant contributors to delay in the transfer process include the lack of dedicated transfer staff as well as delay attributable to transfer ambulance availability.

The results presented here demonstrating a significant delay to treatment for patients transferred for primary PCI mean that this treatment strategy is not delivering the full clinical benefit over thrombolysis that was seen in the clinical trials of this strategy.13 Despite the possibility that transfer for primary PCI in its current format is only providing equipoise with thrombolysis, our data should not be used to temper enthusiasm for universal access to primary PCI.

In fact the opposite approach is required and based partly on this data the transfer process for STEMI patients has now become the focus of both MMH and NCCN working groups with the aim of streamlining the Emergency Department and inter-hospital transfer processes. In addition electronic ECG transmission from the
ambulance is being developed that may be used to bypass the non-interventional hospitals if STEMI is identified after hours. Data from this audit will now serve as the baseline for assessing progress with respect to the inter-hospital transfer of patients with STEMI.

**Time to coronary angiography in ACS**—Our data shows that over the study period 69% of patients admitted to the MMH CCU with ACS were catheterised within 3 days of admission. This occurs in the setting of high rates (84%) of catheterisation in this cohort. Predictors of a more than three day delay predictably include advanced CKD (OR 3.68) and presentation late week (OR 2.85). Of interest there was a weaker association with female sex (OR 1.56) which is substantiated when examining the mean time to angiography for female (3.2 days) and male (2.7 days) ACS patients (p value <0.0001). Ethnicity was not associated with a >3d delay to catheterisation (p value 0.3509).

The reason female patients wait longer for catheterisation in this ACS cohort was not specifically examined in our research. Female patients in our series were older and presented less often with STEMI which may confound the association however other contributing factors cannot be excluded including for example a higher likelihood of atypical presentation as well as physician bias.

The 2012 New Zealand management guidelines for NSTEMI recommend an early invasive strategy for high risk patients with cardiac catheterisation within 72 hours. This has currently been operationalised in the Midland and Northern DHBs as a three day target. This target is incorporated in the Midland ACS project and the Northern Region Health Plan, both endorsed by the Ministry of Health.

The appropriate target for proportion of ACS patients receiving angiography within three days depends partly on the comorbidity of the population being managed. There is a subgroup of patients for whom it is clinically appropriate to delay coronary angiography pending clinical stabilisation which includes those with active infection, acute renal failure, and decompensated heart failure. In addition, some patients and their families request more time than others to make decisions regarding invasive management.

Based on our data a target of a minimum 70% catheterisation within three days is achievable for our patient population. This target was achieved in our series in 8 of the 14 quarters which have been audited with this series.

There is an association between (a) the time to coronary angiography and (b) the inpatient length of stay for ACS patients (see figure 4 above) and it is plausible that strategies targeting reduced waiting times for coronary angiography would in addition reduce hospital length of stay for these patients.

Reducing the time to coronary angiography for ACS patients is also now the target of a focus working group. Areas already identified for potential improvement include (1) expediting the referral process, (2) re-organising the catheter laboratory workflow which currently has to balance catheterisation requests for both in and outpatients, with both ACS and non ACS indications, as well as with pacemaker implantation, and (3) increasing operating hours of the laboratory including investigating the feasibility of a weekend catheter list (at a local or regional level).
Data on the MMH ACS patients receiving cardiac catheterisation within three days of presentation is now being reported and disseminated on a monthly basis.

**Time to CABG in ACS**—Previous authors have been critical of the waiting time for surgical revascularisation of in-patients with acute coronary syndromes in New Zealand.14 Our data adds weight to the argument that the delay for surgery is unacceptably long for our highest priority surgical patients (median inpatient waiting time 13 days from admission to surgery and a quarter of patients waited more than 20 days). This delay not only adds significantly to hospital costs but also exposes our patients to the cumulative risks of prolonged anticoagulation, re-infarction, heart failure, arrhythmia and death.

The aetiology for this delay is likely to be multi-factorial however the time to coronary angiography is only a modest contributor with a median waiting time of 2 days across our entire cohort. The weight of the other factors potentially contributing to delay was not examined in this study but these factors include (1) the need to investigate and optimise comorbidity, (2) the delay to referral for surgery, (3) competing demands on the cardiothoracic surgeon, (4) the need to wait for platelet activity to return after cessation of Clopidogrel, as well as (5) staff and bed shortages in the intensive care unit and cardiothoracic surgical ward.

In addition, of specific concern are the group of inpatients with ACS who are deemed appropriate for outpatient surgery, a group in our cohort with a significant ACS readmission rate (38% or 18 of 48 patients) necessitating reprioritisation to inpatient priority surgery. This high readmission rate reflects not only (1) the higher risk of these patients with unstable coronary artery disease but (2) the contribution of lengthy outpatient surgical waiting times (median delay to outpatient surgery 155 days). Our data also suggests that we are not good at identifying a lower risk subgroup of ACS patients who can safely wait longer.

In view of the relatively small number of patients involved (49 ACS patients over just more than three years) one could make a case for all ACS patients that require CABG to be listed with inpatient priority unless there is a compelling reason to wait. Further discussion and consensus strategy regarding the appropriateness of outpatient surgery for the management of ACS patients is required.

Improving the waiting time for cardiac surgery has been the focus of a Ministry of Health led initiative over the last 18 months and performance is now being reported on a weekly basis.

**Future directions**—From the latter period of this audit and onwards the MMH Cardiology service now generate monthly reports from the ACS registry which are used as the basis for quality improvement projects around both the DTB times and the 3-day catheterisation results being obtained. This type of quality improvement is in keeping with ESC recommendations15 that support continuous audit with a view to improved patient outcomes.

The Midland DHBs have recently begun an ACS project to improve access to coronary angiography and it is planned to extend this quality improvement project to the Northern region this year using the Acute Predict system as electronic support. Whilst reducing waiting times is a key focus of these projects other quality indicators
are also important including use of appropriate investigations, medications and access to cardiac rehabilitation.

**Conclusions**

This audit of the in-hospital waiting times for our ACS patients complements the recently published work on pre-hospital delay and has identified several key areas where reducing the delays for our ACS patients should allow us to optimise the efficacy of our evidence-based interventions and potentially reduce hospital length of stay as well as improve patient outcomes.

The areas of most concern are (1) the delay to reperfusion for patients transferred for primary PCI, (2) the waiting time to CABG for ACS patients and (3) the ACS readmission rate for those discharged waiting for outpatient CABG surgery.

By using continuous audit across the spectrum of ACS management in both the pre-hospital and in-hospital phases we should ensure that our patients receive timely and quality care across this continuum.

**Competing interests:** Nil.

**Author information:** Jamie Voss, Cardiology Registrar, Middlemore Hospital, Auckland; Andrew Martin, Electrophysiology Fellow, Auckland City Hospital, Auckland; Imogen Caldwell, Medical Registrar, Auckland City Hospital, Auckland; Mildred Lee, Data analyst, Counties Manukau District Health Board, Auckland; Andrew J Kerr, Cardiologist and Clinical Head of Cardiology, Middlemore Hospital, Auckland

**Correspondence:** Andrew Kerr, c/o Cardiology Department, Middlemore Hospital, Otahuhu, Auckland 93311, New Zealand. Email: Andrew.Kerr@middlemore.co.nz

**References:**


Abstract

**Aims** To report perceptions regarding vitamin D sources; risk factors, prevention and management of vitamin D deficiency and insufficiency; supplement prescribing practices; patients’ enquiries.

**Methods** A NSW survey instrument was adapted and pre-tested for NZ conditions. Royal NZ College of General Practitioners online weekly newsletter recipients were provided an electronic survey link. The Medical Council emailed an invitation and online survey link to non-respondents. Hard copy questionnaires were posted to remaining non-respondents.

**Results** 1089 GPs responded (32% participation). Several sources of information on vitamin D were identified. Sun exposure was considered the main vitamin D source in summer (85%), but in winter (47%) supplements (13%) and food sources were more commonly mentioned. Daily sunlight exposure at low UV times (79%) was identified as the main factor preventing deficiency, followed by high-dose supplements and fortified foods (54% each), winter sun-protection relaxation (48%), daily low-dose supplements (47%), daily sunlight exposure at peak UV times (35%) and relaxation of sun protection, year-round.

Patient characteristics prompting alertness to vitamin D status included being housebound or institutionalised (96%), wearing concealing clothing (88%), past history of bone fractures (87%), age over 65 years (84%), poor nutrition (71%) and current bone disease (69%). Insufficiency and deficiency were managed primarily through high-dose supplementation and advice to receive more sunlight. Almost half (47%) had received patient requests for vitamin D testing, and 40% requests for prescribed vitamin D.

**Conclusions** Study results should help inform possible educational and other interventions to optimise vitamin D and sun-exposure advice.

An increased risk of bone disease (rickets, osteomalacia and osteoporosis) is attributable to vitamin D deficiency, and serum 25(OH)D levels tend to be negatively associated with an increased risk of other diseases, although convincing evidence of causality is lacking.1

The main vitamin D source in humans is usually endogenous synthesis from exposure of the skin to solar ultraviolet-B (UV-B),2 although diet plays a role, depending on the food types eaten, as well as fortification and supplementation practices.3

Endogenous vitamin D production is related to personal characteristics. Darker colour skin types require longer UVR exposure for a given amount of vitamin D to be
produced, whereas lighter colour skin types require shorter times and are also more susceptible to erythema.

The efficiency of endogenous vitamin D production, as well as absorption from nutritional intake, tends to decline with age and supplementation is commonly recommended for the elderly and prescribed for the institutionalised or housebound. Endogenous vitamin D production is related to the pattern of sun exposure, being most efficient during peak summer UVR around solar noon. However, that is also the time when erythema occurs most quickly.

In high latitudes, such as southern NZ, very little vitamin D may be produced from incidental UVR exposure in winter months. Vitamin D production is also influenced by behavioural factors, such as the amount of time spent outdoors and the area of skin exposed - which is related to cultural body coverage practices, including the wearing of veils and other concealing clothing.

Assuming conditions of minimal sun exposure, the US Institute of Medicine recently proposed a target of 50 nmol/L, whereas the Endocrine Society Clinical Practice Guideline recommended levels above 75nmol/L. There is also debate about the amount of UV radiation exposure required to achieve particular levels of serum 25(OH)D.

In response to these issues, a Consensus Statement on Vitamin D and Sun Exposure in NZ was recently released. The NZ Ministry of Health recommends an annual mean serum vitamin D level of 50 nmol/L, and reports that in the 2008 NZ Adult Nutrition Survey of those 15 years and over, 27% were below this level, though not deficient (defined as <25 nmol/L), with 4.9% showing mild to moderate deficiency (12.5-24.9 nmol/L) and 0.2% severe deficiency (<12.5 nmol/L).

In NZ, as elsewhere, there is evidence that vitamin testing has increased (although this is not a recommended routine practice for the NZ general population); there are concerns about the need for, accuracy and cost of, serum testing for vitamin D, and also some indication that more patients may be requesting such testing.

Given the situation where an increased risk of bone disease is attributable to vitamin D insufficiency or deficiency and there are associations with other health outcomes, it is important to know about the perceptions and practices of health professionals with respect to vitamin D.

GP's are a widely respected source of health information for the general NZ population, yet lack confidence about their vitamin D knowledge and would appreciate clinical guidelines, confirming Australian conclusions about a need for greater clarity in the advice that GPs provide. The findings reported here are part of a broader study about sun exposure and vitamin D.

The aim of this paper is to describe current perceptions, practice and advice provided by GPs with respect to vitamin D sufficiency/deficiency. In particular, perceptions of factors which may prevent vitamin D deficiency and prompt alertness to vitamin D status; ways to manage vitamin D insufficiency and deficiency; the ordering of serum vitamin D tests; the prescribing the 50,000 IU vitamin D supplement; and perceived common vitamin D related patient enquiries.
The overall goal being to document current practice and identify any information and resource needs of GPs around vitamin D sufficiency/deficiency. Our findings also provide baseline levels for possible follow-up study following the release of the Consensus Statement.

Methods

Instrument—A study-specific survey instrument, which drew on Australian precedent, was developed and pre-tested for NZ conditions. The measures obtained included demographics (sex, ethnicity), training (when, where and which qualifications were received) and practising issues (years of practise, skin cancer clinic work, usual number of sessions in General Practice per week). Ethnicity was categorised following recommended Level 1 (five category) coding procedures. In addition, there were items about awareness of vitamin D and its relation to sun exposure, sun protective practices, the accessing of key information sources and perceived information needs.

The present paper focuses on those questionnaire items concerned with patient contact and vitamin D status. As some questionnaire items involved making selections from lists of items, providing the potential for response bias due to list order, those items were listed in random order for online presentation and four (colour coded) versions of the instrument were randomly distributed in hard copy mailings.

Questionnaire data were supplemented with information about whether or not the GP was based in a metropolitan area with a medical school—a potential marker of ease of access to seminars and other educational opportunities. In addition, five latitude bands were created reflecting levels of ambient UVR, with each including at least one major population cluster.

Population—All NZ medical practitioners are required to register annually with the Medical Council of NZ (MCNZ) and hold a current practicing certificate. Permission to access the MCNZ register was obtained and it was accessed on 1 Sept 2010. It was not possible to determine precisely how many on the register were currently practicing GPs, so those with ‘General Practice’ as a vocational scope or any GP college noted in their qualifications were selected, cross checking with the Royal NZ College of General Practitioners (RNZCGP) 2010 membership list. The resulting ‘master file’ contained a total of 3,450 potentially eligible practitioners.

Procedures—Study procedures, described in full elsewhere, are summarised here. The practicalities of administration using LimeSurvey version 1.87, an open source online survey application, were tested by an IT contractor.

Once a secure survey site was activated, all recipients of the online RNZCGP electronic weekly newsletter ePulse were notified that they could click a link and begin the survey by entering their Medical Council registration number. This link was provided for two successive weeks, from Tuesday 12 October to Monday 25 October 2010. The first survey question asked potential participants how many sessions of general practice they worked each week and only those reporting at least one session were defined as currently practicing GPs and invited to complete the survey.

Two weeks after the second ePulse mailing, a list of all those remaining on the ‘master file’ who had not yet responded was provided to the Medical Council which then made direct email contact (2nd November 2010) with an invitation and an online link to the survey. This email was repeated on 16th November 2010.

For those who did not respond to any of these electronic opportunities, a hard copy questionnaire was posted in the first week of December 2010, with a reply paid, addressed envelope enclosed.

When completing the questionnaire, participants were asked to refer to a Survey Information Sheet which provided contemporary definitions of vitamin D status used in NZ. Vitamin D deficiency was defined as ‘below 25 nmol/L’, insufficiency as ‘between 25 and 50 nmol/L’ and ‘adequate vitamin D as ‘50 nmol/L or above.’ Otherwise, respondents were invited to ‘answer according to your current understanding and beliefs.’

Analysis—Appropriate descriptive statistics were used to summarise demographic, training and practising measures. Where data were available, comparisons were made with the NZ medical workforce.
The number of work sessions per week was coded as 1-3, 4-7, and 8+ per week, with 8+ sessions assumed to be equivalent of ‘full time’, allowing 1 day for administration and training. This variable was taken to indicate the ‘intensity’ of general practice work. Stata statistical software, version 12.0 was used for all analyses. 

Results

Demographic, training and practicing data were obtained from 1089 GPs (Table 1), producing an estimated 32% participation rate, with 686 (63%) returning a hard copy questionnaire.

Table 1. Characteristics of the 1089 study participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>533</td>
<td>49.0</td>
</tr>
<tr>
<td>Female</td>
<td>555</td>
<td>51.0</td>
</tr>
<tr>
<td>Missing data</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ethnicity (multiple identification possible)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Māori</td>
<td>22</td>
<td>2.0</td>
</tr>
<tr>
<td>Pacific</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>Asian</td>
<td>134</td>
<td>12.4</td>
</tr>
<tr>
<td>NZ European/European</td>
<td>933</td>
<td>86.4</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>1.4</td>
</tr>
<tr>
<td>Missing data</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metropolitan centres with a medical school</td>
<td>547</td>
<td>50.2</td>
</tr>
<tr>
<td>All other</td>
<td>542</td>
<td>49.8</td>
</tr>
<tr>
<td>Missing data</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Latitude bands for location of practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper N: 34 to 36.59°</td>
<td>344</td>
<td>31.8</td>
</tr>
<tr>
<td>Mid-N: 37 to 39.59°</td>
<td>282</td>
<td>26.0</td>
</tr>
<tr>
<td>Lower N/upper S: 40 to 41.59°</td>
<td>199</td>
<td>18.4</td>
</tr>
<tr>
<td>Mid-S: 42 to 44.59°</td>
<td>171</td>
<td>15.8</td>
</tr>
<tr>
<td>Lower S: 45 to 47°</td>
<td>87</td>
<td>8.0</td>
</tr>
<tr>
<td>GP practice (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>94</td>
<td>8.7</td>
</tr>
<tr>
<td>5 to 10</td>
<td>159</td>
<td>14.7</td>
</tr>
<tr>
<td>11 to 20</td>
<td>324</td>
<td>29.9</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>505</td>
<td>46.7</td>
</tr>
<tr>
<td>Missing data</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Practice sessions per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 3</td>
<td>117</td>
<td>11.1</td>
</tr>
<tr>
<td>4 to 7</td>
<td>388</td>
<td>36.7</td>
</tr>
<tr>
<td>≥ 8</td>
<td>553</td>
<td>52.3</td>
</tr>
<tr>
<td>Missing data</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Place of medical graduation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZ</td>
<td>767</td>
<td>70.4</td>
</tr>
<tr>
<td>US/UK/other European</td>
<td>191</td>
<td>17.6</td>
</tr>
<tr>
<td>SE Asian</td>
<td>30</td>
<td>2.8</td>
</tr>
<tr>
<td>S Africa</td>
<td>39</td>
<td>3.6</td>
</tr>
<tr>
<td>All other</td>
<td>31</td>
<td>2.9</td>
</tr>
<tr>
<td>Australia</td>
<td>28</td>
<td>2.6</td>
</tr>
<tr>
<td>Missing data</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
### Variables

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Highest medical qualification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical degree</td>
<td>173</td>
<td>15.9</td>
</tr>
<tr>
<td>Graduate certificate/diploma</td>
<td>76</td>
<td>7.0</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>21</td>
<td>1.9</td>
</tr>
<tr>
<td>College fellowship</td>
<td>799</td>
<td>73.4</td>
</tr>
<tr>
<td>Research doctorate</td>
<td>16</td>
<td>1.5</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Missing data</strong></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Year received highest medical qualification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before 1980</td>
<td>88</td>
<td>8.2</td>
</tr>
<tr>
<td>1980–1999</td>
<td>478</td>
<td>44.7</td>
</tr>
<tr>
<td>2000 and after</td>
<td>504</td>
<td>47.1</td>
</tr>
<tr>
<td><strong>Missing data</strong></td>
<td>19</td>
<td></td>
</tr>
<tr>
<td><strong>Skin cancer course completion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>190</td>
<td>17.4</td>
</tr>
<tr>
<td>No</td>
<td>899</td>
<td>82.6</td>
</tr>
</tbody>
</table>

Comparison with available Medical Council of New Zealand data on medical practitioners indicates that participants were somewhat under representative of GPs who trained overseas (30% vs 42%) and over representative of women who account for 44% of GPs. 15

Despite questionnaire item wording, when asked: ‘How have you mostly obtained information about vitamin D deficiency?’ many (47%) of the 686 GPs who completed the hard copy questionnaire indicated that there had been more than a single source, an option not available to online respondents.

Among all of the remaining respondents who identified a single main source (including hard copy and electronic responses), professional guidelines (20%), journals (19%), courses/training programmes (19%), colleagues (14%), medical training (10%), non-professional internet sources (7%), industry literature and promotions (4%), mass media (3%) and patients (<1%). Three per cent reported never having obtained information about vitamin D.

When asked: ‘Which is the main source of vitamin D in NZ’ during summer months, 10% of hard copy respondents again selected multiple sources. Among all other respondents, most (91%) identified ‘exposure to sunlight outdoors’ as the single main source, followed by those who were ‘not sure’ (4%), fortified milk products (2%) ‘fish with a high fat content’ and supplements (1%). No other fixed response source category (fortified cereals, exercise and exposure to artificial UVR) reached the 1% endorsement level.

For winter, 13% of hard-copy respondents selected multiple sources, but ‘exposure to sunlight outdoors’ remained the most frequently reported source among all of the other respondents, although with a much reduced frequency (51%), followed by ‘supplements’ (14%), ‘not sure’ (12%), fortified milk products and margarine (10%), ‘fish with a high fat content’ (8%) and ‘fortified cereals’ (3%), with the remainder (‘exposure to artificial UV light’ and ‘exercise’) each failing to reach the 1% level.

When provided with a list and asked ‘Which of the following do you believe may prevent vitamin D deficiency in the general population?’ GPs responded as ranked by the frequency of reporting presented in
Table 2. Factors which may prevent vitamin D deficiency in the general population, ranked by frequency of reporting

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Daily exposure to sunlight outdoors at low UV times of day</td>
<td>853</td>
<td>79</td>
</tr>
<tr>
<td>2</td>
<td>A course of high-dose (50,000 IU) vitamin D tablets</td>
<td>590</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>Adequate intake of vitamin D fortified foods</td>
<td>582</td>
<td>54</td>
</tr>
<tr>
<td>4</td>
<td>Relaxation of sun protection during winter</td>
<td>515</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>Daily low dose (2,000 IU or less) vitamin D supplements</td>
<td>514</td>
<td>47</td>
</tr>
<tr>
<td>6</td>
<td>Daily exposure to sunlight outdoors at peak UV times of day</td>
<td>379</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>Relaxation of sun protection throughout the year</td>
<td>283</td>
<td>26</td>
</tr>
<tr>
<td>8</td>
<td>Adequate physical activity</td>
<td>146</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td>Daily exposure to artificial UV light</td>
<td>101</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>Daily calcium supplements</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>There is no effective way to prevent vitamin D deficiency</td>
<td>7</td>
<td>&lt;1</td>
</tr>
<tr>
<td>12</td>
<td>No response selected</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

When provided with a list of 17 possibilities, responses to the question ‘Which of the following patient features would prompt you to be alert to vitamin D status?’ are reported in rank order in Table 3.

Table 3. Which of the following patient features would prompt you to be alert to vitamin D status?

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>People who are housebound or institutionalised</td>
<td>1,006</td>
<td>96</td>
</tr>
<tr>
<td>2</td>
<td>People who wear concealing clothing for cultural or religious reasons</td>
<td>922</td>
<td>88</td>
</tr>
<tr>
<td>3</td>
<td>Past history of bone fractures</td>
<td>917</td>
<td>87</td>
</tr>
<tr>
<td>4</td>
<td>Aged over 65 years</td>
<td>878</td>
<td>84</td>
</tr>
<tr>
<td>5</td>
<td>Poor nutrition</td>
<td>750</td>
<td>71</td>
</tr>
<tr>
<td>6</td>
<td>Current bone disease</td>
<td>727</td>
<td>69</td>
</tr>
<tr>
<td>7</td>
<td>Dark skin (Fitzpatrick skin types V-VI)</td>
<td>580</td>
<td>55</td>
</tr>
<tr>
<td>8</td>
<td>Muscle aches and weakness</td>
<td>487</td>
<td>46</td>
</tr>
<tr>
<td>9</td>
<td>Pregnant or breastfeeding women</td>
<td>351</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>Women in general</td>
<td>330</td>
<td>31</td>
</tr>
<tr>
<td>11</td>
<td>Depression</td>
<td>326</td>
<td>31</td>
</tr>
<tr>
<td>12</td>
<td>Fatigue</td>
<td>318</td>
<td>30</td>
</tr>
<tr>
<td>13</td>
<td>Very fair skin (Fitzpatrick skin types I-II)</td>
<td>233</td>
<td>22</td>
</tr>
<tr>
<td>14</td>
<td>Obesity</td>
<td>148</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>Current skin disease</td>
<td>143</td>
<td>14</td>
</tr>
<tr>
<td>16</td>
<td>Children (aged under 16 years)</td>
<td>113</td>
<td>11</td>
</tr>
<tr>
<td>17</td>
<td>Not sure</td>
<td>19</td>
<td>2</td>
</tr>
</tbody>
</table>

(In addition, 38 did not select a response option).

Asked about ‘In which ways do you manage vitamin D insufficiency?’ and similarly with respect to deficiency, the percentages reporting specific fixed responses for summer and winter, respectively, were as presented in Table 4.
Table 4. Reported ways of managing vitamin D insufficiency and deficiency by season, ranked by percentages of GPs reporting

<table>
<thead>
<tr>
<th>Ways of management</th>
<th>Season and vitamin D status</th>
<th>Summer</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insufficiency</td>
<td>Deficiency</td>
<td>Insufficiency</td>
</tr>
<tr>
<td>Monthly high-dose vitamin D supplements</td>
<td>72</td>
<td>85</td>
<td>81</td>
</tr>
<tr>
<td>Advice to receive more natural sunlight</td>
<td>59</td>
<td>55</td>
<td>71</td>
</tr>
<tr>
<td>Nutrition advice</td>
<td>48</td>
<td>42</td>
<td>48</td>
</tr>
<tr>
<td>Daily low dose vitamin D supplements</td>
<td>16</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Calcium supplements</td>
<td>11</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Advice to receive more artificial UV light</td>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Management strategies were ranked in the same order for both seasons and statuses, with higher percentages advising monthly high dose supplements and receipt of more natural sunlight in winter for insufficiency, but either the same or similar percentages for other options and seasons.

When asked to ‘Please estimate the number of patients for whom you have made a laboratory investigation of serum vitamin D in the last 12 months’, many GPs reported having done this (80%) and a few (n=19) specifically noted that this was either ‘not recommended’, ‘not current practice’, ‘too expensive’ or ‘the laboratory won’t do it.’

GPs reported a wide range of estimates (0-100%, mean of 21% from 802 GPs) for the percentage of their serum vitamin D orders in the last 12 months that were requested by patients. Of all those patients for whom a serum vitamin D test was ordered, some GPs indicated that they either did not know, were not sure or were unable to estimate how many of the proportion producing results indicated either insufficiency (n=24, 3% of those requesting tests) or deficiency (n=7, <1% of those requesting tests).

When asked to estimate ‘for how many patients have you prescribed high dose vitamin D supplements in the past 12 months’, the median for the 1005 providing this information was 30 (25th percentile 10, 75th percentile 80), but some (n=24, 2%) indicated that they either did not know, were not sure or could not estimate that number.

Finally, participants were invited to indicate ‘Which are the more common vitamin D related patient enquiries you receive?’ (Table 5).
Table 5. The more common vitamin D-related patient enquiries received, ranked by frequency of reporting

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Requests for vitamin D level tests</td>
<td>504</td>
<td>47</td>
</tr>
<tr>
<td>2</td>
<td>Requests for prescribed vitamin D</td>
<td>437</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>Information about sources of vitamin D</td>
<td>343</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>Advice regarding how much time they should spend out in the sun</td>
<td>270</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>Advice regarding the use of sun protection and effects on vitamin D</td>
<td>264</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>Did not receive any or received very few patient enquiries regarding vitamin D</td>
<td>274</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>Information about vitamin D following media reports</td>
<td>262</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>Requests for complementary and alternative therapies</td>
<td>120</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Prevention of vitamin D deficiency in the general population—It was encouraging to find that less than 1% of NZ GPs considered that there was no effective way to prevent vitamin D deficiency in the general population.

There was widespread agreement that daily exposure to sunlight, at times of day when there are low levels of UVR, may prevent deficiency.

However, this may not be a sufficient or practical strategy in winter for those who spend relatively little time outdoors in southern regions of the South Island where lower temperatures may discourage exposure of more than the face and hands, and winter levels of UVR may generate little endogenous vitamin D production.

The possible benefit of supplementation to this population, at least May-August, has been acknowledged in the recent Consensus Statement.\(^7\)

Of possible concern was the quite high endorsement of daily exposure during peak UV (35%), given that these responses may not have referred to winter, alone. There was also quite frequent endorsement of the relaxation of sun protection throughout the year (26%). Such relaxation could increase skin cancer risk from summer exposure and, during winter may have minimal impact, particularly in the south of the South Island.

It is reassuring that there was low (9%) endorsement of artificial UV exposure, although even that level of support is a concern, given the increased risk of melanoma, particularly for those <35 years,\(^17,18\) in contrast to the efficacy, relative economy, ready availability and greater safety of supplements.

There was more than 50% endorsement of 50,000 IU vitamin D supplements as a preventive strategy, equivalent endorsement of vitamin D fortified foods and similar levels of endorsement of low dose (≤2,000 IU) supplements (47%).

Taken overall, these responses demonstrate the potential importance of the recently developed Consensus Statement which aims at achieving a balance between vitamin D requirements and protection against skin cancer risk, taking into account differences in personal characteristics, such as skin type, and latitude.
There was agreement between NZ and Australian GPs regarding the efficacy of daily exposure to sunlight outdoors at low UV times of day (79:78%) and similarly low levels of endorsement of exposure to artificial UV (9:10%), but substantial differences in the percentages reporting intake of fortified foods (54:76%), daily vitamin D supplements (47:80%), relaxation of winter sun protection (47:28%) and differences in peak UV sun exposure (35:53), relaxation of sun protection throughout the year (26:18) and physical activity (13:27).

The option of a course of high-dose vitamin D supplements, selected by 54% in NZ, was not available to NSW GP’s as these tablets had not been approved for prescription there, whereas in NZ they are the recommended treatment option for the general population at risk. Furthermore, there is a move in NZ to make this supplement more readily available through pharmacies, rather than just on prescription. The lack of this option in Australia is likely to have resulted in increased NSW endorsement of the fortified foods and daily supplementation options.

**Risk factors/groups for vitamin D status**—Most GPs identified being housebound or institutionalised as a patient characteristic which would prompt alertness to vitamin D status. The prescribing of vitamin D supplementation for these groups is encouraged by the Accident Compensation Corporation and subsidised in NZ. There were also high levels of awareness regarding those who wear concealing clothing, have a history of bone fractures or current bone disease and are over 65 years of age.

There was relatively less acknowledgment of the potential needs of pregnant and breastfeeding women and even less for children under 16 years. The vitamin D needs of these groups have recently been reviewed for a Consensus Statement, similar to that already available with respect to adults.

In response to similar questions about risk factors/groups for vitamin D status, broadly similar percentages of GPs in NZ and NSW identified those in institutional care (96% each), those who wear concealing clothing (88:95%), those over 65 years of age (83:91%), those with current bone disease (69:61%), pregnant or breastfeeding women (33:41%), women in general (31:41%), the obese (14:24%) and children (11:13%) as groups at increased risk.

The NSW study did not report about a past history of bone fractures, skin type differences, depression, muscle aches and weakness or fatigue, so the inclusion of those items among the NZ response options may have influenced response patterns. However, where comparable information was available, percentages differed by no more than 10%, indicating broad agreement in perceived risk factors across both countries.

**Ways of managing vitamin D insufficiency and deficiency**—Management strategies most commonly reported by NZ GPs were the same as those reported for NSW, namely, the prescription of supplements, followed by advice to receive more natural sunlight, then nutrition advice. However, there were major differences in reported practices which reflect health policy.

Unless clinically indicated otherwise, a monthly 50,000 IU supplement is the standard management strategy in NZ, but it is not a registered medicine approved for use in Australia, where lower dose daily supplements are prescribed and were reported by 97% of surveyed NSW GPs, whereas only 18% reported this in NZ. In NSW, most
GPs (58%) had referred >21 patients for testing in the past year, 14% having referred more than 100, with most tests (82%) initiated by the physician.\textsuperscript{11}

Vitamin D testing is not encouraged in NZ because the cost of testing greatly exceeds the cost of treatment, and few GPs reported ordering laboratory tests. However, internationally, there is evidence of significantly increased test frequency in recent years, prompting expression of concerns about test reliability, cost and need.\textsuperscript{19}

In most cases in NZ, testing is considered unnecessary, as the ‘vast majority of tests performed currently do not reveal vitamin D deficiency’ so that ‘a move away from routine vitamin D measurements seems sensible, though they are still indicated when investigating suspected metabolic bone disease or hypocalcaemia’.\textsuperscript{9}

A portion of the observed increase in testing may be attributable to a recent increase in vitamin D research, although some of that testing is done, in-house, within research institutions.

Another difference is that Australia and many other Western countries have broader fortification policies and practices than New Zealand.

In Australia it is mandatory for food manufacturers to fortify edible oil table spreads, which are estimated to contribute almost 50\% of daily total vitamin D intake, excluding supplements.\textsuperscript{20} Nevertheless, serum 25(OH)D levels in the NZ European population are, broadly, comparable to Australia and the UK. However, 25(OH)D levels tend to be higher in North America, most likely due to wider fortification practices together with higher levels of supplementation and, at least in parts of the United States, lower latitude.\textsuperscript{21}

The most common vitamin D related patient enquiries received—Requests for vitamin D level tests were the most commonly reported patient enquiries received in both NZ (47\%) and NSW (36\%), followed, in NZ, by requests for prescribed vitamin D (40\%) — a response option not provided in the NSW study. However, about one quarter of NZ and one-third of NSW GPs reported not receiving any vitamin D related patient enquiries.

Similar proportions reported requests for advice about how much time should be spent in the sun, the use of sun protection and its impact on vitamin D, and information about vitamin D following media reports. Given the low levels of confidence in their knowledge about these issues reported by GPs in both studies, the recent Consensus Statement on Vitamin D and Sun Exposure in NZ, should help to meet GP needs in responding to patient enquiries. However, as acknowledged in that Statement, given existing uncertainties and the level of current research, it is likely that the advice provided will need to be reviewed and updated as new evidence emerges.

Conclusions

Study findings should help inform possible educational and other interventions to optimise vitamin D and sun-exposure advice.

Broad similarities were observed in the patterns of responses from NZ and NSW GPs, but there were also some notable differences, largely attributable to policies and guidelines around vitamin D testing—which is discouraged in NZ, and supplement
prescribing practices—with routine use of a high dose monthly supplement in NZ, but not NSW.

These differences illustrate how public health policy can impact on GP practices and, potentially, health outcomes. The reported low NZ levels of confidence in vitamin D knowledge reinforce the importance of developing educational guidelines.

It would be informative for a second survey to be conducted once sufficient time has been allowed for the 2012 Consensus Statement to exert a potential influence.

**Competing interests:** AIR participated in the Consensus Statement Workshop process which provided advice for the drafting of the Ministry of Health and Cancer Society of New Zealand: Consensus Statement on Vitamin D and Sun Exposure in New Zealand.7

**Author information:** Anthony I Reeder, Associate Professor and Director, Cancer Society Social and Behavioural Research Unit; Janet A Jopson, Assistant Research Fellow; Andrew R Gray, Biostatistician; Preventive & Social Medicine, Dunedin School of Medicine, University of Otago, Dunedin

**Acknowledgements:** This study was conducted with support from the Cancer Society of New Zealand Inc and the University of Otago.

We thank Dr Billie Bonevski (University of Newcastle, Australia) for permission to modify her survey instrument for New Zealand conditions. We also thank the IT consultants Standby Consulting and DataSynergy for the development of the electronic questionnaire and secure website, respectively, and the New Zealand College of General Practitioners for providing access to their national database. Lastly we extend our gratitude to survey participants.

**Correspondence:** Assoc Prof Anthony Reeder, Preventive & Social Medicine, Dunedin School of Medicine, PO Box 913, Dunedin, New Zealand. Email: tony.reeder@otago.ac.nz

**References:**


Pharmaceutical quality of “party pills” raises additional safety concerns in the use of illicit recreational drugs

Simon A Young, Thilini R Thrimawithana, Ushtana Antia, John D Fredatovich, Yonky Na, Peter T Neale, Amy F Roberts, Huanyi Zhou, Bruce Russell

Abstract

Aim To determine the content and release kinetics of 1-benzylpiperazine (BZP) and 1-(3-trifluoromethyl-phenyl)piperazine (TFMPP) from “party pill” formulations. From these data, the possible impact of pharmaceutical quality upon the safety of such illicit formulations may be inferred.

Methods The amount of BZP and TFMPP in party pill formulations was determined using a validated HPLC method. The in-vitro release kinetics of selected party pill brands were determined using a USP dissolution apparatus (75 rpm, 37.5°C). The release data were then fitted to a first order release model using PLOT software and the time taken to achieve 90% release reported.

Results Many of the tested party pill brands contained amounts of BZP and TFMPP that varied considerably from that stated on the packaging; including considerable TFMPP content in some brands not labelled to contain this drug. Dissolution studies revealed that there was considerable variability in the release kinetics between brands; in one case 90% release required >30 minutes.

Conclusion Lack of quality control in party pill manufacture may have led to the toxic effects reported by users unaware of the true content and release of drug from pills. More stringent regulation in the manufacture and quality control of “new generation party pills” is essential to the harm reduction campaign.

Until reclassification as Class C Controlled Drugs in April 2008, “party pills” containing 1-benzylpiperazine (BZP) either alone or (more usually) in combination with the analogue 1-(3-trifluoromethylphenyl)piperazine (TFMPP) were legally manufactured, marketed and consumed by adults in New Zealand.

This reclassification defined the manufacture, trade or possession with the intent to trade these piperazines to be a criminal act with immediate effect; the enacted period of amnesty in relation to possession for personal consumption is now expired. As a result, the gift of a range of “party pills” to the School of Pharmacy made a quantity of these formulations available for research purposes.

BZP/TFMPP containing party pills gained popularity as a legal and arguably safer alternative to 3,4-methylenedioxymethamphetamine (MDMA, or “ecstasy”) and were sought by recreational drug users.

MDMA induces a pleasurable mixture of stimulant effects and heightened emotional empathy towards others, understood to result from the serotonin transporter (SERT)-mediated release of serotonin (5-HT) from neurones augmented by a similar dopamine transporter (DAT)-mediated release of dopamine. However, chronic
MDMA use has been linked to serious sequelae, including memory dysfunction and cognitive deficits. BZP, the major bioactive component of “party pills”, is an amphetamine-like stimulant. Subjective human studies confirm stimulant effects indistinguishable from dexamphetamine with ca. one tenth the potency.

Animal studies establish TFMPP to be a modest, non-selective 5-HT receptor agonist and to cause the SERT-mediated release of 5-HT from neurones, analogous to MDMA.

Unlike BZP, which is principally excreted unchanged in the urine, TFMPP is almost exclusively excreted as metabolites. These metabolites largely result from the aromatic hydroxylation by cytochrome P450 isoenzyme CYP2D6 and subsequent conjugation.

Party pills are generally comprised of a mixture of BZP and TFMPP with the ratio of BZP to TFMPP typically ranging from 2:1 to 10:1. The quantity of BZP per pill ranges from 50 mg to 200 mg; although the labelling is often unclear. Such variation in BZP/TFMPP content between brands and the misleading labelling may relate to the reports of toxic effects of party pills.

In addition, the effects of BZP/TFMPP are typically experienced 2–3 hours following ingestion, whereas users seek and anticipate an immediate effect. Thus the slow onset of action may contribute to the adverse effects of BZP/TFMPP and resulting hospitalisation of users following the ingestion multiple doses. However, data on party pill content and release kinetics is scarce in the literature.

This study aims to evaluate the BZP and TFMPP content of the available party pill formulations and to determine the in-vitro release kinetics of party pill brands where the number available is sufficient. These data allow the likelihood of BZP/TFMPP overdose due to label misinterpretation and the effects of dissolution rate to be predicted.

Materials

BZP and TFMPP were purchased from Sigma-Aldrich (USA). Acetic acid, hydrochloric acid (37%), potassium dihydrogen phosphate and sodium hydroxide were purchased from Scharlau Chemie (Spain). Methanol and acetonitrile was obtained from Ajax Finechem (New Zealand). The party pills (PEAQ™, Exodus™, Frenzy™, NOS Boost™, Buzzzz™, Stingers Xtreme!™, Xombie™, The Pinky Panther’s™, S5 party pill™, Blue Diamonds™, EFX™, HUMMER™, Crimson Hearts™, Exotic™) were obtained by gift to the University of Auckland, School of Pharmacy.

Water purified by reverse osmosis (Millipore, USA) was used in the preparation of buffers.

Methods

Determination of BZP and TFMPP content in party pills

Sample preparation—The content of capsule or tablet formulations were initially weighed and then dissolved in methanol to provide an equivalent concentration of one dosage unit per 100 mL. The samples were then sonicated for ten minutes and equilibrated at room temperature (22 °C) in a water bath prior to filtering (0.45 µm filter) directly into HPLC vials. The amount of BZP and TFMPP in each party pill formulation was then determined using a validated HPLC method.

HPLC conditions—The HPLC system (Waters, USA) consisted of a pump (Waters 1525 pump), a UV-VIS spectrophotometer detector (Waters 2487 Dual Absorbance Detector), an autosampler (Waters...
717plus Autosampler), a Waters inline degasser, a reverse phase column (150 mm x 4.6 mm, Beckman Ultrasphere ODS 5 µm C18) and a Waters Breeze software (version 3.3).

The mobile phase consisted of acetonitrile (ACN) and acetate buffer (40 mmol L⁻¹, pH 4.5)/ACN mixture at a ratio of 85:15 v/v. A gradient program was used and the composition of the mobile phase at time zero was 16% (v/v) ACN and 84% (v/v) buffer.

At 3 minutes the percentage of ACN was increased to 66% (v/v) over five minutes. At 10 minutes of run time, the composition was reverted to 16% (v/v) ACN and 84% (v/v) buffer over 30 seconds. The chromatographic system was then equilibrated for 5 minutes prior to next injection. A flow rate of 1.5 mL.min⁻¹ and an injection volume of 20 µL were used.

The analysis was performed at room temperature (22 °C) and dual UV wavelength mode was used with both BZP and TFMP being monitored at 220 nm and 254 nm.

Validation of this HPLC method demonstrated the reproducibility with coefficients of variation from 0.31 to 1.76% for BZP and 0.13 to 0.83% for TFMP.

**Determination of in vitro release kinetics of party pills**

**In vitro dissolution**—Dissolution studies were conducted using either a USP I (basket method) or II apparatus (paddle method) at 75 rpm, 37.5°C with a SR-8 Plus dissolution tester (Hanson Virtual Instruments, CA, USA).

Drug release from PEAQ™, Exodus™, Frenzy™, Blue Diamonds™ and Crimson Hearts™ formulations were carried out in 0.2M phosphate buffer (pH 6.8) for 60 minutes. A pH of 6.8 was selected as there is no official pharmacopeial test for such illicit formulations and information had been received that the onset of adverse effects could follow ingestion by protracted periods.

Formulations were selected on the basis of product availability; six capsules/tablets of each brand were investigated. For tablets, USP II apparatus was employed whereas for capsules, USP I apparatus was required due to the considerable buoyancy of these formulations.

Samples were withdrawn from the dissolution medium at pre-determined intervals (1, 3, 5, 7, 9, 11, 15, 20, 30, 45, and 60 minutes) and the release of formulation contents in each sample was determined by UV-VIS spectroscopy with the measuring wavelength being dependent on the formulation. All measurements were performed in triplicate.

**Data analysis – iterative curve fitting**—Release data obtained was analysed using non-linear curve fitting. The absorbance data were fitted to novel first order function (equation 1) using PLOT software (version 0.997) to infer the mechanism of drug release mechanism from the formulation.

In a first-order process, the rate of drug release is dependent on concentration. This exponential function was used to determine the time taken to reach 90% (t₉₀) of the maximum absorbance values for the selected party pill formulations.

\[
\text{Absorbance} = A(1 - e^{-k(t-t_{lag})^2})(e^{-Dt})
\]

Equation 1

Where: ‘A’ is the theoretical maximum absorbance, ‘k’ is the first-order rate constant of the release process, ‘t’ is time in minutes, ‘t_{lag}’ is lag time corresponding to the time required for the solvent to penetrate into the dosage form and initiate drug release. The parameter ‘e^{-Dt}’ is a function corresponding to the rate of hydrolysis of absorbing species in the dissolution medium observed in some samples.
Results
Determination of BZP and TFMPP content in party pills

Figure 1. Comparison of claimed and actual amount of BZP (A) and TFMPP (B) per dosage unit of selected party pill formulations (n=4; error bars represent SD)

Analysis of BZP content in party pill formulations demonstrated that only two of the tested brands (Hummer and Crimson Hearts) comply with the British Pharmacopoeia
(BP) standard, requiring drug content to be within 5% of the labelled content. The majority of formulations contained significantly higher amount of BZP than claimed; with Xombie capsules showing the greatest deviation. Conversely, PEAQ, Exodus, Frenzy and EFX formulations contained a lower than claimed amount of BZP.

Six of the 14 party pill brands under investigation claimed to contain TFMPP. However the analysis of the content of these formulations demonstrated some of these claims as misleading; as four formulations (Stingers Xtreme!, Pink Panther, $5 Party Pill and EFX) which claimed not to contain TFMPP was shown to contain the substance.

The variation in component content from that stated leads to a far greater variance in BZP:TFMPP ratio than anticipated. Where TFMPP was detected, the ratio of BZP:TFMPP ranged from 81:1 to 1:1.

Table 1. Comparison of the claimed and actual ratios of BZP to TFMPP in selected party pill formulations

<table>
<thead>
<tr>
<th>Brand</th>
<th>Claimed ratio of BZP to TFMPP</th>
<th>Actual Ratio of BZP to TFMPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Diamonds²</td>
<td>66.6:1</td>
<td>81.2:1</td>
</tr>
<tr>
<td>Stingers Xtreme!</td>
<td>–</td>
<td>65.4:1</td>
</tr>
<tr>
<td>Pinky Panther’s</td>
<td>–</td>
<td>52:1</td>
</tr>
<tr>
<td>$5 Party Pill</td>
<td>–</td>
<td>9.4:1</td>
</tr>
<tr>
<td>Xombie</td>
<td>5:1</td>
<td>8.4:1</td>
</tr>
<tr>
<td>PEAQ</td>
<td>6.8:1</td>
<td>6.5:1</td>
</tr>
<tr>
<td>Exotic²</td>
<td>2:1</td>
<td>2.6:1</td>
</tr>
<tr>
<td>Crimson Hearts²</td>
<td>2:1</td>
<td>1.9:1</td>
</tr>
<tr>
<td>Exodus</td>
<td>1.9:1</td>
<td>1.1:1</td>
</tr>
<tr>
<td>EFX</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Frenzy</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>NOS Boost</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Buzzz</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>HUMMER²</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Determination of in vitro release kinetics of party pills
The time to release 90% of content from these party pills varied from 9 minutes to over 30 minutes (Table 2). Release profiles of BZP/TFMPP from selected party pill formulations evidence that PEAQ and Frenzy capsules release their content at a significantly faster rate than other formulations (Figure 2, Table 2).

Capsule formulations (PEAQ, Exodus and Frenzy) were observed to release content more rapidly than the tablet formulations (Blue Diamond and Crimson Hearts) which demonstrated a lag-time of ca. 2-3 minutes (Figure 2).

**Table 2. Time taken to reach 90% ($t_{90}$) of the maximum absorbance values for party pill formulation used in the dissolution study (n=6 and data represents average ± SD)**

<table>
<thead>
<tr>
<th>Party pill brand</th>
<th>Mean $t_{90}$/min (± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frenzy capsules</td>
<td>8.49±2.89</td>
</tr>
<tr>
<td>PEAQ capsules</td>
<td>9.81±1.37</td>
</tr>
<tr>
<td>Exodus capsules</td>
<td>16.03±2.73</td>
</tr>
<tr>
<td>Blue Diamond tablets</td>
<td>21.49±2.93</td>
</tr>
<tr>
<td>Crimson Hearts tablets</td>
<td>&gt;30</td>
</tr>
</tbody>
</table>
Discussion

Determination of BZP and TFMPP content in party pills

As an unregulated drug, there was no clear consensus on the amount of BZP or TFMPP or ratio thereof that should be incorporated into party pills. Studies have shown the amount of BZP in commercial party pills to range from 50mg to 200mg per pill.\textsuperscript{15,17} In addition, party pills are often made up of a blend of BZP and TFMPP with the ratio being reported to range from 2:1 to 10:1.\textsuperscript{14}

Analysis of manufacturers’ claims of the party pills used in this study demonstrated that some pills contained neither BZP nor TFMPP (i.e. Buzzz) and the ratio of BZP to TFMPP (where TFMPP was claimed to be present) varied more widely than anticipated (up to 66:1, Table 1).

HPLC analysis of the party pill contents showed few of the brands to contain less than the manufacturer stated amount of BZP and TFMPP (Figure 1). It has been postulated that these observations may result from different salt forms of BZP and TFMPP being employed; manufacturers may refer to the dihydrochloride (.2HCl) form of the piperazines rather than to the parent compound.\textsuperscript{14} However, many party pills contained considerably high amounts of BZP and TFMPP than the amounts stated on the label (Figure 1). For example, EFX party pills (which did not specify the amount of BZP and TFMPP), contained relatively high concentrations of the piperazines.

In addition some formulations (Stingers Xtreme!, Pink Panthers and $5 Party Pills) which claimed no TFMPP content were found to contain appreciable quantities of the drug. These results suggest the potential health risks of illicit formulations as the users are unable to assess the amount or ratio of drugs taken.

The recommended doses of piperazines as stated on the labels of commercially available products are between 100mg and 360mg for BZP and between 20mg and 100mg for TFMPP. However various surveys carried out in New Zealand to determine the use of party pills in young adults have reported that 4 out of 10 users take 4 or more party pills on one occasion.\textsuperscript{14}

As the amount of BZP and TFMPP in most party pills being higher than that claimed, the likelihood of these formulations causing adverse effects such as seizures, palpitation and anxiety,\textsuperscript{16} and subsequent admission to hospital is considerable. Moreover, as the ratio of the psychoactive components varies considerably (and far more than previously reported), the balance of effects experienced would similarly be anticipated to vary considerably between brands.

Determination of in vitro release kinetics of party pills

Four of the party pill formulations tested demonstrated in-vitro release kinetics within reasonable expectation for a formulation intended for rapid onset of action; an initial rapid release of the content (Figure 2) with 90% or more of the content being released within 20 minutes (Table 2). However, the release rate of formulations varied considerably and two formulations failed to meet the arbitrary target of 90% release in the first 20 minutes.
In the most extreme example, Crimson Hearts tablets approached a zero-order release profile lacking any discernible initial pulse of release (Figure 2); leading to a time to reach 90% release being in excess of 30 minutes.

Whilst some variation may be argued to be caused by apparatus geometry (paddle vs. basket methods) these methods are considered equivalent in most circumstances; such a release profile could lead to the excessive consumption as users are likely to anticipate psychological effects shortly after consumption.

Whilst most of the tested party pills released their content within 20 minutes, the dissolution and therefore the absorption and distribution of BZP/TFMPP may vary considerably. Many of the toxic effects of BZP may be related to the slow onset of action of party pills when taken orally leading users to ingest multiple doses.\textsuperscript{16}

Release kinetics of these formulations demonstrated Frenzy and PEAQ capsules to be the fastest releasing party pills (Table 2). Conversely, tablet formulations released content more slowly; this observation is consistent with disintegration of tablets being a relatively slow process in comparison to that of capsules.

**Conclusions**

The amount of BZP and TFMPP in most formulations analysed varied considerably from the amount stated by manufacturers; including appreciable content of unlabelled active. In addition to both the amount labelled and contained being extremely variable, the lack of standardisation of ratio of ingredients could lead to wide variability in the subjective experience of users and thus unanticipated adverse effects.

Delayed onset of neurological effects may also result from a lack of rapid release following ingestion; one formulation investigated was found to have an excessively slow release rate for a drug intended for immediate or rapid effect. Such a delay could result in unintended overdose resulting from the consumption of multiple doses; this would be consistent with cases of extreme delay in the onset of adverse side effects reported in the literature.\textsuperscript{16}

These findings show the deficiency of quality control incorporated into the manufacturing process of party pills; these concerns are no less importance to other illicit formulations. Rigorous quality control measures similar to those of medically used drugs should therefore be demonstrated before a formulation may be considered “safe” for social consumption.

**Competing interests:** None known.

**Author information:** Simon A Young, Program Coordinator, Pharmacy, Discipline of Pharmacy, RMIT University, VIC, Australia; Thilini Thrimawithana, Tutor in Pharmaceutics, Discipline of Pharmacy, RMIT University, VIC, Australia; Ushtana Antia, PhD Student, John D Fredatovich, Yonky Na, Peter T Neale, Amy F Roberts, and Huanyi Zhou, BPharm programme students undertaking a final-year research project, University of Auckland; Bruce Russell, Senior Lecturer, School of Pharmacy, University of Auckland
Acknowledgements: This work was funded by research project initiative funds of the School of Pharmacy, University of Auckland and was carried out in the pharmaceutics laboratories of that institution. “Party Pill” formulations were anonymously gifted, before reclassification as controlled drugs on 1 April 2008.

Correspondence: Thilini Thrimawithana, Discipline of Pharmacy, School of Medical Sciences, RMIT University, Bundoora, VIC 3083, Australia. Email: thilini.thrimawithana@rmit.edu.au

References:


How are New Zealand’s District Health Boards funded and does it matter if we can’t tell?

Erin Penno, Robin Gauld

Abstract

In 2011 the Population Based Funding Formula (PBFF) was used to distribute a $9 billion share of Vote Health amongst District Health Boards (DHBs), making it one of the single largest determinants of the allocation of public funds and exerting considerable influence on the healthcare sector. However, there is minimal public information available regarding the methods used in the PBFF and, consequently, the process of determining DHB allocations.

We sought to investigate how the PBFF works and found that no comprehensive description of the process in its entirety has ever been produced. In light of this, based on information we obtained from the Ministry of Health, we have compiled our own version of how we believe the PBFF allocations are determined.

This article summarises our findings and includes an example calculation of the inpatient cost weights to illustrate our understanding of the process. Our hope is that this article will improve understanding and stimulate debate on the PBFF as well as highlight the need for greater transparency around the funding process.

Funding is an issue that New Zealand’s 20 District Health Board (DHB) CEOs constantly fret about. DHBs are required to live within their budgets, almost all of which comes from the government. Yet the funding allocations between the 20 DHBs vary by almost 25% per capita (see Table 1). This is because of the way funding is cut via the so-called Population-Based Funding Formula (PBFF) which, in 2011/12, was used to distribute a $9 billion dollar share of Vote Health, representing over two-thirds of the total public health spend. The implication of the PBFF process is that some DHBs appear to be financially better off than others as the populations they serve attract higher levels of funding.¹,²

The PBFF allocates funding according to the demographic characteristics of DHB populations and certain ‘unavoidable’ costs in providing services to rural and non-resident populations.³

As a consequence, the PBFF process is one of the single largest determinants of the allocation of public expenditure and exerts considerable influence on the healthcare sector. However, for a country in which transparency and public accountability are key principles of government, there is minimal information publicly available regarding the construction of the PBFF or the methods used to derive individual DHB allocations. As such, it is impossible to tell whether the DHB allocations are correct or fair, raising questions that every DHB finance department and the Government should be concerned about.
Given the lack of information on the PBFF, we attempted to find out more about how it is constructed. We submitted several requests for information to the Ministry of Health over an almost 18-month period (late-2010 to early-2012) and were supplied with much material. However, several key pieces of information were not supplied meaning fundamental questions outlined in our requests remained unanswered.

We stopped short of resorting to the Office of the Ombudsman. Instead, based on information obtained and interactions with Ministry officials, we sought to piece together our version of how we believe the PBFF is constructed.

This article summarises our findings. It aims to improve public understanding of how the PBFF works, promote informed discussion on the principles and methods used in the PBFF, particularly around the cost weights, and to highlight the need for greater transparency around the funding process.

### Table 1. Summary table of influence of PBFF on 2011/12 allocations to DHBs
(Adapted from Ministry of Health Data)

<table>
<thead>
<tr>
<th>District Health Board</th>
<th>Population Split</th>
<th>Overall PBFF % Split</th>
<th>Funding:Population ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whanganui</td>
<td>1.43%</td>
<td>1.77%</td>
<td>1.24</td>
</tr>
<tr>
<td>West Coast</td>
<td>0.74%</td>
<td>0.92%</td>
<td>1.24</td>
</tr>
<tr>
<td>Tairawhiti</td>
<td>1.05%</td>
<td>1.29%</td>
<td>1.22</td>
</tr>
<tr>
<td>Northland</td>
<td>3.59%</td>
<td>4.32%</td>
<td>1.20</td>
</tr>
<tr>
<td>Wairarapa</td>
<td>0.91%</td>
<td>1.09%</td>
<td>1.20</td>
</tr>
<tr>
<td>South Canterbury</td>
<td>1.26%</td>
<td>1.48%</td>
<td>1.17</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>4.84%</td>
<td>5.52%</td>
<td>1.14</td>
</tr>
<tr>
<td>Hawke’s Bay</td>
<td>3.51%</td>
<td>3.93%</td>
<td>1.12</td>
</tr>
<tr>
<td>Taranaki</td>
<td>2.47%</td>
<td>2.74%</td>
<td>1.11</td>
</tr>
<tr>
<td>Lakes</td>
<td>2.33%</td>
<td>2.52%</td>
<td>1.08</td>
</tr>
<tr>
<td>Mid Central</td>
<td>3.82%</td>
<td>4.12%</td>
<td>1.08</td>
</tr>
<tr>
<td>Nelson Marlborough</td>
<td>3.15%</td>
<td>3.34%</td>
<td>1.06</td>
</tr>
<tr>
<td>Waikato</td>
<td>8.32%</td>
<td>8.69%</td>
<td>1.04</td>
</tr>
<tr>
<td>Southern</td>
<td>6.85%</td>
<td>6.85%</td>
<td>1.00</td>
</tr>
<tr>
<td>Hutt</td>
<td>3.27%</td>
<td>3.22%</td>
<td>0.99</td>
</tr>
<tr>
<td>Canterbury</td>
<td>11.61%</td>
<td>11.22%</td>
<td>0.97</td>
</tr>
<tr>
<td>Counties Manukau</td>
<td>11.37%</td>
<td>10.83%</td>
<td>0.95</td>
</tr>
<tr>
<td>Auckland</td>
<td>10.38%</td>
<td>9.25%</td>
<td>0.89</td>
</tr>
<tr>
<td>Waitemata</td>
<td>12.41%</td>
<td>11.02%</td>
<td>0.89</td>
</tr>
<tr>
<td>Capital &amp; Coast</td>
<td>6.68%</td>
<td>5.90%</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>1.00</strong></td>
</tr>
</tbody>
</table>

### Background

The present PBFF was introduced in 2003 to allocate funding between the newly-created DHBs. Framed against health system reform which focused on promoting a population-level perspective of healthcare, the new PBFF model was intended to align funding with the relative needs of DHB populations, providing each DHB with the same opportunity, in terms of resources, to respond to those needs.

The only publically available description of the methods which determine DHB funding shares dates from 2004, shortly after the PBFF was implemented. This
provides only a high level picture of its construction and does not reflect subsequent changes to the formula.\(^3,5\)

Despite having been in place for almost a decade no comprehensive description of the PBFF process in its entirety has ever been released by the Ministry of Health. This lack of clarity over the allocation process, combined with significant differences in funding per capita across the 20 DHBs,\(^1\) has contributed to criticism of the PBFF and ongoing tensions surrounding health funding decisions.\(^6,7\)

The following section describes our best assessment of how the PBFF inpatient cost weights, which heavily influence DHB funding allocations, are calculated. To the best of our knowledge, the methods outlined below are current and continue to be used to determine the allocations to DHBs.

**How we think the formula works**

Underpinning the PBFF is the concept of differential need and, consequentially, risk adjustment. Decisions around how to weight the formula centre on demographic characteristics which were found to have demonstrated clear links with health need, health care costs, and the distribution of these factors between DHBs.\(^3\)

In addition, costs arising from providing services to rural and overseas populations and the requirement to help address unmet need in Māori, Pacific and deprived populations were identified by the government as significant factors facing DHBs.\(^3\) Consequently the formula comprises two components: Cost Weights and Adjusters (see Figure 1).

Three Adjusters are intended to compensate DHBs for differences in certain unavoidable costs associated with managing unmet need, rurality and overseas visitors. Each adjuster is composed of a number of components which the Ministry of Health identified as areas in which DHBs face material differences in costs.

The Cost Weights represent the expected average health care costs per person in a given year and are calculated for five service groups. Each service group is comprised of a number of service areas which are combined to determine final capitation weights.

The greatest proportion of the PBFF, over 95%, is allocated according to the cost weights with the single largest share of funding devoted to the Personal Health Other service area which covers inpatient, outpatient and maternity care services.\(^1\) For this reason, the remainder of this article primarily focuses on the methodology used in deriving the cost weights, in particular for the inpatient service area.
**The cost weights**

DHBs receive funding for each member of their population according to an expected average annual cost per person. These capitation payments are known as the cost weights and are modelled using historical average expenditure according to four demographic characteristics (see Table 2).

Age and sex were selected after being identified as having a significant impact on health expenditure and, reflecting much of the needs analysis and policy work undertaken during the late 1990s and early 2000s, socioeconomic status (SES) and ethnicity were identified as the other principal demographic factors.\(^3\)

SES is derived from matching patient address against the corresponding New Zealand Index of Deprivation (NZDep2006) quintile, a small area measure of relative socioeconomic deprivation.\(^8\)

Ethnicity is also derived from self-identified patient level data sources. Ethnicity is prioritised according to Ministry of Health ethnicity data protocols such that a single ethnicity is assigned to any person who has selected multiple ethnic groups.\(^9\) For the purposes of the PBFF ethnicity is prioritised in the order: Māori, Pacific, Other.
Table 2. Population-Based Funding Formula variables

<table>
<thead>
<tr>
<th>Category</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>5 year groupings ranging from age 0-85+</td>
</tr>
<tr>
<td>Sex</td>
<td>Male, Female</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Prioritised ethnicity: Māori, Pacific, Other</td>
</tr>
<tr>
<td>Deprivation</td>
<td>Deprivation Quintile based on New Zealand Index of Deprivation 2006</td>
</tr>
</tbody>
</table>

The formula derives information on expenditure (which serves as a proxy for health need) from a range of sources, including national data collection systems, the National Pricing Programme and historical expenditure estimates.

The method of calculating inpatient cost weights forms a process which is largely standardised across the different service areas. However, practical considerations and the availability of data influence the particular method used. For example, aged residential care cost weights within the Health of Older People Service Group exclude NZDep2006 quintile adjustments as they would simply reflect the deprivation score of the residential facility rather than those of the patients.

The following fictitious example illustrates our understanding of how the inpatient cost weight methodology model is used to develop PBFF cost weights. The example is based on a hypothetical population of 50 and for simplicity is restricted to males aged 5–9 years.

Additionally, only a very small range of health events or conditions are used in the example. (It should be noted that this example is purely for illustrative purposes and does not reflect the complexity of the data sources used to develop cost weights and should not be used to extrapolate information on the types or frequency of events or conditions in the New Zealand population or the actual costs incurred within the health system.)

Step 1: Patient level data are gathered

Table 3 shows the deprivation distribution and prioritised ethnicity of the example population.

Table 3. Example population: age, sex, deprivation and ethnicity distribution

<table>
<thead>
<tr>
<th>Age</th>
<th>5–9 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
</tr>
<tr>
<td>NZDep2006 Quintile</td>
<td>Prioritised ethnicity</td>
</tr>
<tr>
<td></td>
<td>Māori</td>
</tr>
<tr>
<td>Q1</td>
<td>2</td>
</tr>
<tr>
<td>Q2</td>
<td>2</td>
</tr>
<tr>
<td>Q3</td>
<td>3</td>
</tr>
<tr>
<td>Q4</td>
<td>3</td>
</tr>
<tr>
<td>Q5</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
</tr>
</tbody>
</table>
Table 4 provides utilisation information for inpatient services for the example population over a period of one year. In addition to sex (male) and age (5-9 years) it gives prioritised ethnicity, NZDep2006 quintile, health event discharge information and cost estimates for each of the 50 members.

Cost estimates are added to individual discharge records using case weights determined by Weighted Inlier Equivalent Separations methodology, which provides a relative measure of resource use for each event within a Diagnosis Related Group.11

In any given year only a proportion of the population will access healthcare services in a particular service area. To illustrate this, a proportion of individuals who did not utilise healthcare services are included in the example population and are classified as “NO EVENTS” under the health event column.

Table 4. Discharge information for example inpatient services population over a 1 year period

<table>
<thead>
<tr>
<th>Unique ID</th>
<th>Sex</th>
<th>Age</th>
<th>Prioritised ethnicity</th>
<th>NZDep2006 quintile</th>
<th>Health event</th>
<th>WIES cost weight</th>
<th>Cost</th>
<th>Total cost per patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Male</td>
<td>7</td>
<td>Māori</td>
<td>1</td>
<td>Headache</td>
<td>0.198</td>
<td>$904.36</td>
<td>$904.36</td>
</tr>
<tr>
<td>002</td>
<td>Male</td>
<td>6</td>
<td>Other</td>
<td>2</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>003</td>
<td>Male</td>
<td>6</td>
<td>Other</td>
<td>4</td>
<td>Gastroenteritis with complications</td>
<td>0.6721</td>
<td>$3,069.81</td>
<td>$4,786.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Headache</td>
<td>0.198</td>
<td>$904.36</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Oesophagitis, gastroenteritis</td>
<td>0.1778</td>
<td>$812.10</td>
<td></td>
</tr>
<tr>
<td>004</td>
<td>Male</td>
<td>6</td>
<td>Māori</td>
<td>4</td>
<td>Asthma</td>
<td>0.4407</td>
<td>$2,012.89</td>
<td>$4,166.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Asthma</td>
<td>0.4714</td>
<td>$2,153.11</td>
<td></td>
</tr>
<tr>
<td>005</td>
<td>Male</td>
<td>9</td>
<td>Other</td>
<td>5</td>
<td>Tonsillectomy</td>
<td>0.4881</td>
<td>$2,229.39</td>
<td>$3,299.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Minor Skin Disorder</td>
<td>0.2409</td>
<td>$1,100.31</td>
<td></td>
</tr>
<tr>
<td>006</td>
<td>Male</td>
<td>7</td>
<td>Pacific</td>
<td>4</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>007</td>
<td>Male</td>
<td>7</td>
<td>Māori</td>
<td>2</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>008</td>
<td>Male</td>
<td>8</td>
<td>Other</td>
<td>5</td>
<td>Minor Skin Disorder</td>
<td>0.2409</td>
<td>$1,100.31</td>
<td>$4,028.98</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cellulitis</td>
<td>0.6412</td>
<td>$2,928.67</td>
<td></td>
</tr>
<tr>
<td>009</td>
<td>Male</td>
<td>7</td>
<td>Māori</td>
<td>3</td>
<td>Minor Skin Disorder</td>
<td>0.2465</td>
<td>$1,125.89</td>
<td>$1,125.89</td>
</tr>
<tr>
<td>010</td>
<td>Male</td>
<td>5</td>
<td>Pacific</td>
<td>2</td>
<td>Cellulitis</td>
<td>0.6412</td>
<td>$2,928.67</td>
<td>$2,928.67</td>
</tr>
<tr>
<td>011</td>
<td>Male</td>
<td>5</td>
<td>Other</td>
<td>5</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>012</td>
<td>Male</td>
<td>6</td>
<td>Other</td>
<td>2</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>013</td>
<td>Male</td>
<td>9</td>
<td>Māori</td>
<td>4</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>014</td>
<td>Male</td>
<td>7</td>
<td>Other</td>
<td>1</td>
<td>Minor Skin Disorder</td>
<td>0.2465</td>
<td>$1,125.89</td>
<td>$1,125.89</td>
</tr>
<tr>
<td>015</td>
<td>Male</td>
<td>8</td>
<td>Pacific</td>
<td>3</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>016</td>
<td>Male</td>
<td>7</td>
<td>Other</td>
<td>2</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>017</td>
<td>Male</td>
<td>6</td>
<td>Māori</td>
<td>5</td>
<td>Headache</td>
<td>0.1701</td>
<td>$776.93</td>
<td>$5,584.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Headache</td>
<td>0.1701</td>
<td>$776.93</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gastroenteritis</td>
<td>0.3332</td>
<td>$1,521.89</td>
<td>$2,622.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gastroenteritis with complications</td>
<td>0.5493</td>
<td>$2,508.92</td>
<td></td>
</tr>
<tr>
<td>018</td>
<td>Male</td>
<td>5</td>
<td>Other</td>
<td>2</td>
<td>Minor Skin Disorder</td>
<td>0.2409</td>
<td>$1,100.31</td>
<td>$1,100.31</td>
</tr>
<tr>
<td>019</td>
<td>Male</td>
<td>9</td>
<td>Other</td>
<td>5</td>
<td>Respiratory Infection</td>
<td>0.9219</td>
<td>$4,210.77</td>
<td>$4,210.77</td>
</tr>
<tr>
<td>020</td>
<td>Male</td>
<td>7</td>
<td>Pacific</td>
<td>3</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>021</td>
<td>Male</td>
<td>6</td>
<td>Pacific</td>
<td>5</td>
<td>Gastroenteritis</td>
<td>0.3332</td>
<td>$1,521.89</td>
<td>$2,622.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Oesophagitis, gastroenteritis</td>
<td>0.2409</td>
<td>$1,100.31</td>
<td></td>
</tr>
<tr>
<td>022</td>
<td>Male</td>
<td>8</td>
<td>Other</td>
<td>3</td>
<td>Tonsillectomy</td>
<td>0.5958</td>
<td>$2,721.31</td>
<td>$2,721.31</td>
</tr>
<tr>
<td>023</td>
<td>Male</td>
<td>5</td>
<td>Pacific</td>
<td>3</td>
<td>Tonsillectomy</td>
<td>0.5958</td>
<td>$2,721.31</td>
<td>$2,721.31</td>
</tr>
<tr>
<td>024</td>
<td>Male</td>
<td>9</td>
<td>Other</td>
<td>1</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>025</td>
<td>Male</td>
<td>7</td>
<td>Māori</td>
<td>1</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>026</td>
<td>Male</td>
<td>6</td>
<td>Pacific</td>
<td>1</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>027</td>
<td>Male</td>
<td>9</td>
<td>Māori</td>
<td>3</td>
<td>Respiratory Infection</td>
<td>1.0076</td>
<td>$4,602.20</td>
<td>$4,602.20</td>
</tr>
<tr>
<td>028</td>
<td>Male</td>
<td>7</td>
<td>Other</td>
<td>2</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>029</td>
<td>Male</td>
<td>8</td>
<td>Other</td>
<td>1</td>
<td>NO EVENTS</td>
<td>0</td>
<td>$-</td>
<td>$-</td>
</tr>
</tbody>
</table>
Step 2: Expected cost per person is determined

Expected (i.e. average) cost per person is determined by calculating the total expenditure divided by the total population count for each age, sex and NZDep2006 quintile group (ethnicity is essentially ignored as a factor at this point of the calculation).

- Total expenditure is calculated for each age (5-9 years), sex (male) and NZDep2006 quintile group (Table 5).

Table 5. Total expenditure for example population by NZDep2006 quintile

<table>
<thead>
<tr>
<th>Age</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>$63,606.41</td>
</tr>
</tbody>
</table>

- Total expenditure per age, sex and NZDep2006 quintile group is then used to calculate the expected cost per person (Table 6).
Table 6. Expected expenditure per person in example population by NZDep2006 quintile

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Number of individuals in quintile</th>
<th>Expected average cost per person</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–9 years</td>
<td>Male</td>
<td>10</td>
<td>$358.41</td>
</tr>
<tr>
<td>NZDep2006 Quintile</td>
<td>Total Cost</td>
<td>Expected cost per</td>
<td></td>
</tr>
<tr>
<td>Quintile 1</td>
<td>$3,584.11</td>
<td>50</td>
<td>$2,467.86</td>
</tr>
<tr>
<td>Quintile 2</td>
<td>$6,275.27</td>
<td>10</td>
<td>$627.53</td>
</tr>
<tr>
<td>Quintile 3</td>
<td>$13,856.85</td>
<td>10</td>
<td>$1,385.69</td>
</tr>
<tr>
<td>Quintile 4</td>
<td>$15,211.57</td>
<td>10</td>
<td>$1,521.16</td>
</tr>
<tr>
<td>Quintile 5</td>
<td>$24,678.61</td>
<td>10</td>
<td>$2,467.86</td>
</tr>
</tbody>
</table>

* The overall average cost per person is not used in the cost weight calculations; rather they are calculated using expected average cost per person by NZDep2006 quintile.

Step 3. The ethnicity adjustment is calculated

Expected costs are compared to determine whether there is any residual difference by ethnic group.

(a) Total expected expenditure for each ethnic grouping is calculated (Table 7).

- The average expected expenditure per person for each age-sex-deprivation cell (calculated in Table 6) is multiplied by the number of people belonging to that cell within each ethnic group. The expected costs for each cell group are then added together to determine the overall expected expenditure for each ethnic group.

Table 7. Expected expenditure for each ethnic grouping in example population

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q 1</td>
<td>$358.41</td>
<td>2</td>
<td>$716.82</td>
<td>2</td>
<td>$1,075.23</td>
<td>5</td>
<td>$1,792.05</td>
</tr>
<tr>
<td>Q 2</td>
<td>$627.53</td>
<td>2</td>
<td>$1,255.05</td>
<td>2</td>
<td>$1,255.05</td>
<td>6</td>
<td>$3,765.16</td>
</tr>
<tr>
<td>Q 3</td>
<td>$1,385.69</td>
<td>3</td>
<td>$4,157.06</td>
<td>4</td>
<td>$5,542.74</td>
<td>3</td>
<td>$4,157.06</td>
</tr>
<tr>
<td>Q 4</td>
<td>$1,521.16</td>
<td>3</td>
<td>$4,563.47</td>
<td>3</td>
<td>$4,563.47</td>
<td>4</td>
<td>$6,084.63</td>
</tr>
<tr>
<td>Q 5</td>
<td>$2,467.86</td>
<td>3</td>
<td>$7,403.58</td>
<td>3</td>
<td>$7,403.58</td>
<td>4</td>
<td>$9,871.444</td>
</tr>
<tr>
<td>Total</td>
<td>$18,095.98</td>
<td>$19,840.68</td>
<td>$25,670.34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Actual expenditure in each ethnic group (derived by summing the total cost per patient shown in Table 4 for each ethnic group) is then compared to the expected expenditure estimated in Table 7 above. Expected and actual expenditure for the example population by ethnic grouping is shown in Table 8.
Table 8. Actual compared with expected expenditure by ethnic grouping in example population

<table>
<thead>
<tr>
<th>Prioritised Ethnicity Grouping</th>
<th>Expected Expenditure</th>
<th>Actual Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Māori</td>
<td>$18,095.98</td>
<td>$21,126.01</td>
</tr>
<tr>
<td>Pacific</td>
<td>$19,840.08</td>
<td>$21,177.17</td>
</tr>
<tr>
<td>Other</td>
<td>$25,670.34</td>
<td>$21,303.23</td>
</tr>
</tbody>
</table>

➢ An adjustment is made for different expenditure in different ethnic groups.
➢ An adjustment factor is calculated by dividing the actual expenditure by the expected expenditure for each ethnic group to derive the percentage difference between the expected expenditure model and actual expenditure (Table 9).
➢ Because the adjustment uses the entire national population as a base an adjustment is made to all three ethnic groups. Where a group is adjusted up another group(s) must be adjusted down (i.e. where the model under predicts expenditure in one group it must have over predicted expenditure in another).

Table 9. Ethnicity adjustment factor calculation for example population

<table>
<thead>
<tr>
<th>Ethnicity Grouping</th>
<th>Expected Expenditure</th>
<th>Actual Expenditure</th>
<th>Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Māori</td>
<td>$18,095.98</td>
<td>$21,126.01</td>
<td>1.16</td>
</tr>
<tr>
<td>Pacific</td>
<td>$19,840.08</td>
<td>$21,177.17</td>
<td>1.07</td>
</tr>
<tr>
<td>Other</td>
<td>$25,670.34</td>
<td>$21,303.23</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Step 4: The final cost weights are calculated.

The ethnicity adjustment factor calculated in Table 9 is applied as a single adjustment across all cells in the particular ethnicity group. This is achieved by multiplying the unadjusted cost weights, (see Table 6) by the ethnicity adjustment factor specific to that ethnic group (Table 10).

Table 10. Final cost weights for example population

<table>
<thead>
<tr>
<th>NZDep2006 Quintile</th>
<th>Final Cost Weights (applying the ethnicity adjustment factors)</th>
<th>5–9 Years</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priority Ethnicity</td>
<td>Māori</td>
<td>Pacific</td>
<td>Other</td>
</tr>
<tr>
<td>NZDep2006 Quintile</td>
<td>Unadjusted Cost Weight</td>
<td>Adjusted Final Cost Weight</td>
<td>1.16</td>
</tr>
<tr>
<td>1</td>
<td>$358.41</td>
<td>$418.42</td>
<td>$382.57</td>
</tr>
<tr>
<td>2</td>
<td>$627.53</td>
<td>$732.60</td>
<td>$669.82</td>
</tr>
<tr>
<td>3</td>
<td>$1,385.69</td>
<td>$1,617.71</td>
<td>$1,479.07</td>
</tr>
<tr>
<td>4</td>
<td>$1,521.16</td>
<td>$1,775.86</td>
<td>$1,623.67</td>
</tr>
<tr>
<td>5</td>
<td>$2,467.86</td>
<td>$2,881.08</td>
<td>$2,634.18</td>
</tr>
</tbody>
</table>
This process would be carried out separately for each sex and each of the 5-year age group bands (i.e. 0-4, 5-9, 10-14…75-79, 80-84, 85+). However, our understanding is that the ethnicity adjustment is calculated using data which are specific for each sex but incorporates all age groups and is applied across all age-sex-deprivation group cells, i.e. all age-sex-deprivation cost weights within a particular ethnicity grouping are adjusted by a single factor.

So, for example, if the example population were extended to include males of all ages, steps 1-2 would be carried out separately for each age group (average expected cost per person for each NZDep2006 Quintile would be calculated by drawing from patient level data on cost weighted health events).

Expected (average) expenditure would then be compared to expected expenditure for each age and ethnicity grouping and the amounts summed to derive an overall population comparison (Table 11):

**Table 11. Total example population expenditure, actual and expected**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Expected Expenditure</th>
<th>Actual Expenditure</th>
<th>Expected Expenditure</th>
<th>Actual Expenditure</th>
<th>Expected Expenditure</th>
<th>Actual Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4</td>
<td>$58,197</td>
<td>$62,772</td>
<td>$18,096</td>
<td>$21,126</td>
<td>$16,476</td>
<td>$12,330</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-9</td>
<td>$56,847</td>
<td>$57,626</td>
<td>$19,840</td>
<td>$21,177</td>
<td>$16,864</td>
<td>$18,064</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85+</td>
<td>$56,038</td>
<td>$49,848</td>
<td>$25,670</td>
<td>$21,303</td>
<td>$32,474</td>
<td>$36,990</td>
</tr>
<tr>
<td>Māori</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacific</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As in step 3(a) the ethnicity adjustment would then be calculated by comparing expected expenditure for the total population to actual expenditure for the total population (Table 12):

**Table 12. Ethnicity adjustment calculation for total example population**

<table>
<thead>
<tr>
<th>Ethnicity Grouping</th>
<th>Expected Expenditure</th>
<th>Actual Expenditure</th>
<th>Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Māori</td>
<td>$1,809,598</td>
<td>$2,112,601</td>
<td>1.16</td>
</tr>
<tr>
<td>Pacific</td>
<td>$1,984,008</td>
<td>$2,117,717</td>
<td>1.07</td>
</tr>
<tr>
<td>Other</td>
<td>$2,567,034</td>
<td>$2,130,323</td>
<td>0.83</td>
</tr>
</tbody>
</table>

The ethnicity adjustment factors would then be applied as a single adjustment across all cells in the particular ethnicity group (Table 13). For example, the unadjusted cost weights (the expected average expenditure per person for each age group calculated in step 2) in the Other ethnicity grouping would be multiplied by a factor of 0.83 to derive the adjusted final cost weights.
The adjusted cost weights for each service area are then scaled to the annual PBFF budget and are combined to derive an overall cost weight for each service group. The resulting final cost weights would form the cost weights used in determining allocations to DHBs.

Funding allocations would be calculated by multiplying the final cost weights by the number of people belonging to each age, sex, deprivation and ethnicity cell group within a DHB’s population and summing these together to determine the amount of funding allocated to that DHB for a given service group.

Table 13. Unadjusted (average) and final (ethnicity adjustment) cost weights for males, all age groups, in example population

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Unadjusted</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

The cost weights are, in essence, the core of the PBFF. They hinge on the premise that health needs of DHB populations can be extrapolated from individual patterns of utilisation which, in turn, are aggregated to derive expected average expenditure by different demographic groups. That is to say, that average expenditure acts as a proxy for health needs. Consequently, a clear understanding of the processes used to transform health spending into weighted capitation payments that go to DHBs is vital.

In the absence of Ministry of Health openness around the processes it uses, the methodology outlined above, we believe, represents the most comprehensive description of cost weight calculation available to date and draws on an ongoing investigation into the methods supporting PBFF allocations.
The approach illustrated in the example presented in this article is routinely used to determine cost weights throughout the different service areas of the PBFF, regardless of the source of cost data. Where the method does vary this has been linked to the predictive capability or availability of data. For instance, ethnicity was found to be a stronger predictor than deprivation for maternity services, so cost weights for maternity services are based on an age-gender-ethnicity framework and are adjusted for deprivation quintile. In contrast, data availability has influenced the approach taken in the Aged Residential Care service area such that cost weights are based on an age-gender-ethnicity framework with no adjustment for deprivation and in the Psycho-geriatric services service group where cost weights are based on an age-gender framework with no adjustments for ethnicity or deprivation. Finally, although based on the same demographic characteristics, for Primary Health Organisation (PHO) capitation rates, the costs are determined outside of the PBFF model and are integrated into PBFF allocations.

We found the methods used to calculate weighted allocations within the inpatient service area to be the most transparent, largely due to the standardised data drawn from the National Minimum Data Set to support the cost weights.

In contrast, where cost data and, by extension, valuations of need are estimated on existing expenditure via payments to providers or contractual arrangements, such as within the Health of Older People or Mental Health service groups, we have been unable to obtain specific details of the methods used to transform this information into cost weights. This obviously leads to questions around the transparency of these processes.

Raising further questions is the quality of data used in the PBFF, in particular the reliability of data reflecting population characteristics. For example, the accuracy of ethnicity data recorded in administrative datasets, including the NMDS and NHI databases, has proven a consistent concern.21-23

Furthermore, although we were supplied with final cost weights for each service area from the Ministry of Health, the technical data supporting their derivation was not made available. Consequently, while we have been able to describe the methods used, and the Ministry of Health, given opportunity to comment, confirmed that our earlier efforts to do so were accurate, we have not been able to fully replicate or verify the process of determining the capitation rates for each demographic group.

We also remain uncertain about some processes such as the ethnicity adjustment and the point within the formula at which this occurs. Specifically, whether the adjustment is calculated at a service area level or once cost weights have been aggregated to a service group level.

An important question underlying the demand for such data is the desire to understand how the factors used to explain need in the PBFF influence allocations. For example, whether the effect of deprivation outweighs the effect of age on DHB allocations.

In addition to the share of funding allocated to DHBs via the Cost Weights, the Adjusters can have a significant impact on the amount of funding each DHB receives per capita. Although not explored in this article there is a similar need for greater transparency in the processes used to determine adjuster funding, along with a demand for greater scrutiny of the assumptions underpinning these and the effect of
these assumptions on DHB allocations. Some DHBs that receive considerably higher funding levels may do so based on adjustments that over-predict actual needs and service utilisation.

Does it matter whether DHBs and the public are able to scrutinise the PBFF? We argue that it does. First, the paucity of information surrounding the methods used to determine the allocation of the New Zealand’s healthcare budget is marked when viewed in an international context.

Notwithstanding technical differences, a striking point of contrast between New Zealand and other jurisdictions is the relative accessibility of detailed data on the development and construction of funding formulae. For example, England’s Advisory Committee on Resource Allocation (ACRA) systematically publishes reports and recommendations surrounding processes within the English resource allocation formula as well as the final allocations made to health providers.13 Perhaps because of this, the level of independent evaluation and robust debate concerning the allocation process is also much greater than in New Zealand, suggesting a will to engage society more closely in this.13-16

Second, New Zealand’s government and public sector has a proud history of openness and trust and a strong belief in improvement, values which underpinned the development of our current health system4 and continue to guide health policy.17-18 Yet, almost 10 years after the introduction of the PBFF 8 out of 20 DHBs are operating with deficits19-20 and, as we have argued in this article, each has only limited information on the processes underpinning their funding allocations. This means no DHB can be sure it is receiving the right level of funding. With minor adjustments to the PBFF, following greater transparency that could reveal methodological inaccuracies and public debate, some DHBs seen to be perpetually ‘in deficit’ might be better off while others could stand to lose.

Finally, we recognise that elements of the PBFF are based on basic principles, such as equity, which are crucial to New Zealand’s health policy framework and which should not be negated in the interests of technical perfection. However, while cognisant of the challenges inherent in funding-policy development, we believe a wider understanding and robust analysis of the PBFF process will yield considerable opportunities to improve future funding policy and, ultimately, the capacity for individual DHBs to provide the best care for their populations.

Competing interests: Nil.

Author information: Erin Penno, Assistant Research Fellow, Department of Preventive and Social Medicine, University of Otago, Dunedin; Robin Gauld, Professor of Health Policy, Department of Preventive and Social Medicine, University of Otago, Dunedin;

Acknowledgements: We are grateful to the Healthcare Otago Charitable Trust for providing funding for this research and to Dr Rick Audas for his input into earlier work.

Correspondence: Erin Penno, Department of Preventive and Social Medicine, University of Otago, P.O. Box 913 Dunedin 9054, New Zealand. Fax: +64-3-479-7298; email: erin.penno@otago.ac.nz
References:
Peripartum cardiomyopathy

Fitzgerald T Zhanje

Abstract

Peripartum cardiomyopathy (PPCM) is a dilated cardiomyopathy in which left ventricular systolic dysfunction and symptoms of heart failure occur between the late stages of pregnancy and the early postpartum period. It is relatively uncommon. In this case report I describe the development of PPCM in the first pregnancy of a woman of older maternal age.

Peripartum cardiomyopathy (PPCM) is a pregnancy-associated myocardial disease, reported to occur in different parts of the world. Its cause is unknown.

The incidence of PPCM ranges from 1:300 to 1:15 000 live births. Initial left ventricular systolic dysfunction and symptoms of heart failure occur between the last month of pregnancy and the first 5 months postpartum.

The diagnosis of PPCM requires exclusion of other causes of congestive cardiac failure and the demonstration of global ventricular dysfunction on echocardiography.

Case report

A previously healthy 37-year-old female patient was referred to our hospital’s emergency department with a 5-day history of increasing dyspnoea and decreased effort tolerance 12 days after delivery of her first child by a routine lower segment Caesarian section.

Since delivery she had continued to experience per vaginal bleeding as well as some lower abdominal discomfort. However, 5 days prior to admission this previously fit marathon runner had developed progressively worsening breathlessness and decreased effort tolerance. Just prior to admission she could barely manage to walk 10m on the flat without being breathless.

Physical examination revealed the patient to be dyspnoeic, coughing and experiencing significant orthopnoea. She was afebrile, had a pulse rate of 145 bpm with a blood pressure of 120/70 mmHg and a respiratory rate of 40 breaths per minute. Her oxygen saturation was 88% while receiving oxygen at 2 litres through nasal prongs.

The chest examination revealed bilateral inspiratory rales in lower half of the lungs on auscultation. She was noted to have an S3 gallop but no appreciable cardiac murmur on auscultation. Her extremities were non-oedematous. There was some tenderness over the right lower quadrant and suprapubic areas on palpating her abdomen.

An initial 12-lead electrocardiogram showed sinus tachycardia.

A portable, semi-erect antero-posterior chest radiograph at admission was reported as showing “diffuse bibasal shadowing opacity present, partially obscuring the hemidiaphragms and cardiac contours. The upper zones were relatively normally aerated”.

URL: http://journal.nzma.org.nz/journal/126-1376/5700/
These appearances were reported as “possibly reflecting developing cardiogenic oedema, consolidation or even aspiration.”

An urgent computed tomography pulmonary angiogram, to evaluate for possible pulmonary embolism, showed no filling defects in either the right or left main pulmonary arteries or in any of the other lobar branches. It did, however, reveal bilateral pleural effusions. Her abdominal computed tomogram, undertaken at the same time, did not reveal any significant abnormality save for changes consistent with postpartum status.

As the patient became increasingly distressed, elective endotracheal intubation and ventilation was advised. During this intubation the patient suffered pulseless electrical activity arrest. She was successfully resuscitated and admitted to the intensive care unit for further management.

Brain natriuretic peptide (BNP) assay performed at admission showed a level of 348 pmol/l (local laboratory normal range of <40 pmol/l). Other initial blood tests were reported within normal parameters. Serology for a variety of viral infections, including the HIV virus, all returned negative results.

The initial portable transthoracic echocardiogram performed in ICU showed severe global left ventricular systolic dysfunction with a left ventricular ejection fraction of 34%, with trace mitral and tricuspid regurgitation.

She was treated with intravenous frusemide and vasodilator therapy using Levosimendan. After 3 days of support she was successfully weaned off the ventilator. Her dyspnoea was relieved by diuresis.

Angiotensin converting enzyme inhibitor therapy was introduced and titrated to clinical stability before beta blocker therapy was introduced.

A cardiac magnetic resonance scan, specifically looking for other causes of her heart failure such as viral cardiomyopathy, was performed 8 days after admission. This study showed a moderately dilated left ventricle, global impairment with reduction in overall function. The left ventricular ejection fraction was measured as 38%. The delayed gadolinium enhancement imaging showed no abnormal signal, with nothing to suggest any acute viral myocarditis being present at the time of imaging.

A final diagnosis of peripartum cardiomyopathy was made. She was discharged from the hospital 13 days after admission and instructed to continue her medication comprising of a loop diuretic, an ACE-inhibitor and a beta blocker.

Follow-up examination and repeat echocardiogram at 6 months showed improvement in both clinical status and left ventricular function. Her left ventricular ejection fraction was now 45% with her cardiac dimensions having returned to within normal parameters.

Subjectively, patient reported feeling much improved and being able to look after her daughter and the household without undue difficulty.

**Discussion**

The differential diagnosis of breathlessness towards the end of pregnancy or early postpartum period includes pulmonary conditions such as pulmonary embolism,
asthma exacerbation, pulmonary infection or pneumothorax and cardiovascular conditions such as heart failure due to acute or exacerbation of pre-existing heart disease.

Such entities include pre-existing dilated cardiomyopathy, valvular heart disease, hypertensive heart disease, unrecognized congenital heart disease and pregnancy associated myocardial infarction. Other miscellaneous conditions such as anaemia, progesterone-induced hyperventilation, salicylate poisoning and sepsis should also be considered and excluded.

Accordingly, initial evaluation with an ECG, natriuretic peptides and echocardiography are essential in identifying cardiovascular causes early. Other investigations to exclude non-cardiovascular aetiologies should be considered concurrently. As PPCM is a diagnosis of exclusion, all patients should have thorough investigation to identify any alternative aetiology of their heart failure.

Peripartum cardiomyopathy has been variably defined. In 1971, Demakis et al published data on 27 patients with pregnancy-associated cardiomyopathy who presented in the peripartum period. These investigators coined the term “peripartum cardiomyopathy” and defined the diagnostic criteria of the:

- Development of heart failure in the last month of pregnancy or within 5 months of delivery;
- Absence of a determinable aetiology for heart failure; and
- Absence of demonstrable heart disease before the last month of pregnancy.

A fourth criterion was proposed by Hibbard et al. in 1997. In addition to the three previously stated, they proposed that, there should be:

- Left ventricular systolic dysfunction demonstrated by echocardiography with left ventricular ejection fraction of <45%, fractional shortening <30%, or both.

The Heart Failure Association of the European Society of Cardiology Working Group on PPCM in 2010 defined PPCM as “an idiopathic cardiomyopathy presenting with heart failure secondary to left ventricular systolic dysfunction towards the end of pregnancy or in the months following delivery, where no other cause of heart failure is found. It is a diagnosis of exclusion. The left ventricle may not be dilated but the ejection fraction is nearly always reduced below 45 %”.

Our patient’s clinical presentation, once all other causes of acute dyspnoea had been excluded, fulfilled the criteria for both definitions of peripartum cardiomyopathy.

Incidence—The exact incidence of PPCM is unknown. Most studies on the subject have been conducted in the USA, Haiti and South Africa with few in the rest of the world. From available literature, the incidence of PPCM is around 1 in 2500–4000 live births in the USA, 1 in 1000 in South Africa, and 1 in 300 Haiti. The incidence of PPCM in New Zealand remains unknown.

Aetiology—The aetiology of PPCM is still unknown, and many potential causes have been proposed but not proven. Some of these include the general risk factors for cardiovascular disease, viral myocarditis, abnormal immune response to pregnancy,
abnormal response to increased haemodynamic burden of pregnancy, inflammation, hormonal abnormalities and apoptosis.

Recent data suggest involvement of a cascade involving oxidative stress, the prolactin-cleaving protease cathepsin D, and the nursing-hormone prolactin, in the pathophysiology of PPCM. Strong associations have been shown between PPCM and pregnancy-related factors such as older maternal age, history of hypertension, and multiple pregnancies.1,5–7

**Clinical presentation and diagnosis**—Most patients, as illustrated by our patient, present with a clinical picture similar to patients with other forms of systolic heart failure. Early clinical features of PPCM may mimic normal physiological findings of pregnancy and include pedal oedema, dyspnoea on exertion, orthopnoea, paroxysmal nocturnal dyspnoea and persistent cough.

Additional features may include abdominal discomfort, dizziness, praecordial pain, and palpitations.2 In the majority of patients, symptoms develop in the first 4 months after delivery (78%). Only 9% of patients present in the last month of pregnancy. 13% present either prior to 1 month before delivery, or more than 4 months postpartum.8

Signs can include tachycardia, tachypnoea, pulmonary rales, an enlarged heart, and an S3 heart sound. Brain natriuretic peptide (BNP) levels are reported to remain low and stable during normal pregnancy or in the postpartum period in most healthy women.15 However, as in the patient presented, elevations in BNP have been shown to occur in patients with peripartum cardiomyopathy and other heart disease, as a result of elevation in the left ventricular diastolic pressure due to systolic dysfunction.16

Echocardiography shows variable degrees of left ventricular dilatation, with moderate to severe systolic dysfunction. Our patient’s initial echocardiogram was consistent with this pattern, showing a dilated left ventricle with severe systolic dysfunction. Cardiac magnetic resonance imaging has been used for the assessment of cardiac function and detection of mural thrombi or myocardial fibrosis. The MRI specific technique of measuring the presence of late gadolinium enhancement has been reported to provide important information in the differential diagnosis of myocarditis.17

Case reports and small series have suggested that the presence and persistence of late gadolinium enhancement maybe associated with poor recovery of cardiac function.18 Our patient’s cardiac MRI with gadolinium enhancement reported that “delayed enhancement imaging showed no abnormal signal, with nothing to suggest any acute viral myocarditis being present at the time of imaging, and no evidence of previous scar formation or myocardial infarction.”

**Treatment and prognosis**—The principles of managing acute heart failure due to PPCM are no different to those applying to acute heart failure arising from any other cause.9 Once the patient is clinically stable, therapy with diuretics, ACE inhibitors (or angiotensin receptor blockers), beta-blockers and other treatments should be used. Treatment with Bromocriptine, a dopamine D2 receptor agonist, to suppress the production of prolactin has been suggested. This is largely based upon experimental observation of PPCM in mice.14
Whilst the drug has been promising a number of small studies there is insufficient
evidence to conclusively establish its safety and efficacy. If a patient with PPCM
has persistently severe left ventricular dysfunction 6 months following presentation,
despite optimal medical therapy, many clinicians would advise consideration of an
implantable cardioverter/defibrillator.2

The available data suggest that the prognosis of PPCM appears to vary
geographically.2 In US studies, recovery of left ventricular function (LVEF to ≥ 50%)
at 6 months has been reported in 45% to 78% of patients, with a mean of 54%.10,11
Most of this recovery appears to occur within 2–6 months after diagnosis.2 Later
recovery, however, is possible and occurs in some patients.

Outcome of subsequent pregnancy—Reports and studies on subsequent pregnancies
of women with a history of PPCM are very few. The general consensus at present is
that subsequent pregnancy in patients with a history of PPCM is associated with a risk
of persistent cardiac dysfunction and even mortality.

The risk appears substantially higher in patients with persistent left ventricular
dysfunction before subsequent pregnancy.21 Given this difficulty in prescribing
individual counsel, our patient, after appropriate discussion, decided not to have any
further pregnancies.

Conclusions—The case presented here demonstrates the clinical presentation of
PPCM. Our patient demonstrated significant recovery, clinically and on
echocardiographic parameters, 6 months post initial presentation.

Peripartum cardiomyopathy remains a difficult condition to diagnose and treat. The
rarity of the condition and lack of awareness of it among physicians and midwives
often leads to late diagnosis and treatment. It is important that practitioners be familiar
with PPCM and therefore consider it as a possible differential diagnosis when
evaluating dyspnoeic patients towards the end of pregnancy or early postpartum
period.

Author information: Fitzgerald T Zhanje, Cardiologist, Department of Medicine,
Taranaki Base Hospital, New Plymouth

Correspondence: Fitzgerald T Zhanje, Cardiologist, Department of Medicine,
Taranaki Base Hospital, Private Bag 2016, New Plymouth 4620, New Zealand.
Fax: +64 (0)6 7537721; email: fitzgerald.zhanje@tdhb.org.nz

References:
and Blood Institute and Office of Rare Diseases (National Institutes of Health) workshop
diagnosis, management, and therapy of peripartum cardiomyopathy: a position statement from
the heart failure association of European Society of Cardiology Working Group on Peripartum
4. Hibbard JU, Lindheimer M, Land R. A modified definition for peripartum cardiomyopathy
Dramatic hydronephrosis caused by pelvi-ureteric junction obstruction in a morbidly obese man

Daniel Chou-yen Lin, Rowshan Khaleghian, Carl Horsley, Jamie Kendrick-Jones

A 33-year-old obese, New Zealand Māori man presented with reduced level of consciousness and severe tachypnoea after 1 week of right flank pain and haematuria. Emergency serum tests revealed severe metabolic acidosis (pH 7.05, bicarbonate 7 mmol/l); potassium 9.1 mmol/l; urea 60.6 mmol/l; and creatinine 2520 umol/l. His last assessment of renal function had been 3 years ago with a documented serum creatinine at 86 umol/l.

He was transferred to Intensive Care Unit for intubation and ventilatory-support, and underwent urgent renal replacement therapy by sustained low efficiency diafiltration (SLED). His medical history included morbid obesity (body mass index of 60 kg/m2), treated obstructive sleep apnoea, and hypertension.

He had abdominal computed-tomography which revealed a dramatic gross left hydronephrosis measuring 32×21×22cm associated with a thin rim of renal cortex on that side. (Figure 1. Double arrow heads) There was a similar, but less severe, appearance on the right kidney (Figure 1. Single arrow head).

Figure 1
The appearance was consistent with bilateral obstruction at pelvi-ureteric junctions (PUJs) most likely congenital in origin. He received bilateral nephrostomies which immediately drained 2 and 0.9 litres of urine from left and right kidneys, respectively. Subsequently, he was markedly polyuric producing 11.5 litres over the following day. His creatinine improved to 600 umol/l by day 3 and was 121 umol/L by day 21. He underwent bilateral retrograde ureteric stenting as the interim treatment before definitive solution.

Follow-up radioisotope renography showed minimal function of his left kidney, which was eventually removed secondary to recurrence of hydronephrosis seven months later. His renal function remains close to baseline with creatinine 98 umol/l (MDRD eGFR 72 ml/min) at 1 year after presentation. Definitive treatment with pyeloplasty of the remaining kidney is planned following upcoming bariatric surgery to improve perioperative risk.

This case illustrates the most dramatic obstructive appearances of hydronephrosis caused by late-presenting bilateral congenital PUJ obstructions. This is often associated with higher incidence of nephrectomy when presenting in adulthood. This case also illustrates the difficulty in detecting even large abdominal masses during routine physical examination in morbid obesity, and the capacity for return of overall renal function after resolution of obstruction on the single functioning kidney.

Author information: Daniel Chou-yen Lin1; Rowshan Khaleghian2; Carl Horsley3; Jamie Kendrick-Jones1

Departments of Renal Medicine1, Radiology2, and Intensive Care3, Middlemore Hospital, Otahuhu, Auckland

Correspondence: Daniel Chou-yen Lin, Department of Renal Medicine, Middlemore Hospital, 100 Hospital Road, Otahuhu, Auckland 1041, New Zealand. Email: dan_din2000@hotmail.com

Reference:


Laparoscopic cholecystectomy: an unexpected and delayed complication

Nikola Lilic, Sergej Cicovic

Abstract

Laparoscopic cholecystectomy is one of the most commonly performed operations in New Zealand. Unretrieved peritoneal gallstones occur in 2% of people and abscess formation is the most common resulting complication. This is the first time unretrieved peritoneal gallstones have been reported to cause a complex collection involving the pleural space and soft tissues of the back.

Case report

A 72-year-old man underwent an elective laparoscopic cholecystectomy for recurrent biliary colic. At the time of the operation gallbladder perforation occurred with gallstone spill into the peritoneal cavity. Retrieval of the gallstones and irrigation was performed.

Four years later he presented to clinic with worsening right upper quadrant abdominal and right-sided middle back pain. This worsened over a period of 2 years. On examination he had a mildly tender right upper quadrant and an area of tenderness on the right side of his mid back.

His initial blood tests revealed a CRP of 12 (normal <5) and a normal white cell count. Computed tomography scan of the chest and abdomen revealed a complex right-sided pleural effusion with a tract extending through the posterior chest wall, between the 11th and 12th ribs, to the posterior thoracic musculature. Two small areas of high attenuation were identified within the collection (see Figure 1 and 2).

An incision and drainage of the collection on the back was performed. Thick and clear fluid was drained and two small gallstone fragments were removed. The patient finished a course of antibiotics and was discharged symptom-free.

At the 2-week follow-up clinic he remained symptom free and a chest X-ray showed that the pleural effusion was smaller in size. Microbiology swabs taken at the time of surgery did not culture any organisms.
Figure 1. CT scan of abdomen – sagittal section. Two small areas of high attenuation are seen in the subcutaneous tissue of the back with surrounding inflammatory change that extends anteriorly through the intercostal musculature.

![CT scan of abdomen – sagittal section.](image1)

Figure 2. Computed tomography scan of abdomen – axial section. A small area of high attenuation is seen consistent with the gallstone fragment removed intraoperatively.

![Computed tomography scan of abdomen – axial section.](image2)
Discussion

Gallstone spillage during cholecystectomy is a well-documented complication and is more common in laparoscopic cholecystectomy than in open cholecystectomy. The incidence of gallbladder perforation is between 18 to 40%, gallstone spillage is 7%, and that of unretrieved peritoneal gallstones is estimated to be 2%. The incidence of complications when all stones are retrieved is estimated to be 2.3% and when there are known unretrieved stones the incidence is 7%. The most common complication of unretrieved gallstones is intra-abdominal abscess formation. Pleural involvement is rare but has been documented.

A non-infectious collection in the posterior thoracic musculature with a tract to the pleural space is unique and has not been described in the literature before. An infected low retroperitoneal abscess mimicking a gluteal abscess has been described as well as three cases of more superior retroperitoneal abscesses.

Right-sided empyema formation due to gallstone spillage has been reported and is thought to occur due to gallstone erosion through the diaphragm. Alternatively, the presence of a pleuroperitoneal communication can allow gallstones to pass into the pleural space.

Pleuroperitoneal communication can be present as a congenital defect in the diaphragm or can be an acquired anatomical defect due to lymph drainage disorders or tendinous diaphragm defects. They are thought to develop more readily on the right due to the protective effect of the heart and pericardium on the left against leakage through the diaphragm.

The intraoperative findings and imaging suggest our patient likely developed a pleural effusion secondary to gallstone erosion through the diaphragm or via the gallstone passing through a pleuroperitoneal communication. These stones then eroded posteriorly through the 11th and 12th rib intercostal musculature and formed an inflammatory collection. The reason why gallstone related collections can develop years after surgery is unknown.

Given the possible severity of complications if perforation of the gallbladder and gallstone spillage does occur, immediate intraoperative retrieval of as many stones as possible should take place. After all visible stones are collected copious irrigation should be performed to further dilute any remaining bile salt.

Conversion to an open cholecystectomy should only be considered in patients who have had a spillage with multiple stones and especially pigment stones, as these are much more likely to form infective abscesses. Clinicians should be aware of the possibility that complications can occur a number of years following cholecystectomy.

**Author information:** Nikola Lilic, Otorhinolaryngology Registrar, Department of Otolaryngology, Head and Neck Surgery, Counties Manukau District Health Board, Auckland and Clinical Medical Education Fellow, University of Auckland; Sergej Cicovic, General Medicine Registrar, Department of General Medicine, North Shore Hospital, Auckland.
Correspondence: Nikola Lilic, Department of Otolaryngology, Head and Neck Surgery, Manukau Super Clinic, 901 Great South Road, Manurewa, Auckland, New Zealand. Fax: +64 09 375 7038. Email: Nikola.z.lilic@gmail.com

References:

Pneumomediastinum—an unusual complication of diabetic ketoacidosis

Venkata M R Katreddy, George I Varughese, Ananth U Nayak

A 30-year-old male with Type 1 diabetes, admitted with diabetic ketoacidosis, complained of change in voice and chest pain on day 2 of admission. Clinical examination revealed “hot potato voice” and subcutaneous emphysema in the neck. X-ray of the chest revealed air at the left heart border and subcutaneous emphysema in the neck (Figure 1).

Figure 1. Chest X-ray demonstrating pneumomediastinum and subcutaneous emphysema (arrows)

CT chest confirmed pneumomediastinum with surgical emphysema but no obvious oesophageal rupture (Figure 2).
With conservative treatment including analgesia and oxygen, both surgical emphysema and pneumomediastinum resolved completely within 48 hours.

Pneumomediastinum, the presence of gas in the mediastinum, is an uncommon but a reported complication of diabetic ketoacidosis.\(^1\)\(^2\) Kussmaul’s breathing, vomiting, metabolic acidosis with hyperventilation leading to increased intra-alveolar pressures and alveolar rupture have been postulated as possible explanations.

Management is usually conservative and almost all cases reported in literature recovering without any squealae.\(^1\) Its recognition in diabetic ketoacidosis can prevent unnecessary investigations by the treating physicians

**Author information:** Venkata M R Katreddy, Speciality Registrar; George I Varughese, Consultant; Ananth U Nayak, Speciality Registrar; Department of Diabetes and Endocrinology, University Hospital of North Staffordshire NHS Trust, Stoke on Trent, UK

**Correspondence:** Dr VMR Katreddy, Department of Diabetes and Endocrinology, University Hospital of North Staffordshire NHS Trust, Stoke-on-Trent, United Kingdom ST4 6QG. Fax: +44 1782 552467; email: Venkata.katreddy@uhns.nhs.uk

**References:**


Is censorship of films a useful solution to the problem of covert tobacco advertising?

It has recently been suggested that all movies with smoking scenes should be classified with the Restricted or (R) adult classification as a solution to the problem of covert tobacco advertising in films.\(^1\) It is illegal to sell, supply or show R movies or digital games to a person younger than 18 years. We challenge whether this proposed change in classification will be either appropriate or effective.

Tobacco use or smoking scenes in movies were declining until recently, 88.2% of youth-rated movies in the US in 2010 had no tobacco scenes.\(^2\) However, recent measures indicate that smoking scenes in youth rated (Parental Guidance-13) movies doubled from 2010–2012.\(^3\) Despite this, R-rated movies have the highest numbers of smoking scenes.

A now large body of research suggests that there is a relationship between young people’s viewing of movies with smoking content and their uptake of smoking.\(^4\) Importantly, studies in this field include youth viewing of R-rating movies in their exposure assessments. For example, in Sargent et al’s 2007 paper, 40% of the films were R-rated.\(^5\)

Sargent et al have also shown that between 52-81% of US adolescents are allowed to watch R-rated movies.\(^6,7\) Many more watch without parental approval via downloads and file-sharing. Data from a survey of New Zealand teenagers (2002–2004) found that 39% of 15 year olds watched R-rated movies,\(^8\) just over half of all Māori teenagers watched R-rated movies and R-rated movie watching is higher for lower SES teenagers. With greatly increased use of movie downloads in recent years, these figures are likely to have increased.

If youth who allegedly start smoking because of exposure to smoking in movies are already watching lots of R-rated movies, how would an R-rating significantly reduce such exposure? Moreover, moving nearly all movies with smoking to R-rating would put increased onus on parents to regulate their children’s viewing. Few would disagree with that. But why would parents regulate their children more because of concern about smoking than they do now with because of concerns about exposure to strong violence and explicit sex in R-rated movies?

Additionally, Maubach et al\(^1\) suggest an exception to the censorship rule. Films portraying a known historical person who smoked would be exempt, although unknown characters from the same era would not be allowed to smoke if the movie was to avoid an R rating.

Why should it be acceptable to air-brush the smoking of whole populations or eras, while preserving the historic authenticity of smoking by a known individual? This concession would appear to demonstrate the authors’ sensitivity to their proposal being an objectionable form of censorship.
As one of us has written previously⁹ “we are concerned about the assumption that advocates for any cause should feel it reasonable that the state should regulate cultural products like movies, books, art, and theatre in the service of their issue.”

Many children’s films and children’s stories in general often portray behaviours that people are likely to disapprove of or lead to ill-health. Obesity is another serious health issue. Do we turn our attention then to Cookie Monster whose diet is extraordinarily unbalanced? “Charlie and the Chocolate Factory” has several child characters whose hallmarks are overconsumption. Do we modify these and change this film to R based on imagery of overconsumption rather than the nuances and messages inherent in both the book and film?

The role of film in open societies involves far more than being simply a means to mass communicate healthy role models. Many movies depict social problems and people behaving badly and smoking in movies mirrors the prevalence of smoking in populations.⁹

Except in authoritarian nations with state-controlled media, the role of cinema and literature is not only to promote overtly pro-social or health “oughts” but to have people also reflect on what “is” in society. This includes many disturbing, antisocial, dangerous, and unhealthy realities and possibilities.

Filmmakers often depict highly socially undesirable activities such as racial hatred, injustice and vilification, violence and crime. It would be ridiculously simplistic to assume that by showing something most would regard as undesirable, a filmmaker’s purpose was always to endorse such activity.

Children’s moral development and health decision-making occurs in ways far more complex than being fed a continuous diet of wholesome role models. Many would deeply resent a view of movies that assumed they were nothing more than the equivalent of religious or moral instruction, to be controlled by those inhabiting the same values.

Janine Paynter
Research Fellow
Centre for Tobacco Control Research, School of Population Health
University of Auckland, New Zealand

Simon Chapman
Professor in Public Health
School of Public Health, University of Sydney
NSW, Australia

References:


Response to Paynter and Chapman’s letter, “Is censorship of films a useful solution to the problem of covert tobacco advertising?”

While informed discussion and debate are an important element of policy development, Paynter and Chapman’s (hereafter P&C) arguments ignore the broad international scientific consensus that exposure to smoking in movies causes youth smoking,1–3 and misrepresent our arguments.

Evidence Base—There is a global scientific consensus that a causal, dose-response relationship exists between exposure to smoking in movies and smoking experimentation.4 However, P&C argue that, because some young people access adult-rated movies,5 restricting movies that feature smoking would have little effect. The purpose of this policy is not to prevent children from seeing movies, it is to eliminate smoking from films producers want to market to youth audiences, which would substantially lower the dose of smoking to which children and adolescents are exposed.

P&C’s claim ignores the importance of reducing exposure and is analogous to arguing that because many young people obtain tobacco via social sources,6 we should abandon restrictions that prohibit tobacco sales to those aged under 18 years, or that just because some smokers will decant their cigarettes out of plain packs and into more attractive packages, Australia should rescind plain packaging. The fact is, the evidence P&C cite shows most young people see age-appropriate films most of the time;7 removing smoking from these films would greatly reduce both their exposure to, and risk of taking up, smoking.

Movie Ratings—Producers and distributors routinely calibrate film content to secure ratings that will assist their marketing plans. Indeed, the MPAA rating of a film to be delivered to a distributor (studio) is usually stipulated in the agreement with the producers, and guides screenplay, directing and editing choices before a single frame is shot.8 Currently, around one-third of top-grossing films released in the US each year are adult-rated ("R").9 However, because less-restrictive ratings attract larger audiences, children get most of their tobacco exposure from youth-rated films.7,10
Age-restrictions on movies featuring smoking will reduce this exposure and thus the proven risk they will experiment with and become addicted to smoking.

Treating tobacco as part of film’s language is, in large part, an artefact of the tobacco industry’s exploitation of film since the late 1920s. Accepting smoking imagery as simply natural and spontaneous is equivalent to imagining that actors just ad lib their own lines. Everything in a multimillion dollar enterprise, such as making a feature film, is very carefully choreographed, including who will and will not be smoking, and when they will smoke.

Requiring adult ratings is the least intrusive way to correct the perverse incentives that support smoking imagery in movies. Our proposal does not alter any film already released. It does not dictate the creative treatment of smoking in films. It does not interfere with the audience’s enjoyment of the film by inserting warnings. It simply adds tobacco imagery to the criteria for an adult rating.

Our proposal leaves producers and distributors free to decide how and when to represent tobacco imagery, just as they do now for violence, language and sexuality.

Historical Exceptions—The question of allowing representations of smoking by historical figures recognises that, in some contexts, smoking was an integral part of some individuals’ personae. Applying age-restrictions to other portrayals is not censorship; instead it protects children from unnecessary and harmful exposure to smoking in the same way as occurs uncontroversially with age-restrictions that limit exposure to sex, violence, cruelty and illegal drug use.

Artistic freedom—P & C’s argument assumes that film makers’ portrayal of smoking in children’s movies represents lofty values of artistic freedom and social realism, and stands in stark contrast to evidence from tobacco companies’ internal documents. These reveal a decades-long commercial association between the film industry and tobacco companies, an association that supported the tobacco industry’s goal of recruiting new, highly profitable, young smokers.

We question how the gratuitous appearance of smoking in movies such as Avatar (science fiction fantasy), Skyfall (espionage fantasy) or Rango (children’s cartoon), where smoking appears out of nowhere and functions as tacit tobacco advertising, help us to reflect on what society ‘is’. Film makers’ presentation of smoking in society solely benefits the tobacco industry. For example, the tobacco industry’s deliberate promotion of smoking by female screen actors during the 1920s and 1930s demonstrates the hollowness of arguments that the film industry needs protection from excessive censorship and highlights (again) why children require protection from the tobacco industry’s deliberate manipulation of the movie industry.

Erroneous Analogies and Reasoning—Following in the footsteps of British American Tobacco NZ, whose expensive advertising campaign claimed plain tobacco packaging will spawn rampant policy impositions elsewhere, P&C also invoke fallacious slippery-slope reasoning. They begin by arguing against an imaginary scenario we did not advocate and that may never happen. All public health measures should be based on clear evidence and spurious analogies do nothing to critique the validity of age-restricting films with smoking. As we have noted, the evidence that exposure to smoking in movies leads to smoking experimentation and addiction is very well-established.
We agree that many films depict “racial hatred, injustice and vilification, violence and crime”, but are unaware of any evidence that exposure to such images contributes to the death of around 5000 New Zealanders every year. Tobacco imagery differs from violence, language or other content which the audience might find objectionable or even repellent.

First, because seven decades of documentary evidence show deliberate, systematic commercial collaboration between tobacco and film companies to promote the appearance of tobacco use and brands.

Second, because more than a decade of independent research evidence from a dozen countries, involving thousands of adolescents, shows that the tobacco industry's exploitation of film serves its marketing interests by recruiting a large numbers of "replacement" smokers.

Third, because the research evidence consistently shows the harm to children comes from cumulative exposure and exhibits a dose response, so that all films with more or less smoking contribute to the harm.

In summary, the evidence is very clear, for those who wish to see it. Exposure to smoking in movies is causally related to smoking uptake by children who deserve protection from social and environmental influences that promote smoking.

Indeed, following a review of the research evidence, both the Surgeon General and the WHO concluded there is a need to age-restrict smoking in films. There is also a need for public health researchers, who share a common interest in evidence-based policy, to respond consistently to the clear evidence that now exists.

The Smokefree 2025 goal to which New Zealand has committed aims to protect the next generation of children from the risk of becoming smokers. Age-restriction of films that portray smoking would not only align with the robust research evidence, but would represent a key intervention needed to realise New Zealand’s 2025 goal.

Ninya Maubach, Janet Hoek, Richard Edwards, Julian Crane
ASPIRE2025
University of Otago

References:
Fat prejudice in health care: Anita Killeen considers whether physicians build less rapport with obese patients

Researchers at John Hopkins University School of Medicine have shown that physicians build significantly less emotional rapport with their overweight and obese patients than for their normal weight patients. The findings raise the concern that low levels of emotional rapport in primary care visits with overweight and obese patients may weaken the patient-physician relationship, diminish patients’ adherence to recommendations and decrease the effectiveness of behaviour change counselling.

Communication between physician and patient influences behaviour and the better the physician-patient relationship, the better the patient’s compliance with their physician’s advice, medications, follow up, etc.

Physicians’ negative attitudes towards patients with obesity are well documented. For example, physicians have been shown to have less respect for obese patients, perceive obese patients as non-adherent to medications, and associate obesity with “laziness” and “worthlessness”. However, until recently, it was not clear whether or how these negative attitudes affected physician-patient communication.

Against this background, the John Hopkins researchers aimed to describe the relationship between patient body mass index (“BMI”) and physician communication behaviours during typical outpatient primary care visits. The researchers examined three well-established domains of medical interaction that relate to biomedical, psychosocial/lifestyle, and rapport building communication.

The study, entitled *Physicians build less rapport with obese patients* involved audio-recorded outpatient encounters from 39 physicians in Baltimore MD and 208 of their patients and examined the frequency of communication behaviours using the Roter Interaction Analysis System. Patients had to be aged 18 years and older and have had an ICD9 diagnosis of hypertension in the preceding 12 months. Overall, patients’ mean age was 62.1 years with 65% female and 59% black. Only 28 patients were of normal weight, meaning they had a BMI below 25. Of the remaining patients, 120 were obese (BMI of 30 or greater) and 60 were classified as overweight (index of 25 to 30).

Physicians generally spent the same amount of time, and discussed the same topics, with all of the patients. However, the physicians demonstrated less emotional rapport with overweight and obese patients than for normal weight patients. There were no significant differences in any elements of physician biomedical or psychosocial/lifestyle communication behaviours.

Emotional rapport building includes statements of empathy, legitimisation, concern, reassurance, partnership, and self-disclosure, which is considered essential to creating a patient-centred experience. Studies have also shown that patients are far more likely to follow a physician’s advice and to have a better health outcome when they believe their physician empathises with their plight.
Lead researcher, Dr Kimberly Gudzone, Assistant Professor of General Internal Medicine at the John Hopkins School of Medicine stated:

Patients want information and treatment, but they also need the emotional support and attention that could support them through the challenges that accompany weight loss and the establishment of a healthy lifestyle.

Given the importance of emotional rapport building in lifestyle behavior change, our results raise the question of why physicians are not engaging in this behavior. The lower rates of emotional rapport may reflect negative attitudes that physicians hold towards obese patients. Another study found that obesity was a patient characteristic that elicited negative feelings from primary care providers. These negative feelings may interfere with primary care providers’ willingness or ability to engage on an emotional level with these patients. In our study, physicians were more likely to report that they were less familiar with their obese patients than those of normal weight, which may further support the notion that these patient-physician relationships operate at an emotional distance.

This study is the first examining physician communication behaviours by weight and highlights physician-patient communication as an important area for future investigation.

One solution suggested by the study’s researchers is for continuing medical education in the area of communication skills training to improve rapport building and empathy so that physicians and students understand the complex nature of obesity as well as their own (perhaps subconscious) biases.

Kimberly Gudzone, the lead researcher of this study, spoke directly with the author of this article and noted the following:

There are some great resources out there for providers to improve their communication skills, some are more general trainings while other are specific to obesity.

I think a good starting place for providers who are interested in this topic is the Rudd Center at Yale, who has put together continuing medical education training specifically on what weight stigma is, how it can affect care, and some brief communication skills training specifically related to obesity.

The communication strategies presented in Yale's program are obesity-focused. Therefore, I would also recommend that physicians seek out a more in-depth communications skill building curriculum to truly develop rapport building skills. The American Academy on Communication in Healthcare has developed an online program called DocCom, which has 42 different online modules to build these skills. The American Academy on Communication in Healthcare will also provide onsite in-person training for interested organizations.

Anita Killeen
Barrister, Quay Chambers
Auckland, New Zealand
www.quaychambers.co.nz
anita.killeen@xtra.co.nz

(The writer of this letter is a regularly published author and recently published “Does Body Weight and Gender Influence Jurors’ Perceptions of Guilt and Responsibility”? [2013] Vol 163 New Law Journal, 9 (United Kingdom). That article reviewed empirical research conducted at Yale University’s Rudd Center for Food Policy and Obesity which has found that a defendant’s body weight and gender impacts jurors’ perceptions of guilt and responsibility.)
References and Endnotes:


2. Huizinga MM, Bleich SN, Beach MC, Clark JM, Cooper LA. Disparity in physician perception of patients’ adherence to medications by obesity status. Obesity (Silver Spring) 2010;18:1932-7.


5. IRR 0.65, 95%CI 0.48-0.88, p=0.01; IRR 0.69, 95%CI 0.58-0.82, p<0.01.


7. At page 10 of the study.
Response to Dr J Havill letter entitled Medically Assisted Dying

Dear Editor,

The Australian and New Zealand Society of Palliative Medicine (ANZSPM) is a speciality medical society promoting the discipline and practice of Palliative Medicine. ANZSPM Aotearoa Branch represents 86 such medical practitioners working in New Zealand. We write as the ANZSPM Aotearoa executive to disagree with Dr Havill’s in his suggestion that euthanasia should be legalised in New Zealand. ANZSPM Aotearoa strongly supports the NZMA’s position opposing the legalisation of euthanasia in New Zealand in line with the World Medical Association resolution in euthanasia; adopted by the 53rd MA General Assembly, Washington DC USA – October 2002, which states “The World Medical Association reaffirms its strong belief that euthanasia is in conflict with basic ethical principles of medical practice. The World Medical Association strongly encourages all national medical associations and physicians to refrain from participating euthanasia even if national allows it or decriminalises it under certain conditions.”

Palliative Care is defined by the World Health Organisation as an approach that improves the quality of life of patients and their families associated with life threatening illness through the prevention and relief of suffering by means of earlier identification and impeccable assessment in treatment of pain and other symptoms, psychosocial, spiritual and physical.

We wish to highlight that in addition, the World Health Organization states that palliative care affirms life and regards dying as a normal process and that palliative care intends neither to hasten nor postpone death. ANZSPM Aotearoa therefore stands with the international medical community in opposing the legalisation of euthanasia.

We wish to emphasise that there is a distinction between good care for the dying and active intervention instituted in order to deliberately end the life of a patient. The Palliative Medicine discipline does not include the practice of euthanasia. Patients have the right to refuse life sustaining treatments including the provision of medically assisted nutrition or hydration; refusing such treatment does not constitute euthanasia. Good Medical practice mandates that the ethical principles of beneficence/non-maleficence should be followed at all times. The benefit and harms of any treatment should be considered before instituting such treatments including the provision of medically assisted nutrition or hydration.

The benefits or harm of continuing treatment should be regularly reviewed. Discontinuing or withdrawing treatments that are not benefiting the patient is not euthanasia. Treatment that is appropriately titrated to relieve symptoms and has a secondary and unintended consequence of hastening death is not euthanasia. Palliative sedation for the management of refractory symptoms is not euthanasia.
Dr Havill displays an ignorance of basic ethical terminology and fails to draw out the nuances associated with many of the positions he attempts to introduce. Dr Havill makes no attempt to examine and consider the complexities associated with doctors being involved with medically assisted death. There is abundant literature outlining the difficulties it would pose for those providing effective clinical treatment.

We understand the author is a member of the “End Of Life Choice” national committee also known as the “Voluntary Euthanasia Society of New Zealand” and is also secretary of the “Waikato Voluntary Euthanasia” branch committee. It is good practice when presenting letters for publication that allegiances such as this, which are closely related to the topic are declared.

Dr Sinead Donnelly
Chair, Wellington

Dr Murray Hunt
Deputy Chair, Waikato

On behalf of ANZSPM Aotearoa executive
Neglecting the basics? Survey of water and soap availability in council-operated public toilets in New Zealand

Hygiene practices, including handwashing, are one of the most cost-effective means for preventing infectious disease. Nevertheless, even in developed countries handwashing appears to occur far less than it should. For example, in one survey in the United Kingdom, the hands of 28% of commuters had bacteria of faecal origin. In New Zealand, inadequate hand hygiene has also been recorded, with public toilet users sometimes not washing hands (13%) or using soap (28%).

The situation may not be helped with inadequate toilet facilities. One New Zealand study of primary school toilets reported that only 28% (19/68) had facilities meeting the relevant code of practice. The deficiencies included lack of hot water, lack of drying facilities and even lack of soap. Another study of toilets in Dunedin (mainly at cafés and public facilities), found that some had no handwashing facilities (2%, 2/91) and no soap (13%, 12/91). Within this sample, the lack of soap was highest in the public toilets (at 38%, 9/24).

There has been no published multi-region New Zealand study of the provision of soap and water in public toilets in New Zealand. Therefore to further explore this issue we undertook a such a survey.

Methods—The selection of Council-operated public toilets was based on a convenience sample that fitted in with unrelated road travel plans of the researchers in the lower half of the North Island in the period October 2012 to May 2013. This included sampling in 7 cities, 30 towns and 18 different local authority regions. Nevertheless, Wellington City (n=69 or 46.0% of all the samples), was the most frequent area sampling as this was also convenience-based (near where the researchers lived and worked). In each facility, data were collected on the availability of both running water for handwashing and soap. Ethics approval for the study was obtained (University of Otago, Category B).

Results—Of the 150 public toilets units assessed, 4.0% had no functioning running water and 39.3% had no available soap (see Table 1). The latter included the 6.4% (6/94) of toilets with a liquid soap dispenser where the dispenser was either empty or otherwise not working.

The lack of water was significantly worse in rural areas than all other settings combined (risk ratio [RR] for no water = 13.8, 95%CI: 2.71–70.22, p=0.001). This was also the case for the lack of soap when comparing rural areas to cities (RR=1.83, 95%CI: 1.02–3.31, p=0.039) and minor urban areas compared to cities (RR=2.54, 95%CI: 1.66–3.89, p=0.00003).

The data from the limited number of repeat visits (n=51 or 34% of the total), suggested that the deficits tended to be long-term in nature. That is there were no improvements in soap status in the n=27 units initially found to have no soap; and for water, one unit gained this and another lost it on the repeat samples.
Additional problems identified for some facilities were the lack of signage directing the public to the toilet location (and sometimes with often only a small sign on the facility itself), lack of cleanliness, doors that would not shut properly, and toilets where the automatic flush system did not work.

Table 1. Water and soap provision in 150 Council-operated public toilets* in New Zealand (multi-region convenience sample in 2012/2013, excluding repeat samples)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Running water available</th>
<th>Soap available***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Unisex toilets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>94.2</td>
<td>71</td>
</tr>
<tr>
<td>Male toilets</td>
<td>46</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>144</td>
<td>96.0</td>
</tr>
<tr>
<td>Location**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>City or main urban area (30,000+ population), [7 cities, 89 samples]</td>
<td>87</td>
<td>97.8</td>
</tr>
<tr>
<td>Secondary urban area (10,000 to 29,999 population), [4 large towns, 7 samples]</td>
<td>7</td>
<td>100.0</td>
</tr>
<tr>
<td>Minor urban area (1000 to 9999 population), [16 towns, 35 samples]</td>
<td>35</td>
<td>100.0</td>
</tr>
<tr>
<td>Rural area (&lt;1000 population), [12 localities, 19 samples]</td>
<td>15</td>
<td>79.0</td>
</tr>
</tbody>
</table>

* The unit of analysis was discrete rooms, sometimes within a built toilet block. That is one toilet block could contain a mix of rooms with toilet/s for men, women and unisex toilets. We ignored temporary toilet facilities such as “portaloos”.

** Statistics New Zealand classification of urban/rural areas.

*** This was nearly always liquid soap or foam, bar soap was rare (at just n=2 sites on the first visit).

Some facilities without soap dispensers (or with empty dispensers) were fairly modern in other ways e.g., automatic flushing. All facilities were free of charge and very few had graffiti inside or out.

A total of seven toilet blocks also had external art work (see Figure 1), which improves attractiveness and may help to reduce graffiti attacks.
Discussion—This study is somewhat limited by having collected data in non-randomly selected parts of New Zealand (and only covering unisex and male facilities). Nevertheless, it does suggest that many Council-operated public toilets could benefit from various basic improvements, especially soap provision. Indeed, the hygiene picture would have been worse if we had included the more temporary-type toilet facilities on some main highways (“portaloos” and “kiwiloos”) which have no basins, water or soap.

This situation regarding soap and water is inadequate from a public health perspective—in terms of preventing endemic gastrointestinal and respiratory infectious diseases, but also in terms of pandemic preparedness. It fits with poor hygiene behaviour that has been documented in various New Zealand settings (public toilets, public use of hand sanitisers, and very inadequate respiratory hygiene behaviour during an influenza pandemic). But sub-optimal provision of public toilets is also a concern in terms of New Zealand’s reputation as a tourist destination.

On the other hand, to the credit of the Council authorities, all these facilities were free of charge and some had state-of-the-art features in terms of automation as well as attractive features (e.g., murals on the outside).
More detailed studies could be conducted by central and/or local government of public toilet provision and the quality of this service, including such data items as:

- The adequacy of signage (from main roads and on the facility).
- The provision of warm water (to encourage handwashing in winter).
- The provision of functioning hand drying facilities (hot air or paper towels).
- The provision of automatic features or foot operation to reduce hand touching of surfaces (e.g., door-less entry / labyrinth entrance, automatic door opening/closing, automatic toilet flushing, and automatic soap/water/hot air dispensing).
- Level of cleanliness and provision of garbage receptacles.
- Disability access and infant changing facilities.
- The absence of graffiti and broken windows (inside and out).
- The presence of water conservation features (dual flush options, taps that turn off automatically) and the absence of dripping taps.

Some of the issues around the design and physical structure of public toilets are dealt with in existing laws (the Building Act) and standards (NZ Standards). Also some Councils do have limited quality requirements stipulated (e.g., on cleanliness and response to public requests). But collectively these do not seem to be enough to ensure all facilities have soap and water (and some of the other quality issues in the above dot points). Therefore one option is that central government could do more to help by providing specific supplementary funding to local government for public toilet provision (if minimum standards are achieved), given the benefits to local New Zealand internal travellers and visiting tourists.

Regardless of what the next steps are—it is clear that there is still scope for the country to address such basics as soap and water provision in public toilets.

Nick Wilson*, George Thomson
Department of Public Health, University of Otago, Wellington
*Email: nick.wilson@otago.ac.nz

References


Gonorrheal Arthritis

Excerpt of article by Dr Arthur S. Wohlmann (Government Balneologist, Rotorua) published in 1912 Nov;11(44):262–72.

Before considering the question of gonorrheal arthritis in particular I would like to point out the necessity of taking a broad outlook on the whole subject of arthritis in general, and of disencumbering our minds of a mass of meaningless terms.

I think we may, without much fear of contradiction, advance the following postulates:—

1. Arthritis is not a disease per se, but a symptom of many diseases.
2. Arthritis may be set up by an injury or by certain chemical poisons, but in, at any rate, a large proportion of all cases it is induced by the direct invasion of a joint by micro-organisms or by their toxins.
3. Clinically different types of arthritis may result from the invasion of the same organism, and conversely.
4. One distinctive type of arthritis, apparently a clinical entity, may be caused by varying organisms or by mixed infections.

The aetiology of most cases of chronic arthritis is still somewhat obscure, and our judgement is still fettered by a system of classification based almost wholly on clinical evidence or on macroscopic pathological appearances.

The word “rheumatism” has been a stumbling block, and more than all other causes put together, has been the real hindrance to the advance of knowledge of the subject of chronic arthritic diseases.

Apart from the true rheumatism and gout and such conditions as tubercular and pyaemic infections, every case of arthritis and every painful condition about muscular and fibrous structures as in the past been labelled “rheumatic,” and even now it can hardly be denied that “chronic rheumatism” hides a multitude of diagnostic sins.

The study of gonorrheal arthritis has to a certain extent paved the way to a more clear understanding of the subject of chronic arthritis in general, and we are gradually getting a little more clear conception of the disease which formerly we were content to call chronic rheumatism, bemusing our enquiries with a name for an explanation, a name which really explained nothing, but which suggested a false pathology.
Computed tomographic colonography versus barium enema

Barium enema (BE) is widely available for diagnosis of colorectal cancer despite concerns about its accuracy and acceptability. Computed tomographic colonography (CTC) might be a more sensitive and acceptable alternative. This report concerns a large multicentre randomised trial which evaluates these 2 diagnostic procedures.

3838 patients with symptoms suggestive of colorectal cancer were randomised to receive either BE (2553) or CTC (1285). The detection rate of colorectal cancer or large polyps was significantly higher in patients assigned to CTC (7.3%) than in those assigned to BE (5.6%). CTC missed 3 of 45 colorectal cancers and BE missed 12 of 85. The researchers conclude that CTC is a more sensitive test than BE and should be the preferred radiological test for patients with symptoms suggestive of colorectal cancer.


n-3 fatty acids and cardiovascular risk factors

The use of n-3 polyunsaturated fatty acids derived from fish may reduce the risk of cardiovascular disease by means of beneficial effects on arrhythmic, atherosclerotic, inflammatory, and thrombotic processes. Benefits from such treatment have been reported in patients with cardiovascular risk factors and a previous myocardial infarction or heart failure. This report concerns a trial in such patients who have not had a previous myocardial infarction.

Over 12,000 such patients were randomised to receive either n-3 fatty acids (1g daily) or placebo (olive oil). The primary end point was admission to hospital or death from cardiovascular causes. The conclusions were that in this large general-practice cohort of patients with multiple cardiovascular risk factors, daily treatment with n-3 fatty acids did not reduce cardiovascular mortality and morbidity.


Suspected scaphoid fracture

X-ray of the wrist is the investigation of choice but such an investigation may miss the fracture in 15–20% of such cases. If the suspicion is high, the wrist is put in a cast and radiography can be repeated after an interval. This paper evaluates the other imaging possibilities—CT, MRI, bone scan or ultrasonography. Meta-analysis of repeat radiography has relatively low sensitivity and cost (£24). CT is better and costs £100. MRI is the most accurate but is expensive at £200 per study. Bone scanning costs £140 but is not commonly used because of radiation exposure and also because of false positive results. Ultrasonography is cheap (£10) but often difficult to interpret.
Apparently the American College of Radiology recommends MRI as the second line of investigation and the authors of this paper agree. However, available and cost are factors to be considered.

BMJ 2013;346:f1370.