THE NEW ZEALAND MEDICAL JOURNAL
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This Issue in the Journal

Teaching and learning in the hospital ward
Chrystal Jaye, Tony Egan, Kelby Smith-Han, Mark Thompson-Fawcett

Today's medical students are increasingly capable of learning independently but they do need guidance and support from clinical staff. Providing guidance and support can be a challenge in a busy working environment where the provision of patient care is the main priority. Clinical settings offer the best opportunities for teaching and learning but students need to be proactive in taking advantage of these, while clinicians need to encourage students to make the most of them.

The training, experience, and confidence of junior doctors in performing pleural procedures
Conroy A Wong, Olivia Lee, Yvonne Kennedy, Helen Kenealy, Christopher Hood, Pathmanathan Sivakumaran, Y C Gary Lee

Pleural procedures are invasive procedures that involve puncturing the chest wall to access the pleural space between the ribs and the lungs for both diagnostic and therapeutic reasons. We surveyed 493 junior doctors working in 3 major hospitals in Auckland in 2002 to assess their training, experience, and confidence in performing these procedures. Training in pleural procedures was limited and our results suggest the need for better training programmes and supervision of junior doctors

Human papillomavirus knowledge and awareness among undergraduates in healthcare training in New Zealand
Carol Chelimo, Trecia A Wouldes

This research shows that there is only average awareness of the HPV vaccine and its relationship to cervical cancer in students studying to be healthcare professionals. This age group is also a group that would be at greater risk for contracting humanpapillomavirus through sexual contact. Yet, there was very little understanding that HPV or humanpapillomavirus was a sexually transmitted disease. Those students who had known someone with cervical cancer had better knowledge of the vaccine and HPV. Further education around HPV as a sexually transmitted disease may be needed for a better understanding of this disease and the importance of being immunised against HPV.

Customised molecular diagnosis of primary immune deficiency disorders in New Zealand: an efficient strategy for a small developed country
Rohan Ameratunga, See-Tarn Woon

Primary immune deficiency disorders are inherited conditions. They cause problems with infections, cancer, allergies, and autoimmunity. Most conditions can be effectively treated if recognised. Gene testing plays a critical role in confirming the diagnosis. New Zealand has unique service, where any gene known to cause these conditions can be tested. As a direct result of this service, several patients have undergone life-saving bone marrow transplants. This service was established by LabPlus in 2004 with the assistance of the immune deficiency foundation of New Zealand (IDFNZ).

Outcome and prognostic factors on 57 cases of infective endocarditis in a single centre
Chi Wing Wong, Graeme Porter, Jonathan Tisch, Calum Young

Endocarditis is a serious illness with high morbidity and death rate despite of medical treatment. Our 5-year data from Tauranga Hospital showed that less than half of patients were free from recurrent infection, surgery, or death. *Staphylococcus aureus* bacteria were associated with higher chance of complications, surgery, and mortality. Hence, micro-organisms involved is an important prognostic factor.

Utilisation of inpatient cardiology services including by Māori: a study of hospital discharges for patients enrolled with Partnership Health practices for the 2 years ending June 2007
Laurence Malcolm, Ross Barnett

This paper has examined hospital utilization by ethnicity especially by Māori for cardiology services. Previous work has showed that Māori were underutilising these services. One explanation is the poor quality of ethnicity data recording. The reasonably accurate ethnicity data now held by Christchurch PHO Partnership Health general practices was linked to hospital admissions for the 2 years ending in mid 2997. Analysis showed Māori had a nearly 50% higher rate of admission for cardiology conditions. Much more focussed action is needed at the general practice level if these results are to be improved.

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Climate change: the health consequences of inactivity

Hugh Montgomery

Quite what tips a population from apathy to frenzied action is often mysterious. Why does drink-driving engender fraternity one minute, and revulsion the next, while a quarter of UK citizens still smoke tobacco, despite 40 years of solid evidence?

In general, changing behaviours which are immediately pleasurable, but which are associated with some indeterminate personal risk at some unspecified time, are very hard to shift: unprotected sex, indulgence in excess alcohol, use of tobacco, or overconsumption of high-calorie foods are all classic examples. To change such personal behaviours requires a number of factors: the use of a trusted vector (the advice of a doctor, being trusted, increases abstinence from smoking), a solid and clearly communicated evidence base, persistent and consistent communication (which is why one-off campaigns fail), emotional engagement ('this matters to you and those you love'), empowerment to act, a roadmap to do so, and support in taking such action. Big tilts in *population* behaviours, however, happen much more rapidly, when a given way of behaving becomes 'accepted as the standard'.

Climate change threatens not only our health as individuals, but also our very survival. And it does so imminently. In recent years, the alarm has been raised by a vast array of diverse medical bodies, including the American Academy of Pediatrics, The American College of Preventative Medicine, the American Medical Association, The American Public Health Association, the Australian Medical Association, the World Federation of Public Health Associations, and the World Health Organization itself.

An increasing urgency in the message reflects the alarming nature of the latest data, with a recent University College London (UCL)/Lancet Commission describing climate change as the greatest global health threat of the 21st Century,[1] a message recently reinforced by the presidents of 17 international medical academies.[2]

In this issue of the *New Zealand Medical Journal*, Scott Metcalfe and colleagues[3] add their voice. As the authors describe, climate change threatens our health in many ways: through direct effects of heat; injury from storm and floods; changes in disease vectors; flooding; drought; crop failure; economic collapse; and poverty. Together, these drive mass migration and war—for which the departments of defense of most nations are documented to be preparing. Were that not enough, human activity appears to have initiated a mass-extinction event some 10,000 as great as any on the fossil record, and to which climate change is likely to contribute substantially in the future.[4]

But what should be done, and how fast? The authors offer a detailed summary of previously accepted targets, which suggest that greenhouse gas emissions should be halved in the next 11 years. They also rightly draw attention to the fact that such recommendations are based on data which has already been superseded. Indeed, the 'worst case' emissions scenarios were already being significantly exceeded in the first

7 years of this century.[5] The total atmospheric greenhouse gas burden which can be tolerated is probably a deal smaller than previously recognised, and is being fast approached.[6,7] The measured impacts of climate change on nearly every physical measure (such as polar ice loss) has far exceeded that projected. And recent evidence suggests that, for any given level of greenhouse gas emissions, global, and regional temperature rises may be far greater than was thought: without drastic action, polar temperatures may easily rise by upwards of 16ºC in coming decades.[8]

The case, as made by Metcalfe and colleagues, is thus well grounded and compelling. We must act, act aggressively, and act now. As they state, there really *is* no effective way in which the world's ecosystems can adapt to change on this scale, and no way in which humans can adequately react to such change when it happens. We must be proactive—and in a rational way. Whilst economists and technologists talk about 'what can be done given current fiscal or technical boundaries', we must indeed set and meet the targets which the science dictates.

So what *can* we do? It is clear that no one solution exists, and none are likely to be simple or painless. Firstly, we must all act on a personal level. Whilst our own small savings may in themselves be insignificant, they have greater power than we might think—changing the behaviours of those around us, and altering the behaviours of those companies (and their investors) from whom we buy or no longer buy.

Thereafter, perhaps we should think again about how we change health-damaging behaviours in those around us. As doctors, we can be the trusted vector who carries the message. We must communicate a clear and urgent message through every means open to us. We must engage at a personal level ('this matters to *you and your children*') and help people to act. Only then will population behaviour change. And only then will politicians and business feel that they have our permission to change.

The tragedy is that we have so little time available to us. From 7–18 December 2009, World leaders will meet to decide on emissions targets for the coming years. As leading international physicians recently noted, "There is a real danger that politicians [at Copenhagen] will be indecisive, especially in such turbulent economic times as these. Should their response be weak, the results for international health could be catastrophic."

We must all act now to ensure that there *is* a deal, and that it is meaningful rather than fanciful. At present, voiced aspirations for large targets for 2050, or small ones for 2020, are nothing more than dangerous hot air.

A weak deal will represent not an historic international agreement, but a suicide pact. Now is the time for us all to act. If not us, who? If not now, when?

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Where has carotid stenting gone?

Tim M Buckenham

The role of carotid endarterectomy in stroke prophylaxis for symptomatic patients with ipsilateral carotid artery stenotic disease was validated by the publication of the ECST and NASCET trials.[1,2] Since the publication of these concordant trials, there has been a growing advocacy for endovascular revascularisation of carotid artery stenosis using angioplasty and stenting.

The carotid artery represents the only remaining artery in the body outside the brain where endoluminal techniques have not developed an evidence-based complementary role in the management of atherosclerotic disease, and this last frontier is eagerly vied for by a disparate group of endovascular practitioners, particularly interventional radiologists and cardiologists.

As with all new endovascular procedures, the collection of good quality data is difficult due to the rapid changes in technology that occur. In the case of endovascular carotid repair, initial simple angioplasty was replaced with primary stenting, primary stenting was then augmented with flow-maintaining cerebral protection devices, and subsequently the importance of antiplatelet medication has been recognised.

Despite these rapid changes, endovascular carotid repair has undergone an evidence-based evolution rather than the much criticised burgeoning of angioplasty in other areas, which for many years far exceeded the evidence for its use. To date there are four published randomised controlled trials comparing stenting with the reference standard, carotid endarterectomy.[3–6]

What is the efficacy of carotid artery stenting?

To answer this question, it is important to understand that carotid revascularisation is a prophylactic procedure, which if done surgically has a proven stroke risk reduction in patients with a 70% ipsilateral internal carotid artery stenosis of 16% over 5 years compared with best medical therapy.

Review of the NASCET data has also emphasised the importance of rapid carotid revascularisation after symptoms being essential to maximum efficacy, leading to the development of the concept that TIA is a medical emergency. Following a hemispheric event, the stroke risk at 9 days is 12% and up to 85% of strokes following a TIA will be fatal or disabling.[7]

The value of carotid revascularisation is therefore a compromise between strokes caused (periprocedural strokes) and strokes prevented. In the 70–99% carotid stenosis group, the number needed to treat to prevent a stroke is 6, and that benefit is halved at 2 weeks. In the 50–69% carotid stenosis group, the number needed to treat to prevent a stroke is 14, and there is no benefit after 2 weeks.

The CAVATAS trial was the first randomised controlled trial randomising patients between surgery and angioplasty.[8] The CAVATAS patients have now been followed

to 8 years and there is no significant difference in disabling stroke or death, stroke out to 8 years, or in perioperative death. Again, in the EVAR-3S trial and the SPACE trial there is no significant difference in stroke prevention rates at 4 and 2 years respectively.[9,10]

In the CAVATAS trial, all stroke and death rate at 30 days was 10% in both the surgical and the endovascular arms of this prospective randomised trial. Neurologists were used to assess post-procedural stroke. With a 10% all stroke and death rate in both arms, it could be reasonably argued that neither angioplasty or surgery should be offered to those with symptomatic carotid stenosis.

Surgery and carotid stenting has improved since the CAVATAS trial. The currently quoted 30-day all stroke and death outcomes, from prospective randomised trials such as the GALA trial,[11] are around 5%. The Vascular Society of New Zealand gives a figure of 4.8%.

What do the EVAR-3S and other randomised controlled trials tell us?

The burgeoning use of carotid stenting was dealt a setback with the publication of the EVAR-3S trial, which was a prospective randomised non-inferiority trial based in France and which set out to show that carotid stenting is not worse than carotid endarterectomy. The EVAR-3S trial invigilators wanted to ensure that the difference in complications at 30 days did not exceed 2%.

The trial was stopped after 527 of the 870 patients were randomised, as the complication rate was 5.7% in favour of surgery with a 95% confidence interval of 2.1–9.3%. The confidence interval did not include the predefined acceptable difference of 2% when the trial was stopped.

What does this result actually tell us?

The simple view would be that the surgical management of symptomatic carotid artery stenosis is associated with a much lower iatrogenic stroke and death burden than carotid stenting. This is a simplistic view of a trial which had a number of fundamental flaws. There was a very high crossover from stenting to surgery and there was low recruitment from each centre (1.7 patients per year per centre on average). The majority of the patients in the endovascular arm were on inadequate antiplatelet drugs.

An alternative interpretation of the EVAR-3S trial is that untrained operators undertaking stenting on low volumes of patients with inadequate medical therapy get poor results. This interpretation was augmented by the SPACE trial, another prospective randomised non-inferiority trial, randomising patients with symptomatic carotid stenosis of >50% between surgery and stenting. All stroke and death at 30 days in the endarterectomy arm was 6.34% and in the stenting arm was 6.84%, giving a 95% confidence interval of 0.19–2.91%. This was outside the limits set in the trial and the trial was stopped. This was controversial in itself.

The SPACE trial strongly suggests that endarterectomy and stenting of symptomatic carotid disease by trained operators have a similar all stroke and death at 30 days. If the iatrogenic stroke and death burden is similar, then this (combined with the long-

term results of CAVATAS and the 4-year follow-up data from EVAR-3S suggesting stroke prophylaxis is similar) supports the use of stenting in selected centres.

Does the International Carotid Stenting Study (ICSS) trial alter the final verdict?

The results of the ICSS trial safety data, the largest of the prospective randomised trials comparing stenting with surgery in symptomatic disease on an intention to treat basis, with rigorous credentialling of operator experience, have recently been released.[12] ICSS randomised 1710 patients between stenting and surgery, and using the endpoint of stroke, MI or death, there was a difference of 3.4% in favour of endarterectomy.

The majority of these events were strokes, with nearly twice as many strokes in the stenting group compared with the endarterectomy group. These strokes were mostly non-disabling; the number of disabling strokes was identical between the two groups. This led the principal investigator Martin Brown to opine "carotid endarterectomy is the treatment of choice for suitable patients with recently symptomatic carotid artery stenosis."

How well can carotid artery stenting perform in high volume centres, when neurologist outcome assessment is undertaken?

Review of the largest single centre series from Sheffield in the UK[13] shows that, of 537 symptomatic carotid artery stenoses, stroke-free survival at 30 days is 95% ± 0.9%. All of these patients were neurologist-assessed. Prior to the use of stents and clopidogrel, the 30-day stroke-free survival was 92.80%, but after their introduction this increased to 97.45%, which is the equivalent of an all stroke and death at 30 days of 2.60%. With rapid access in this institution, one could strongly argue that carotid stenting is the preferred method of carotid revascularisation.

Where does all this leave carotid stenting?

Ultimately, the most important determinant of how symptomatic carotid stenotic disease is revascularised comes down to local morbidity and mortality figures. The weight of level 1 evidence does however favour surgery, in particular the evidence from the ICSS trial which showed a definite advantage to endarterectomy. However, this advantage may be lost if access to surgery is limited and if such stroke-free survival rates are not sufficiently dissimilar in both groups and stenting has more rapid access, then stenting becomes the more attractive technique.

In my opinion, the future will probably reflect current practice in all other arteries in the body, where revascularisation is a mixture of endovascular and surgical therapy, but this will require the ability to "cherry pick" those patients who will have a low risk/benefit ratio for stenting and this is currently not possible.

To return to the initial question, where has carotid stenting gone, the answer is through a rigorous evaluation process including five randomised controlled trials, and the current status of carotid stenting is that (apart from in very select high volume centres with neurologist-audited low morbidity and rapid access) carotid

endarterectomy remains the technique of choice for carotid revascularisation in symptomatic patients.

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Teaching and learning in the hospital ward

Chrystal Jaye, Tony Egan, Kelby Smith-Han, Mark Thompson-Fawcett

Abstract

Aim To explore ways in which student learning during formal ward rounds can be enhanced.

Method Qualitative study of University of Otago medical students (Dunedin, New Zealand) involving observation of surgical teams during formal ward rounds, and indepth interviews with students and consultant surgeons.

Results Teaching and learning opportunities on ward rounds were often missed by both clinical teachers and students as service provision and patient care took precedence. As a result, students often felt excluded and frequently expressed ambivalence about the educational value of formal whole team ward rounds. Students were more likely to consider themselves part of the team when they felt useful and were included in team discussions about patient care. They reported that they learned more effectively on smaller, more educationally focussed ward rounds that incorporated bedside tutorials and opportunities to practice examination skills.

Conclusion Students and clinical teachers know that students need to make the most of learning opportunities by being proactive, spending time on the ward, being useful, asking questions. Clinical staff can facilitate student learning by consciously including students in the business of patient care. This means inviting students to ask questions and examine wounds, physically guiding hands on examinations, encouraging students to pay attention to discussions among the clinical team, and explaining what is being discussed.

At the outset we wish to acknowledge the dedication and commitment to teaching in the clinical setting. The ward is an environment that is potentially rich in teaching and learning opportunities, both formal and informal. It is an authentic clinical context for medical education and a place where students can test skills and knowledge in a practical way.

Clinical settings are also the context of professional socialisation. However, they vary in the scope of learning opportunities available and students do not always make the most of these opportunities.[1] Long rounds, large teams, or too detailed discussions between clinicians limit the opportunities for student learning.[2,3]

Inevitably there are many tensions within the working environment of the teaching hospital. As others have pointed out, its primary function is in healthcare provision, and secondarily it functions as a learning environment.[1,4-6] However, Wenger argues, working environments *are* learning environments.[7]

One consequence of clinical contexts as learning environments is that all clinicians are implicated in teaching even though they may not be employed to teach or see

themselves as teachers. The modelling of clinical practice and professionalism are obvious examples of the way in which their roles become educational.

Wenger's model of social learning within communities of practice has recently caught the attention of medical educators because of its usefulness in detailing how medical students learn in clinical contexts. In particular, his concept of legitimate peripheral participation is highly applicable to clinical education settings.[4,8–12]

In this article we report an observational study of 4th-year medical students' surgical attachment during which students are required to expand and apply their medical knowledge, learn clinical skills, and to think of themselves as emergent medical professionals. However, our data showed several key tensions. The foremost of these, and the one we 'trouble' in this paper, was the issue of whether space is made available for students to participate in the clinical setting, and what students can do to claim that space.

It should be noted that the surgery attachment is popular with medical students. Contributors to a 4th-year student website in 2005 gave the surgery run a 4-star rating (out of 5) and advised students yet to experience this attachment that it is a tough environment but not to take this personally

Methods

Setting—At the time this research was conducted (2004), students in our medical school began the clinical component of their medical education in their 4th year of study. Typically, they spent 8 weeks on attachment in the Department of Surgery.

Students participate in a wide variety of clinical activities during attachments. One component of this is the formal full team ward round that occurs once a week. These ward rounds are the primary focus of this study. The observer (KSH) followed the team ward round and also observed some small group tutorials. Other components include outpatients and pre-admissions clinics, operating theatres, small group tutorials, bedside teaching, and discretionary activities. These were not observed.

Participants—Four groups of 4th-year medical students were recruited along with the two surgical teams to which they were attached (16 students in total; 5 consultant surgeons). Attachments are of 8 weeks duration; comprising two attachments of 4 weeks each with different teams.

Author KSH observed ward rounds for half of the first 4-week attachment, and a full remaining 4 weeks of the second attachment (a total of 6 weeks). Patients were given information about the study when they were admitted to the ward and were able to opt out of the study. In these cases, the observer (KSH) waited outside the patient's room and rejoined the team when they moved on from the non-consenting patient.

Data collection—A multi-method strategy similar to that described by Lyon[13] incorporating observations and interviews was used. Group interviews were conducted with the student groups following the ward round.

One-to-one interviews were conducted with each of the consultant surgeons. Each student group interview began with the prompt "how did you find today's ward round?" The interviewer (KSH) then encouraged open discussion about students' experiences and perspectives on what they felt they were learning and being taught, both directly and indirectly.

Similarly, the interviews with consultant surgeons were structured around the questions of what they were trying to teach students, and what did they consider that students were learning in ward rounds. Ethical approval was granted by the Otago Ethics Committee (ref. 03/10/114).

Table 1. Summary of data collected

Interviews		Observation		
Type	**No.**	**Type**	**No.**	**Hours**
Student groups	16	Pre-round meeting	16	23
		Formal ward rounds	18	
		Bedside interactions (observed within formal ward rounds)	108	
Consultant surgeons	5	Student clinical tutorials	13	14
Total	**21**	**Total**		**37**

Analysis—The interview and observation data (see Table 1) were initially read by authors CJ, TE and KSH, and entered into the computer assisted qualitative data analysis software program, *Atlas.ti*.

Initially, the data were coded using an editing analytical style so that segments of data, both observational and interview, were grouped into categories of activities and meanings.[14] Subsequently, a crystallisation/immersion analysis was conducted in order to gain greater depth and insight into the data, specifically to explore covert meanings, subtleties, and nuance.[15]

Continuing discussion between authors during the analytical process established interpretive concordance.

Limitations—The primary critique of all research of this design is the question of whether there were enough participants and the study period of sufficient duration for meaningful conclusions to be drawn. Ideally, data collection should proceed until no new data are emerging.[16]

KSH observed for 6 of the 8 weeks that medical students are rostered on their surgical attachment although his participation was limited in that his observations did not encompass all student teaching and learning nor clinical activities.

We can make no claim as to the representativeness of our participants of the larger population of medical students, and therefore do not claim generalisability of our findings to other clinical schools. However, as an indicator of internal validity, there was general concordance between each of the four student groups in terms of their experiences, and recognition by consultant surgeons of these common experiences.

As an indicator of external validity, our findings do support national and international research in medical education (see Discussion).

Results

Here, we present the thematic results of our analysis. These are supported by quotations from our participants. While these lack the subtleties of the spoken word (particularly intonation) they illustrate the tensions, contradictions and anomalies that students found challenging.

Making space and claiming space—Although this is a teaching and learning setting, the primary business of the ward is patient care. Students' immediate concerns were their own learning needs, and they frequently expressed ambiguity about the value of ward rounds, often critical of the prioritisation of clinical care over their learning needs:

> They [the consultants] are conversing with each other because they see it as a collegial conversation, the ones that do include students I think make a conscious effort to do so—people like [consultant], he thinks the ward round is to grill students so he will grill students. These guys think a ward round is where you have a collegial discussion and the students aren't really involved in that (Student interview, Day 9)

The above quotation shows students feeling excluded from the day-to-day business of patient care. Our field notes also illustrated this. For example, on Day 4, the

consultants, registrar, and house surgeon were observed discussing the patient while the students hovered on the peripheries of the group, paying little attention and making no effort to move closer to hear the discussion.

In this case, the house surgeon took time to explain to them that the clinicians were discussing a diagnostic test and the students then began to pay more attention to the discussion.

This suggests that students' participation is dependent on space being made available to them, and being invited into that space through informal invitations to pay attention to what is being said, in addition to formal presentations, and Socratic questioning. Also, the larger the group, the more students had to muscle in to view examinations, and the more intimidating it became for them to ask questions. In these situations it was easier for students to hang back on the peripheries and not be involved.

The question here is, given that space is reserved for students as legitimate peripheral participants, are there ways in which they can be encouraged to claim this space?

Both students and consultants suggested similar strategies; these included smaller groups so that students get more dedicated attention from medical staff, more bedside tutorials where students have the opportunity to have consultants watching them practice examinations and to ask them questions free of performance anxiety:

> The ones I actually found most helpful are the ones where there aren't any other students, like maybe the ones in the wards in the morning on post op call and stuff like that and they are actually quite helpful because there aren't many people and you can hear what is going on and stuff and you get to know all the patients (Student interview, Day 9)

> The ideal for student learning, I think, would be one to one with the consultant. However the reality is we have four students at a time. Sometimes we have a 6th Year student. Usually we have a house surgeon and one or two registrars and a Pharmacist to check for drug problems. Also the ward charge nurse may be there and the patient's nurse… Sometimes we have a nephrologist… With this number of staff I think the teaching component for students may be diluted a bit. Some of the discussion may be a bit over their heads. It takes a brave student to ask about something they don't understand in front of this size of group. We try to keep the students involved by getting them to present the case first and then asking them questions to see what they understand or correct any mistakes they make (Consultant surgeon)

Interestingly, on Day 16 of our observation, the consultant concerned changed the structure of the ward round to resemble a series of bedside tutorials. In this format students learned and practiced taking histories, interviewing patients and conducting examinations. This represented a re-orientation from a focus on performance in presenting patients to a more focused approach to learning and practicing clinical skills.

The students commented that they learned more about the patients they saw and the fewer numbers attending the round made it easier to answer questions:

> We sort of got actual teaching rather than just sort of crowding around the patient with everybody else… We didn't see every patient but we probably learned more about those two cases, three cases that we did…I think it was much easier to just answer the questions without thinking about whether you are going to bore the registrar or bore the TI [Trainee Intern, 6th-year medical student] with the 4th-year level questions (Student interview, Day 16)

Students in all groups discussed the need to take responsibility for recognising and taking advantage of the learning opportunities on the ward – creating your own learning opportunities by insisting on them, even if this meant annoying busy

clinicians. However, from their clinical teachers' perspectives, while students need to be assertive, assertive students can be annoying to patients:

> I said, "can I present this patient" and they said, "yes". I mean you have got to be assertive in this sort of thing (Student interview, Day 6)
>
> There is no doubt that assertive students tend to find [clinical work] easier and accomplish more in that regard but being assertive alone is not necessary. Some assertive students… don't always show great insight… and they often get offside with patients because although they are assertive, they don't show terribly good judgement (Consultant surgeon)

However, being able to practice history taking and examination skills as well as procedural skills on patients, was also part of the space reserved for students and they did need to be proactive in order to claim it. On one hand, they were often reticent about approaching patients because they knew they were being a nuisance, but on the other hand, were driven by learning needs and directives from consultants to spend as much time with patients as possible.

The students in the first excerpt below discuss the difficulties of gaining access to patients, while the student in the second excerpt has resolved these difficulties by prioritising her learning needs over fears of being a nuisance:

> Student 1: And they [the consultants] say, "you are part of this team, if the patient's got visitors, just tell them to have five minutes alone with the patient". It is like – as if we are going to do that – do you know what I mean?
>
> Student 2: And I mean there is the thing of being at the bottom of the hierarchy which doesn't bother me that much but sometimes gets a bit annoying though, you go and see a patient and, "the patient has got to be observed", and it is, "the patient's going to have a shower now"; "this visitor is coming to visit the patient now". It is just a bit annoying when you have waited a whole day to see a patient, there are other things, other more important people coming to see the patient.
>
> Student 1: …and then when you show up to ward round, "why don't you know this patient?" … so what were you meant to do? (a) get up at 6.30, be in here by 7 and wake up the patient; (b) stay here until you see the patient which could be as late as 10 o'clock as night? (Student interview, Day 8)
>
> Well initially I thought it would just be really uncomfortable for the patient to have all these people around but you kind of like— you just have to get over that because there is no other way for those people to learn. You just have to remember that it is a teaching hospital so we all have to be there so that we can learn (Student interview, Day 2)

Students were constantly reminded that they are part of the team during ward rounds, and consultants commented on how important it was that students consider themselves team members. From consultants' perspectives, team membership confers legitimacy, albeit peripheral, on student's presence in the ward. However, students expressed varying degrees of belonging as the following excerpt illustrates:

> Student 1: You have to try hard to be part of the team.
>
> Student 2: You have to be proactive to actually be part of the team…
>
> Student 1: But even when you – like even when I am there like taking a history and examining, it is like I am there to learn, it is not like I am part of the team - like helping the patients. It's distant, like I think you are part of the team when you are actually more actively involved in their treatment than just learning.
>
> Student 3: I always feel I am part of the team… I mean I am not an important part, I am not integral. They won't miss me when I am gone but I try to be helpful (Student interview, Day 7)

This excerpt also illustrates that students are more likely to consider themselves part of the team when they feel useful. Students frequently talked about how much you could learn if you were prepared to help the house surgeon. This also illustrates the role of informal teaching from clinical staff who are not specifically employed as teachers (although an obligation to teach is explicit within the Hippocratic Oath):

> If you were just randomly annoying them (house surgeons and TIs) about stuff, they wouldn't be so happy, you have got to sort of do your bit as well. .. like between us we all sort of take bloods for them or chase stuff or take notes or take someone else down to radiology…, just try to be as helpful as possible… a bit of barter goes on (Student interview, Day 7)

> We didn't have to hang around the ward and help the TI but I mean it is understood and … sort of helps you learn some of that ward stuff that goes on… the informal teaching you just don't otherwise would take in - like why are they charting that number of fluids and why they are giving that drug for something? And just learning how to write discharge summaries and all that... (Student interview, Day 16)

One inescapable duty that team membership confers on students during formal team ward rounds is patient presentation. Students are being tested on their ability to take histories, conduct examinations, and how well they know their patients. But students found patient presentation and the Socratic questioning that traditionally accompanies it highly stressful:

> And I have got this lady that has got truckloads going wrong with her… and really you just live in fear because they can basically ask you anything about that patient randomly which is what happened to (another student). So it's not fair (Student interview, Day 3)

Teachers did not mean to distress students. However, it is clear that students perceive that the price for claiming the space provided for them in the clinical team may be the risk of being "grilled" and "slaughtered". One consultant surgeon acknowledged that students are in a "state of high anxiety" during the ward round because they are frightened of being questioned. He noted that this fear can result in students focusing only on their own patients and 'zoning out' during other presentations while they mentally rehearse their own presentation.

Discussion

The above findings have implications which, in all likelihood, apply to all clinical teaching settings.

The space made available to students as transient team members legitimates their participation in clinical activities. These activities include formal activities such as participation in ward rounds, and practising clinical skills on real patients, and informal activities such as helping out with the daily business of patient care on the ward. However, in a busy clinical setting, there are many factors which influence ability and willingness to make space and it is not always easy for staff to remember to make space for students.

While handbooks and manuals and formal introductions to attachments assist by providing information about what is expected of students during their attachment, even assertive students can find it difficult to claim space when patient care takes priority over teaching and learning. For example, Lyon noted that while surgeons recognised that students have legitimate space in the operating theatre, students may not experience this.[11]

It is known that patient case mix determines what is available for clinical teaching to students, and that high patient volume and throughput can result in decreased learning activities although, ironically, there may well be increased learning opportunities.[4] If students feel they are in the way or a nuisance, opportunities to practice clinical skills and professionalism will not be taken up. The challenge for clinicians is to find ways in which students can avail themselves of these opportunities without compromising patient care or further stressing clinicians.

Similarly, reports of intimidation are a traditional motif in medical education.[17 18 19] Perhaps this is inevitable given the performance anxiety associated with patient presentation and Socratic questioning. But are such experiences conducive to effective learning? Are there better ways in which students can learn presentation skills without being frightened of being criticised in front of their peers? On the other hand, it could be argued that the ability to withstand critique is a key professional attribute in clinical practice. The issue here is when does the Socratic method become an interrogation that may be experienced by students as intimidating?

Both students and clinical teachers in our study had broad agreement on the issues around making space available for students and the need for students to claim that space. The question is what can be done to encourage students' sense of belonging? And to encourage them to claim the space that is available to them in this setting?

Educational innovations such as the dedicated bedside tutorial described here may be a resolution although they are time consuming for teachers with clinical commitments. Simple things like encouraging students to pay attention and explaining team discussions can be effective ways of including students in teamwork and patient care. Similarly, invitations and denials to students can be conveyed by communication subtleties such as tone and gesture.

Table 2. Summary of key points

The ward as a learning environment		**Enhancing learning on the ward**
limitations	**opportunities**	
high patient case mix	chance to interact with real patients	smaller learning oriented rounds with fewer patients
large teams	participate in clinical teamwork	as above, smaller teams on teaching rounds
exclusion from clinical discussions	witness collegial discussions and clinical work	include students in collegial discussions and explaining clinical decisions
patient care prioritised over learning	create learning opportunities through participating in patient care	encourage students to participate in daily ward work and including them in patient care
anxiety and fear around presenting patients	practice examination, procedural, history-taking and presentation skills	bedside tutorials with opportunities for practising examination and presentation skills in safe environment
witnessing undesirable behaviour by clinicians	learn desirable professional values and ethics in practice	awareness of the role clinicians play in modelling desirable professional behaviours, values and ethics

What can we do to increase staff awareness of their role in medical training and their acceptance of this role? Can ways be found to support and reward clinical staff who are not employed as teachers? (See Table 2) This includes other health professionals in the clinical setting, particularly nursing staff who represent an important resource for medical students and play a major role in facilitating their engagement in the clinical setting.

At a national level, the Medical Council of New Zealand, the Colleges, and the District Health Boards have an important role in supporting health care professionals in workplace education.

The clinical setting is familiar and ordinary to those who work in it and therefore goes largely uninspected. However, to outsiders (such as students, new staff, and researchers) it presents practices and interactions that reveal tensions, contradictions and anomalies. Clinical teachers and practice team leaders (and their host institutions) must recognise that the working environment is also a learning environment and should encourage this awareness in all those who occupy the work space.

Local solutions are required to enable students to enter and participate in this work space legitimately. Being explicit about expectations and what is and is not allowed is essential in granting legitimacy. Arguably clinical placements are more about professional socialisation than the acquisition of clinical knowledge or skills but students generally focus on the latter. In either case, legitimate participation is a prerequisite of the acquisition of a clinical repertoire.

Since the completion of this study the authors have reported back to the larger group of clinicians from whom the clinical teachers referred to in this report were drawn. At that meeting there were expressions of surprise and disappointment at the disparity between some of the expectations and perceptions of the clinical staff and those of the participating students. Since that time the present report was written and has been reviewed by a small number of clinicians who felt that its contents portrayed the staff and their service in a poor light.

The authors want to make it clear that this report is not intended as either a full or a fair representation of all teaching and learning in clinical surgery. Rather it is a snapshot of two student groups on their first journey through surgical practice. As such it has revealed issues commonly raised internationally in the educational literature on clinical learning and points to the widely recognised need to align more closely the provision of clinical services with the provision of clinical education.

Conclusion

Medical students have a legitimate place in teaching hospitals. All clinical staff are teachers whenever students are present, whether or not they have formal teaching roles. Students and clinical teachers know that students need to make the most of learning opportunities by being proactive; spending time on the ward, being useful, asking questions.

Clinical staff can facilitate student learning by consciously including students in the business of patient care. This means inviting students to ask questions and examine wounds, physically guiding hands on examinations, encouraging students to pay

attention to discussions among the clinical team, and explaining what is being discussed.

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The training, experience, and confidence of junior doctors in performing pleural procedures

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Abstract

Aim Pleural procedures may cause patient discomfort and serious complications if performed inadequately. We surveyed junior doctors to provide information about training and experience.

Methods We surveyed 493 junior doctors working in departments involved in pleural procedures in three teaching hospitals via postal questionnaires in 2002.

Results The response rate was 66%. Formal training in the performance of pleural procedures was limited at undergraduate and postgraduate levels. Theoretical training at postgraduate level in pleural aspiration, chest drain insertion, and closed pleural biopsies was reported by 34%, 40%, and 14% of respondents respectively. Practical training using animal or artificial models occurred infrequently. Pleural aspiration, chest drain insertion, and pleural biopsy had been performed at least once by 91%, 66%, and 41% of respondents respectively. Most doctors felt they needed more training in chest drain insertion and pleural biopsy. Confidence in performing procedures was related to the number of times the procedure had been performed but not to formal teaching.

Conclusions This study provides a comprehensive survey of the background training, experience and confidence levels of junior medical staff in performing pleural procedures. Training in pleural procedures was limited and our results suggest the need for better training programmes and supervision of junior doctors.

In New Zealand (NZ) pleural procedures are commonly performed by junior medical staff with variable experience and training in the techniques of pleural aspiration, chest drain insertion and pleural biopsy. It is not surprising, therefore, that serious complications of pleural procedures are reported regularly in the literature.[1–4] These include intercostal artery laceration and lung trauma, which can result in bleeding, pain and pneumothorax.[2,5,6] Many of these are potentially preventable by better training.

The training, experience, and confidence of junior medical staff in performing pleural procedures have not been studied in a systematic manner previously. Furthermore, the adequacy of supervision of junior doctors in performing these procedures is uncertain. A study from the 1980's of house officers in the United Kingdom (UK) found that 40% were confident in performing pleural aspiration and 10% were confident in inserting a chest drain.[7] However a recent UK study showed that many junior doctors lack the essential skills and knowledge required to insert chest tubes with over 45% in being unable to correctly identify a safe insertion position.[8]

Another survey of 53 senior house officers and registrars suggested that junior medical staff trained each other in the technique of chest drain insertion.[9]

We undertook a survey of junior doctors to provide much needed information about their training and experience in performing pleural procedures and to assess their need for further training. We also wanted to determine the factors that influence their confidence in performing pleural procedures with a view to developing better undergraduate and postgraduate programmes for training doctors in these important practical skills.

Methods

Study population

We identified doctors working in the three tertiary hospitals in Auckland, New Zealand, with job grades ranging from house officer to senior registrar. The names were obtained from the Registered Medical Officer Support Units in each hospital and included all junior doctors in the Auckland region. All house officers were sent a questionnaire. We identified registrars who worked in departments that perform pleural procedures. Questionnaires were sent to all registrars in the departments of Medicine (including Oncology), Cardiothoracic surgery, Paediatrics, Intensive Care, Anaesthetics, Emergency Medicine, and Radiology.

The questionnaire

We sent questionnaires to the junior doctors in August 2002 and a second questionnaire was sent to those who had not responded after 4 weeks. The questionnaire can be viewed at http://www.nzma.org.nz/journal/122-1304/3818/Appendix.pdf The questionnaires were returned without a name but with a code which was only used to send additional questionnaires to non-responders.

The questionnaire was developed on the basis of the experience of the study investigators. Face validity was assessed with 10 junior doctors by an investigator who reviewed the questionnaire with each respondent. The questionnaire collected information about gender and country of undergraduate training. Participants were asked to indicate their training, experience, confidence and skill in performing pleural aspiration, pleural biopsy and chest drain insertion.

Confidence was rated on an integer scale of 0 to 10 where "0" means no confidence at all and "10" means extremely confident. Self reported skill was rated on a similar 10-point scale. They also completed questions about what tests to request after obtaining pleural fluid and the management of chest drains. The study protocol was reviewed by the local clinical board and no ethical concerns were raised

Statistical analyses

Data are expressed as percentages. The associations between variables were analysed by the Chi-squared (χ^2) test using SPSS v12.0.1 for Windows software (SPSS Inc., Chicago, Illinois).

Results

Participant characteristics

Questionnaires were sent to 526 doctors and 33 were returned undelivered by the mailing centres. Of the remaining 493, 326 completed questionnaires were returned; a response rate of 66%.

Fifty-five percent of participants were men and most respondents worked in the departments of Medicine (43%), Surgery (20%), or Emergency Medicine (11%) (Table 1).

Fifty-three percent of the respondents were house officers (year 1 or 2) or senior house officers (year 3 or more); 17% were year 1 or 2 registrars; and 30% were senior registrars (year 3 or more).

The majority of participants (69%) had graduated from a NZ medical school. There were, however, graduates from 25 other countries with the next largest group being from the UK (4%).

Table 1. Characteristics of 326 respondents working in hospitals in Auckland, NZ in 2002

Variables	Number (%)
Sex	
Male	179 (55)
Female	147 (45)
Postgraduate year	
One	63 (19)
Two	47 (14)
Three	50 (15)
Four or five	49 (15)
More than five	110 (34)
Not specified	7 (3)
Job title	
House officer (year 1or 2)	128 (39)
Senior house officer (year 3 or more)	46 (14)
Registrar (year 1 or 2)	55 (17)
Senior registrar (year 3 or more)	97 (30)
Specialty area	
Medicine	140 (43)
Surgery	65 (20)
Emergency Medicine	37 (11)
Paediatrics	22 (7)
Radiology	19 (6)
Other	43 (13)
Country of graduation	
New Zealand	224 (69)
United Kingdom	13 (4)
Iraq	11 (3)
Bangladesh	10 (3)
Australia	9 (3)
South Africa	8 (2.5)
India	8 (2.5)
Other	43 (13)

Training

Formal theoretical training in the performance of pleural procedures was limited both at undergraduate and postgraduate levels (Table 2). Theoretical training at undergraduate level in pleural aspiration, chest drain insertion and pleural biopsies was reported by only 59%, 40%, and 14% of respondents respectively.

Postgraduate theoretical training was also limited (34%, 40%, and 14% respectively) and practical training using animal or artificial models occurred infrequently (23%,

30%, 7% respectively). Respondents felt they needed further training particularly in chest drain insertion (62%) and pleural biopsy (79%).

The training received was related to the country of graduation for postgraduate training in chest drain insertion and pleural biopsy. Doctors who graduated in NZ were more likely to have had postgraduate training in chest drain insertion with models (χ^2=9.6, p=0.008) but less likely to have had postgraduate theoretical training in pleural biopsy than those who graduated outside of NZ (χ^2=12.6, p=0.006).

Table 2. Rates of reported training and supervised procedures

Variables	Pleural aspiration % (No.)	Chest drain insertion % (No.)	Pleural biopsies % (No.)
Received undergraduate training	59 (192/324)	40 (130/321)	14 (43/317)
Received postgraduate theoretical training (lectures, videos)	34 (110/323)	40 (130/324)	14 (45/318)
Received hands-on training with animal or artificial models	23 (75/325)	30 (98/325)	7 (22/321)
Feel they need further training	42 (134/321)	62 (201/322)	79 (254/323)
First procedure was supervised by a consultant *	9 (25/289)	21 (43/206)	24 (31/127)
First procedure was supervised by a registrar *	83 (241/289)	75 (155/206)	72 (91/127)
First procedure was supervised by a respiratory registrar *	10 (28/289)	17 (34/206)	24 (31/127)
At least one procedure performed was supervised by a registrar *	92 (260/280)	89 (184/206)	81 (103/127)

* Includes only those who had performed the procedure at least once

Experience of pleural procedures

Pleural aspiration—91% of respondents had performed pleural aspiration at least once (Figure 1). Most registrars (93%) and senior house officers (74%) had performed pleural aspiration at least three times but only 38% of house officers had performed pleural aspiration at least three times.

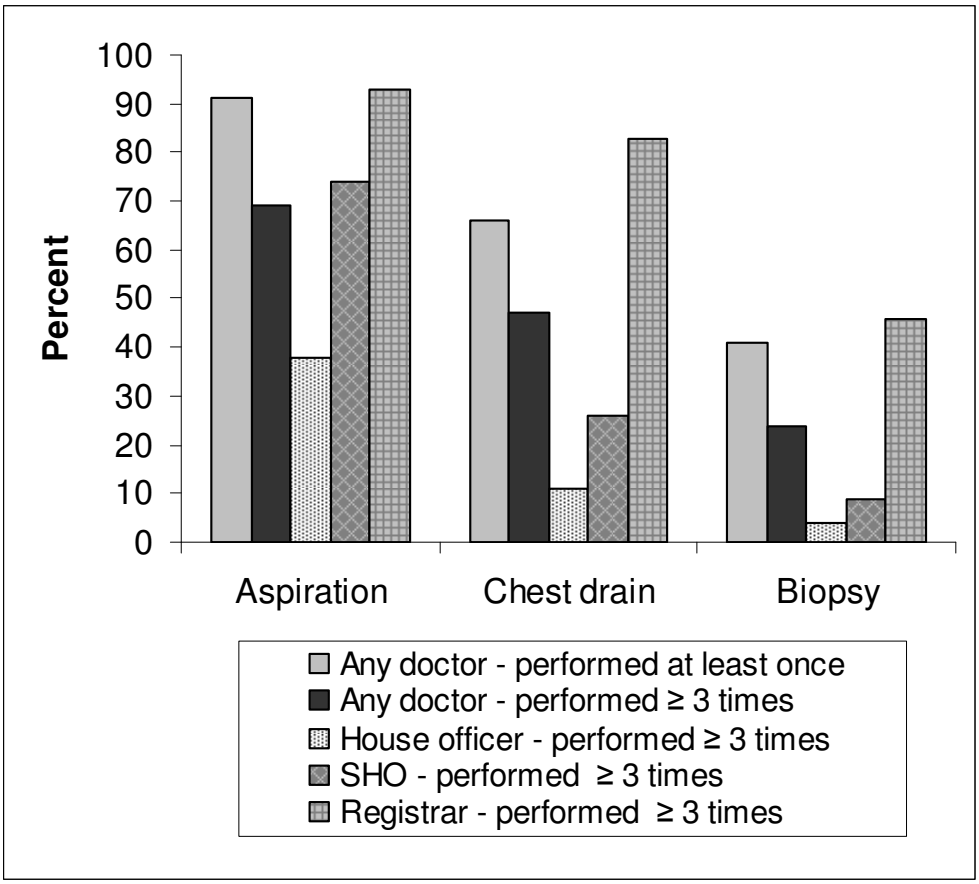
Chest drains—66% of respondents had performed chest drain insertion at least once but most were performed by registrars (67%) (Figure 1). The experience of house officers was limited in contrast to registrars who had considerably more experience (11% vs 83% had inserted a chest drain at least 3 times respectively) (Figure 1).

Most respondents were confident about their ability to manage a chest drain (63% had a confidence level of 6 or more) or to remove a chest drain on their own (only 8% had a confidence level of less than 5).

Pleural biopsy—Pleural biopsy was the least commonly performed pleural procedure amongst our respondents (Figure 1). Only 41% had performed a pleural biopsy and most were done by registrars.

Supervision of procedures—Registrars taught and supervised most pleural procedures (see Table 2). The first chest drain inserted by a junior doctor was supervised by a registrar in 75% of cases. Only 17% of first chest drains were supervised by respiratory registrars—most were by general medical registrars. Consultant physicians infrequently supervised pleural procedures. They supervised only 9%, 21%, and 24% of initial aspirations, chest drains and pleural biopsies respectively.

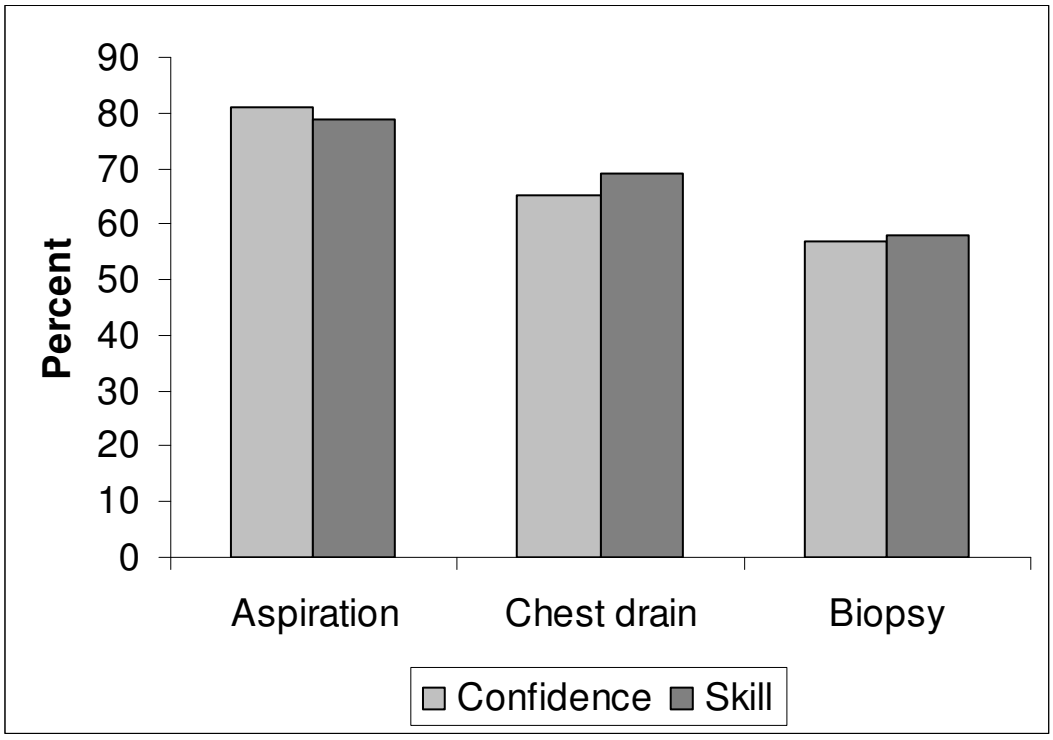
Figure 1. Percentage of respondents who had performed a pleural procedure at least once or ≥3 times according to job title



Confidence and skill in performing procedures—Of those who had performed at least one pleural aspiration, 81% had a confidence level of 6 or more for performing an aspiration without supervision and 79% felt they had a skill level of 6 or more in performing pleural aspiration (Figure 2).

Of the 212 doctors who had performed chest drain insertion previously, 137 (65%) had a confidence level of 6 or more for performing chest drain insertion without supervision. Sixty-nine percent of respondents who had performed a chest drain insertion felt they had a skill level of 6 or more (Figure 2). There was a lower level of confidence in those who had performed pleural biopsies (57% with confidence level of 6 or more).

Figure 2. Percentage of respondents who had a confidence or skill level of ≥6 for performing a procedure on their own if they had performed the procedure at least once previously



Note: Confidence and skill were rated on a scale of 0 to 10 where "0" means no confidence/skill at all and "10" means extremely confident/skilful).

Junior doctors who had only observed a procedure were more likely to report lower confidence in performing a procedure compared to those that had performed at least one procedure, indicating that hands-on experience is associated with increased confidence (aspiration, χ^2=65.5, p<0.001; chest drain, χ^2=103.9, p<0.001; pleural biopsy, χ^2=58.9, p<0.001).

Furthermore, doctors were more likely to report greater confidence in performing a procedure on their own as their number of procedures increased (aspiration, χ^2=74.8, p<0.001; chest drain, χ^2=78.6, p<0.001; pleural biopsy, χ^2=36.1, p<0.001). Reports of confidence in performing procedures did not vary with gender or undergraduate or postgraduate training.

Discussion

Our survey highlights the need for better training in pleural procedures and the variable experience of junior medical staff. Most junior doctors in our study had experience in chest drain insertion but still felt they needed more training.

Confidence in performing pleural procedures was related to the number of times a pleural procedure had been performed but not to teaching at undergraduate or postgraduate level. It is at the bedside that junior doctors appear to learn how to perform most pleural procedures. The teaching and supervision at the bedside is predominantly done by registrars with little consultant input (75% vs 21% of first chest drains).

The level of experience of pleural aspiration and chest drain insertion in our survey was surprisingly high. Most doctors (91%) had performed pleural aspiration and 66% had inserted a chest drain at least once. Experience was obtained mainly at registrar level and few house officers or senior house officers had performed a procedure 3 or more times. Amongst those who had performed a pleural procedure previously, the level of confidence in performing a procedure on their own was moderately high.

Conversely those without hands-on experience had low confidence despite observing the procedure at the bedside—thus emphasising the importance of actual hands-on practice. Sixty-five percent of doctors who had performed chest drain insertion had a confidence level of 6 or more and 69% felt they had a skill level of 6 or more. Although registrars had considerably more experience than house officers and expressed high confidence and skill levels, it is uncertain whether these factors indicate true competency.

In studies of cardiopulmonary resuscitation, doctors who believe they are competent at resuscitation frequently fail to demonstrate their competence when formally tested.[7,10–12] Multiple studies have shown that there is a lack of association between self-rated assessment and objective performance measures in both medical students and junior doctors.[13–17]

Our study indicates that it may be difficult for all junior doctors to obtain adequate hands-on experience in patients to be confident in pleural procedures. This is particularly the case for house officers in whom the early postgraduate years are important in developing practical skills.[18]

Structured training with animal or artificial models and the use of clinical scenarios provide a potential way of improving access to hands-on experience for doctors at all levels. Artificial models for teaching chest drain insertion have improved and can now provide a realistic simulation of the procedure in patients. They allow doctors to develop their skills and familiarity with equipment in a controlled and unrushed environment.

A major potential benefit of simulation models is that they can provide a method of assessing technical skills[19,20] which is highly reliable, and valid if the model is realistic.[21] Simulated learning in the undergraduate years has also been advocated[22] and is likely to be more useful than didactic teaching for practical procedures. A systematic review has indeed concluded that “high-fidelity medical simulations are

educationally effective and simulation-based education complements medical education in patient care settings".[23]

Brief teaching modules using a simulation model have been shown to be effective in improving confidence and skill in chest tube insertion.[24] Once the initial theoretical or simulated training is undertaken, doctors must refine their skills and acquire experience by performing procedures on patients.

Our study indicates that the teaching and supervision of these procedures is undertaken mainly by registrars who are not respiratory trainees - a situation similar to that in the UK.[9] This situation has arisen because there are limited numbers of respiratory registrars and consultants available for bedside supervision after-hours. It is important, therefore, that those registrars who are involved in supervision are adequately trained to teach these procedures and training programmes should give priority to training registrars.

With improvements in chest imaging and the growth of medical and surgical thoracoscopy, blind pleural biopsies are being performed less frequently and it is not necessary to teach this procedure to all junior doctors. This is especially the case in countries with a low prevalence of tuberculous pleuritis—the main indication for performing closed pleural biopsy. This procedure should be taught primarily to respiratory trainees.

A study from the UK audited pleural biopsies performed over a three year period and found that non-respiratory teams performed only two or three biopsies a year, compared to 23 per year for respiratory teams.[25] A lack of experience was associated with a higher proportion of failed or non-diagnostic biopsies amongst non-respiratory teams. The overall number of failed or non-diagnostic biopsies was reduced in a repeat audit after a hospital-wide pleural biopsy service was established.

There are several limitations of our study. Although our response rate compares well to other surveys of junior doctors, we cannot exclude the possibility that non-responders had different training and experience. Our inclusion of all junior doctors in the Auckland region who were likely to be actively involved in pleural procedures limits the potential selection bias.

The validity of our questionnaire was not tested formally and our study was not designed to assess any clinical outcomes related to the training and experience of junior doctors. Our study was also undertaken in 2002. Although changes may have occurred since then, we believe that the training of junior doctors in chest drain insertion remains limited in New Zealand. The interpretation of our results also needs to take into account the large number of senior registrars in our sample (30% were in their 3rd or more year as a registrar).

Most of the respondents graduated from a NZ medical school, but 31% graduated from a variety of different countries. The training and experience of graduates from NZ and overseas were broadly similar. However, compared to doctors who had graduated outside of NZ, doctors who graduated in NZ were more likely to have had postgraduate training in chest drain insertion with models and less likely to have had postgraduate theoretical training and experience in pleural biopsy.

This survey indicates that more structured and better programmes are needed to train junior doctors adequately in the performance of pleural procedures. Simulated learning with models is a rapidly growing field and is likely to play an increasingly important role in preparing doctors for bedside pleural procedures.

We need to work towards optimising educational effectiveness and find ways that allow doctors to practice without using patients as learning objects [26] such as using simulated models[24] and web-based learning[27].

Once learning in this environment has occurred then better supervision of doctors when they perform their first few pleural procedures on patients is imperative. The application of such an approach should lead to less discomfort and fewer complications in patients undergoing pleural procedures.

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Human papillomavirus knowledge and awareness among undergraduates in healthcare training in New Zealand

Carol Chelimo, Trecia A Wouldes

Abstract

Aims To describe knowledge of HPV and its transmission, knowledge of the HPV vaccine, and awareness of free HPV vaccine for 12–18 year old New Zealand females; and to assess whether there are significant age and gender differences in HPV-related knowledge.

Methods Undergraduate university students were invited to complete an anonymous questionnaire, after viewing a brief HPV vaccine TV commercial.

Results Compared to 19 year olds, 18 years olds were more likely to have heard of HPV (OR=3.78; 95%CI=1.66–8.65) and the HPV vaccine (OR=3.94; 95%CI=1.85–8.39), know about sexual transmission of HPV (OR=2.79; 95%CI=1.34–5.77), and be aware of the free HPV vaccine (OR=4.00; 95%CI=1.81–8.84). Participants who knew someone ever diagnosed with cervical cancer were more likely to have heard of the HPV vaccine (OR=2.98; 95%CI=1.09–8.13). Male participants were less likely to be aware of the free vaccine (OR=0.16; 95%CI=0.07–0.40).

Conclusion Average levels of basic knowledge of HPV and HPV vaccine most likely represent minimal awareness as more specific knowledge on sexual transmission of HPV is low. HPV vaccination should be complimented with public education on the link between sexual behaviour, HPV infection and cervical cancer.

Human papillomavirus (HPV) infections, the most common sexually transmitted infections globally, are often asymptomatic and clear within 2 years. However, genital HPV infection is associated with development of cervical cancer, cervical neoplasia, anogenital warts, and other anogenital cancers.[1]

Of more than 35 HPV types, 5 types (HPVs 16, 18, 45, 31, and 33) account for 80% and 94% of the distribution in squamous cell cancers and adenocarcinomas, respectively. HPV16 accounts for 50-60% of cervical cancer cases in most countries, HPV18 for 10–20%, HPV45 for 4–8%, and HPV31 for 1–5%.[2]

Worldwide, cervical cancer is the 5th leading cause of cancer-related deaths among women, after cancers of the breast, lung, stomach, and colorectum.[3] The 2004 New Zealand Health Information Service (NZHIS) report on new cancer registrations and deaths ranked cancers of cervix uteri as the 13th most common cancer registered for females. This accounted for 154 incident cases and 71 deaths, with the deaths to registrations ratio being 0.46.[4]

Two vaccines against HPV types that are responsible for most cervical cancer cases have been developed and tested in clinical trials.[5-10] The quadrivalent vaccine, Gardasil® (Merck & Co., Inc.), protects against HPV types 16, 18, 6, and 11, and the

bivalent vaccine, Cervarix® (GlaxoSmithKline), protects against HPV types 16 and 18.

The aim of prophylactic vaccination is to reduce incidence of anogenital cancers and precancerous lesions, with additional protective benefits against genital warts for those receiving the quadrivalent vaccine.[11]

In June 2006, guidelines for use of prophylactic HPV vaccines for prevention of cervical intraepithelial neoplasia and cervical cancer were developed by the American Cancer Society (ACS). The ACS recommendations included routine HPV vaccination of 11-12 year old girls, catch-up vaccinations for 13–18 year old girls, and continued cervical screening for both vaccinated and unvaccinated females.[11]

The New Zealand Government has committed NZ$164 million over 5 years to a HPV immunisation programme to prevent cervical cancer. Furthermore, the Ministry of Health will invest another $13 million, making the total 5-year investment around $177 million.[12]

From 1 September 2008, the HPV vaccine was made available at no cost to 17–18 year old girls (born in 1990 and 1991) through family doctors, practice nurses, or health clinics. In 2009, the vaccine will be offered to girls aged 12–18 years through schools and healthcare providers, and incorporated into the routine immunisation schedule for Year 8 girls (12–13 year olds).[13]

Genital warts, which are a result of HPV infections, were the second most common sexually transmitted infection (STI) diagnosed in New Zealand in 2003.[14] Among those visiting sexual health clinics (SHC), rates of genital warts were highest among 20–24 years olds (5.7%) closely followed by 15–19 year olds (5.2%). These two age groups also had the highest rates of genital warts among those visiting family planning clinics (FPC), although the rates between the age groups were fairly similar (0.3%–0.4%).

In addition, males had higher rates of genital warts than females among those attending SHC (5.2% versus 3.8%) and FPC (1.3% versus 0.2%).[14] With the HPV immunisation programme already underway among 17–18 year old females, we sought to obtain information on HPV knowledge, attitudes, and beliefs in a population of male and female university undergraduate students in healthcare training. Furthermore, this population will eventually be involved in HPV prevention and screening, and treatment of illnesses resulting from HPV infection.

The aims of this study are:

- To describe knowledge of HPV and its transmission, knowledge of the HPV vaccine, and awareness of free HPV vaccine for 12-18 year old New Zealand females; and
- To assess whether there are significant age and gender differences in HPV-related knowledge.

Methods

In this cross-sectional study, undergraduate students enrolled in a first-year course coordinated and taught by one of the authors (TAW) were invited to complete a 16-item anonymous questionnaire.

Prior to completing the questionnaire, participants viewed a one-minute HPV vaccine (Gardasil®) TV commercial that has been used to promote HPV vaccination in the United States. The purpose of showing the commercial was to provide basic HPV-related information that would enable participants to complete the questionnaire. The TV commercial described the purpose, benefits and potential side-effects of the HPV vaccine, and highlighted the importance of continued cervical screening for women.

No compensation or incentives were given for participation. Students who did not wish to participate were asked to return a blank questionnaire. This study was approved by the University of Auckland Human Participants Ethics Committee and was undertaken in October 2008.

The anonymous questionnaire was completed by 200 students who attended the lecture on the day of the survey; the participation rate among attendees was 97.6%. Demographic information collected included year of birth, gender, and programme of study.

We asked participants whether they had heard of HPV and the HPV vaccine before the survey, and to specify their sources of this information. Participants were asked whether they knew how HPV was transmitted and to specify the mode of transmission, if known. In addition, we collected information on whether participants: were aware of free HPV vaccine for 12–18 year old New Zealand females; had already been vaccinated for HPV; believed that both males and females should be vaccinated for HPV; and would receive the HPV vaccine if it were free.

Participants were also asked whether they knew anyone who has ever been diagnosed with cervical cancer. Finally, to understand vaccination history, participants were asked to report whether they had previously been vaccinated for childhood illness (such as, measles), Hepatitis B, and Meningococcal B.

Outcomes of interest are:

- Knowledge of HPV;
- Knowledge of sexual transmission of HPV;
- Knowledge of the HPV vaccine; and
- Awareness of free HPV vaccine for 12–18 year old females.

Covariates of interest are age, gender, and knowing someone ever diagnosed with cervical cancer. Characteristics of the study population were summarised using counts and percents for categorical data, and mean and standard deviation for participants' age. Bivariate logistic regression was used to test for independent associations between each outcome and each covariate. Multivariate logistic regression analysis was done separately for each outcome of interest.

For each outcome, independent variables with a p-value of 0.15 or less in the bivariate analysis were entered into a multivariate model and manual backward-elimination was used to select the most parsimonious model; a final model consisted of independent variables with p-values of 0.05 or less. Multivariate analysis only included subjects with complete data for the variables in the models. We also tested for interactions between age and gender in models for each outcome.

Results from logistic regression analyses were summarised using odds ratios (OR) and 95% confidence intervals (CI). Statistical analysis was performed using SAS version 9.1 software (SAS Institute Inc., Cary, NC, USA).

Results

Participants in this study were mostly female (80.7%), with a mean age of 19.8 years (Table 1). About one-half (52.3%) of participants were Health Sciences students, 22.8% were Nursing students, and 19.8% were Pharmacy students. Only 7% of all female participants had been vaccinated for HPV. By age group, HPV vaccination was 20.5% among 18 year olds females and 2.5% among 19 year olds females; none of the ≥20 year old females had been vaccinated for HPV.

Regarding whether both males and females should be vaccinated for HPV, 43.4% of participants believed this should happen and 16.7% disagreed. Approximately thirteen percent of participants reported knowing someone who had ever been diagnosed with cervical cancer.

When asked whether or not they would receive the HPV vaccine if it were free, 88.0% of female participants said they would be willing to receive it, 10.1% said they would not, and 1.9% remained undecided. Among male participants, willingness to be vaccinated for HPV was lower; 65.8% said they would be willing to receive it and 34.2% said they would not.

Majority of participants reported that they had been vaccinated for childhood illnesses (92.5%), Hepatitis B (71.0%), and Meningococcal B (77.0%).

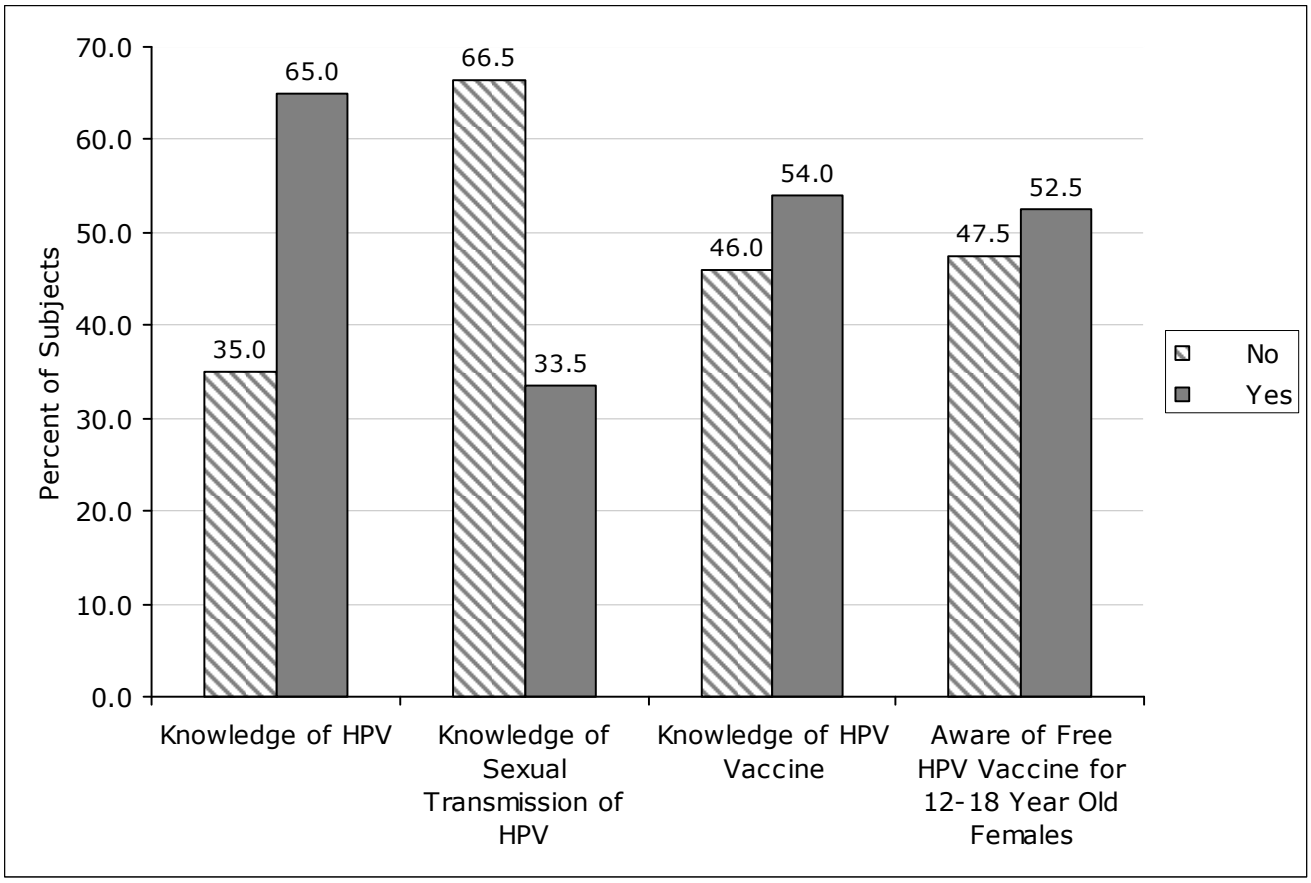
Table 1. Characteristics of the Study Population (n=200)

	n(%)*
Demographics	
Age (Mean ± SD)	19.8 ± 3.7
Gender	
Female	159 (80.7)
Male	38 (19.3)
Undergraduate Programme	
Bachelor of Health Sciences	103 (52.3)
Bachelor of Nursing	45 (22.8)
Bachelor of Pharmacy	39 (19.8)
Other	10 (5.1)
Other Characteristics	
HPV Vaccination Before Survey Among Females (n=157)	
No	146 (93.0)
Yes	11 (7.0)
HPV Vaccination Before Survey Among 18 Year Old Females	8 (20.5)
HPV Vaccination Before Survey Among 19 Year Old Females	2 (2.5)
HPV Vaccination Before Survey Among ≥20 Years Old Females	0 (0.0)
Whether Males and Females Should Receive HPV Vaccine	
Don't Know	79 (39.9)
No	33 (16.7)
Yes	86 (43.4)
Would Receive HPV Vaccine If Free	
Females (n=158)	
No	16 (10.1)
Yes	139 (88.0)
Undecided	3 (1.9)
Males (n=38)	
No	13 (34.2)
Yes	25 (65.8)
Know Someone Ever Diagnosed With Cervical Cancer	
No	175 (87.5)
Yes	25 (12.5)

* Percents may not add up to totals due to rounding

As presented in Figure 1, 65% percent and 54.0% of participants had heard of HPV and the HPV vaccine, respectively. One-third of participants knew that HPV was a sexually transmitted virus (33.5%), and 52.5% were aware of free HPV vaccine for 12-18 year old females.

Figure 1. Knowledge of HPV, sexual transmission of HPV, and the HPV vaccine



Unadjusted odds ratios for the relationship between independent variables and the outcomes are presented in Tables 2 and 3. Participants' age was independently associated with knowledge of HPV and the HPV vaccine, knowledge of sexual transmission of HPV, and awareness of free HPV vaccine for 12–18 year old females.

Knowing someone ever diagnosed with cervical cancer was also independently associated with knowledge of HPV and the HPV vaccine; however, there was no significant association with knowledge of sexual transmission of HPV or awareness of free HPV vaccine for 12–18 year old females. Participants' gender was independently associated with awareness of free HPV vaccine for 12–18 year old females, but not the other outcomes.

Table 2. Unadjusted Odds Ratios for Knowledge of HPV and Its Transmission

	n (%)*		Unadjusted OR (CI)	p-value
	No	Yes		
	Knowledge of HPV			
	(n = 70)	***(n = 130)***		
Age Group				
18 Years Old	9 (18.8)	39 (81.3)	3.79 (1.67–8.61)	<0.01
19 Years Old	49 (46.7)	56 (53.3)	Reference	Reference
≥20 Years Old	10 (22.5)	31 (77.5)	3.01 (1.31–6.95)	0.01
Gender				
Male	13 (34.2)	25 (65.8)	1.08 (0.51–2.26)	0.85
Female	57 (35.9)	102 (64.2)	Reference	Reference
Know Someone Diagnosed With Cervical Cancer				
Yes	4 (16.0)	21 (84.0)	3.18 (1.05–9.67)	0.04
No	66 (37.7)	109 (62.3)	Reference	Reference
	Knowledge of Sexual Transmission of HPV			
	(n = 133)	***(n = 67)***		
Age Group				
18 Years Old	26 (54.2)	22 (45.8)	2.71 (1.31–5.59)	0.01
19 Years Old	80 (76.2)	25 (23.8)	Reference	Reference
≥20 Years Old	24 (60.0)	16 (40.0)	2.13 (0.98–4.63)	0.06
Gender				
Male	30 (79.0)	8 (21.1)	0.48 (0.21–1.11)	0.09
Female	102 (64.2)	57 (35.9)	Reference	Reference
Know Someone Diagnosed With Cervical Cancer				
Yes	15 (60.0)	10 (40.0)	1.38 (0.58–3.26)	0.46
No	118 (67.4)	57 (32.6)	Reference	Reference

* Percents may not add up to totals due to rounding

Table 3. Unadjusted Odds Ratios for Knowledge of HPV Vaccine and Awareness of Its Availability

	n (%)*		Unadjusted OR (CI)	p-value
	No	Yes		
	Knowledge of HPV Vaccine			
	(n = 92)	***(n = 108)***		
Age Group				
18 Years Old	13 (27.1)	35 (72.9)	3.88 (1.84–8.19)	<0.01
19 Years Old	62 (59.1)	43 (41.0)	Reference	Reference
≥20 Years Old	12 (30.0)	28 (70.0)	3.36 (1.54–7.34)	<0.01
Gender				
Male	22 (57.9)	16 (42.1)	0.54 (0.27–1.11)	0.10
Female	68 (42.8)	91 (57.2)	Reference	Reference
Know Someone Diagnosed With Cervical Cancer				
Yes	6 (24.0)	19 (76.0)	3.06 (1.17–8.03)	0.02
No	86 (49.1)	89 (50.9)	Reference	Reference
	Aware of Free HPV Vaccine for 12-18 Year Old Females			
	(n = 95)	***(n = 105)***		
Age Group				
18 Years Old	14 (29.2)	34 (70.8)	3.50 (1.68–7.30)	<0.01
19 Years Old	62 (59.1)	43 (41.0)	Reference	Reference
≥20 Years Old	15 (37.5)	25 (62.5)	2.40 (1.14–5.08)	0.02
Gender				
Male	29 (76.3)	9 (23.7)	0.22 (0.10–0.48)	<0.01
Female	65 (40.9)	94 (59.1)	Reference	Reference
Know Someone Diagnosed With Cervical Cancer				
Yes	8 (32.0)	17 (68.0)	2.10 (0.86–5.12)	0.10
No	87 (49.7)	88 (50.3)	Reference	Reference

* Percents may not add up to totals due to rounding

In the multivariate analysis, age was significantly associated with the four outcomes (Table 4). Compared to 19 year olds, 18 years olds were more likely to have heard of HPV (OR=3.78; 95%CI=1.66–8.65) and the HPV vaccine (OR=3.94; 95%CI=1.85–8.39), know about sexual transmission of HPV (OR=2.79; 95%CI=1.34–5.77), and be aware of free HPV vaccine for 12–18 year old females (OR=4.00; 95%CI=1.81–8.84).

Participants ≥20 years old were also more likely to have heard of HPV (OR=2.99; 95%CI=1.29–6.94) and the HPV vaccine (OR=3.39; 95%CI=1.54–7.48), and be aware of free HPV vaccine for 12–18 year old females (OR=2.54; 95%CI=1.14–5.63). Knowing someone ever diagnosed with cervical cancer was significantly associated with knowledge of the HPV vaccine (OR=2.98; 95%CI=1.09, 8.13), and only marginally associated with knowledge of HPV (OR=3.11; 95%CI=0.99, 9.73).

Gender was significantly associated with awareness of free HPV vaccine for 12–18 year old females; compared to females, males were less likely to be aware of the free vaccine (OR=0.16; 95%CI=0.07–0.40).

Table 4. Adjusted Odds Ratios for Knowledge of HPV, HPV Vaccine and HPV Transmission

	Adjusted OR (CI)	p-value
Knowledge of HPV (n=193)		
Age Group [1]		
18 Years Old	3.78 (1.66–8.65)	<0.01
19 Years Old	Reference	Reference
≥20 Years Old	2.99 (1.29–6.94)	0.01
Know Someone Diagnosed With Cervical Cancer [2]		
Yes	3.11 (0.99–9.73)	0.05
No	Reference	Reference
Knowledge of Sexual Transmission of HPV (n=191)		
Age Group		
18 Years Old	2.79 (1.34–5.77)	<0.01
19 Years Old	Reference	Reference
≥20 Years Old	2.19 (1.01–4.79)	0.05
Knowledge of HPV Vaccine (n=191)		
Age Group [1]		
18 Years Old	3.94 (1.85–8.39)	<0.01
19 Years Old	Reference	Reference
≥20 Years Old	3.39 (1.54–7.48)	<0.01
Know Someone Diagnosed With Cervical Cancer [2]		
Yes	2.98 (1.09–8.13)	0.03
No	Reference	Reference
Aware of Free HPV Vaccine for 12-18 Year Old Females (n=189)		
Age Group [3]		
18 Years Old	4.00 (1.81–8.84)	<0.01
19 Years Old	Reference	
≥20 Years Old	2.54 (1.14–5.63)	0.02
Gender [2]		
Male	0.16 (0.07–0.40)	<0.01
Female	Reference	

[1] Adjusted for whether subjects know someone ever diagnosed with cervical cancer

[2] Adjusted for age

[3] Adjusted for gender

Knowledge of the HPV vaccine was the only outcome that exhibited a gender-age interaction (Table not shown). After stratifying the relationship between knowledge of the HPV vaccine and age by gender, a significant association existed among females, but not among males.

Among females, 18 years olds (OR=6.32; 95%CI=2.50–16.00) and ≥20 years olds (OR=3.18; 95%CI=1.34–7.54) were more likely to have heard of HPV, compared to

19 year olds. On the contrary, among males, there was no significant difference in HPV vaccine knowledge between the age groups.

Discussion

Our findings indicate that in this population, basic knowledge of HPV and the HPV vaccine is average to above average, and knowledge of sexual transmission of HPV is low. Participants who knew someone ever diagnosed with cervical cancer were more likely to have heard of HPV and the HPV vaccine. Eighteen year olds were more likely to know that HPV was sexually transmitted, and to have heard of HPV and the HPV vaccine.

Although no significant gender differences were observed in knowledge of HPV and sexual transmission of HPV, we observed that males were less likely to be aware of free HPV vaccine for 12–18 year old females.

The significant differences between 19 year olds and 18 year olds in knowledge of HPV, knowledge of sexual transmission of HPV, and awareness of free HPV vaccines for 12–18 year old females may be because HPV vaccination has been targeted at the latter. Moreover, majority of participants in this study who had been vaccinated for HPV were 18 years old. This may be further supported by our findings that age difference in knowledge of HPV vaccine existed among females, but not among males.

Several studies in young adult populations have found knowledge of HPV and the HPV vaccine to be lower than was observed in the present study. Yacobi E, et al.[15] found that 37% of university students had ever heard of HPV; 60% reported knowing nothing about HPV and 31% reported knowing little about HPV. The same study also found that even among participants who had been diagnosed with HPV, 62% had not heard of HPV prior to diagnosis.

A recent study in the Netherlands found that a much lower proportion (17.7%) of 18–25 year old university students had heard of HPV.[16] In some other studies among college students, 33.3% of participants had heard of HPV infection of the cervix,[17] and 27% knew that HPV was the most common STI.[18] In female-only samples, the proportion of participants who had heard of HPV was found to be 23.3% among 15–18 year olds,[19] and 30.6% among 18–23 year olds.[20]

Among male university students aged 18–25 years, 45.1% had heard of HPV and 26.2% knew there was a vaccine being developed at the time to prevent HPV infection.[21] In a study among Canadian high-school students aged 15–20 years, only 13% of participants had heard of HPV.[22] Another study that consisted of participants as young as 14 years old in Italy, with a mean age of 19 years, found that 29.8% knew that HPV is an infection of the genital mucosa.[23] The same study also found that 42.1% knew that the vaccine was a preventive measure, and only 15.3% knew that it was available in Italy.

Several factors could explain lower rates in knowledge of HPV and the HPV vaccine in these studies compared to the present study. Some of the studies were conducted when HPV clinical trials were still underway and/or when the HPV vaccine had not been actively marketed to the public; therefore, awareness and knowledge of HPV and the HPV vaccine was possibly lower at the time.

Another likely reason is that there are differences by country in chronological licensing of the HPV vaccine, accessibility of vaccine via national programmes, and age groups targeted.

Other studies have shown much higher rates of knowledge of HPV and the HPV vaccine. In a recent study among heterosexual male college students in the USA, 83% and 51% of the participants had heard of HPV and the HPV vaccine, respectively.[24] These rates are much higher than those observed among male participants in the present study (65.8% and 42.1%, respectively).

One further study of 18-26 year old university students in the USA found 78% of the sample had heard of HPV.[25] The higher rates of knowledge of HPV and the HPV vaccine in these studies may be because marketing and promotion of the HPV vaccine in the USA has been ongoing for several years now, while this has only begun in New Zealand.

The proportion of participants in the present study who knew how HPV is transmitted was lower than in most previous studies.[15, 17, 23] These differences are possibly due to dissimilar study procedures whereby these studies may have informed participants in advance that HPV was a STI, or used multiple-choice or true/false questions that make it possible for participants to guess how HPV is transmitted.

In the present study, females were more likely to be aware of the free HPV vaccine for 12-18 year old New Zealand females than males. However, no other gender differences were found for HPV-related knowledge. These results are consistent with two other studies that also found no differences in knowledge of HPV and the HPV vaccine.[18,26]

In contrast, other studies found females were significantly more aware and knowledgeable about HPV.[15, 16, 25] For instance, Baer H, et al.[17] found males were less likely to know how HPV was transmitted than females (82.6% versus 45.6%).

Older age has been found to be significantly associated with having heard of HPV vaccination.[19,23] Di Giuseppe et al[23] found that for every one-year increment in age, participants were more likely to have heard of HPV. In addition, another study found that females aged ≥18 years old were more likely to have heard of HPV, compared to females aged ≤17 years old.[19]

To some extent, this is similar to our findings in which ≥20 year olds were more likely to have heard of the HPV vaccine compared to 19 year olds. Similar to our findings, Di Giuseppe et al[23] found that participants with personal, familiar, or friendly history of cervical cancer were significantly more likely to have heard of HPV vaccination.[23]

The major limitation of this study is that our findings may not be generalisable to all New Zealand young adults as this population was comprised of university students mostly undertaking health-related studies (95%). Therefore, we might expect them to be more informed on these issues, and for HPV-related knowledge to be lower in the general population. Participants in the study were mostly female (80.7%), which limited further exploration of gender-age interactions in HPV-related knowledge.

Despite these limitations, this study is to our knowledge the first in New Zealand to assess HPV knowledge, attitudes and beliefs in a young adult population or in any

other sample, as well as investigate age and gender differences of HPV-related knowledge. In addition, this study had a high response rate (97.6%), a reasonable sample size, and included both males and female participants. The response rate in this study is comparable to some studies addressing similar issues in young adult populations.[16,23]

In conclusion, the average level of basic knowledge of HPV and HPV vaccine most likely represent minimal awareness as more specific knowledge on sexual transmission of HPV is low. Findings of the present study suggest that more education on sexual transmission of HPV is needed as part of preventive strategies against HPV infection.

Since, the HPV vaccine is expensive and currently not available to all women in New Zealand at no cost,[13] vaccination should be complimented with public education on the link between sexual behaviour, HPV infection and cervical cancer. Moreover, this population indicated a need for additional information on HPV transmission, HPV prevention measures, age groups at risk of HPV infection, effectiveness of the HPV vaccine, vaccination costs for those not aged 12-18 years, and the effects of HPV on males.

Future research in New Zealand should address similar issues in parent and adolescent populations as they are the long-term targets of HPV vaccination with regard to uptake and decision-making.

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Customised molecular diagnosis of primary immune deficiency disorders in New Zealand: an efficient strategy for a small developed country

Rohan Ameratunga, See-Tarn Woon

Abstract

Introduction Primary Immune Deficiency disorders (PIDs) are uncommon conditions, which necessitate urgent diagnosis in order to prevent disabling complications such as bronchiectasis. Timely diagnosis can be life-saving in children with PIDs such as severe combined immune deficiency.

Methods A customised molecular diagnostic service was established in New Zealand in 2005. Most patients referred to the service have undergone genetic counselling before blood was drawn for testing. Genomic DNA was extracted and polymerase chain reaction (PCR) performed to amplify genes of interest, followed by DNA sequencing. The DNA sequences were then aligned with wild type sequence using computer software to identify possible mutations.

Results Mutational analysis was undertaken in 27 probands with suspected PID. Seven causative mutations were identified in these patients. Family studies have been undertaken after genetic counselling.

Conclusions Customised genetic testing is a cost-effective and efficient method for PID diagnosis in a small developed country.

There have been major advances in the understanding of primary immune deficiency disorders (PID) over the last two decades.[1,2] The genetic basis of many of these conditions has been identified. Most are inherited as single gene defects. Early identification of PIDs can reduce morbidity and mortality, as specific treatment is available for the majority of these conditions.

Early work in New Zealand[3] confirmed the value of molecular analysis of these disorders. The mutation responsible for a family with X-linked hyper-Immunoglobulin M (XHIM) syndrome was identified shortly after the molecular basis for the disorder was discovered.

As a result of this work, the diagnosis was confirmed in the proband and his sister was reassured she was not a carrier. Thus, molecular diagnostic testing can play a vital role in patient management.

In 2003 the Immune Deficiency Foundation of New Zealand (IDFNZ) funded a study to explore the feasibility of establishing a molecular diagnostic service in New Zealand to assist patients and families with PIDs. Following the report presented by the late Dr Karen Snow-Bailey, senior management at LabPlus in Auckland City Hospital made a decision to fund the service. A senior scientist was appointed in 2004 to lead the programme.

Over 120 genes have been implicated in the pathogenesis of PIDs. For most of these conditions, commercial tests are not available. The molecular immunology laboratory offers customised testing on a fee-for-service basis with rapid turnaround times. Turnaround time is usually 1 week for established tests. For customised tests, the turnaround time is approximately 2 to 3 weeks.

Quality assurance is a critical part of laboratory testing. Currently there are no external quality assurance programmes for the genetics of PIDs.[4] As part of the quality assurance programme, blinded samples with previously identified mutations were received from European and North American diagnostic laboratories. These were correctly identified. A sample initially sequenced in Perth for XLP was subsequently sequenced in Auckland and the results were confirmed[5] (see below).

The service has been accredited by IANZ, the laboratory-accrediting agency in New Zealand. The programme has also been discussed with NATA, the Australian laboratory accreditation agency (Andrew Griffin personal communication Sydney, 14.3.09). The service follows the guidelines for molecular diagnostic laboratories issued recently by the Centres for Disease Control.[4]

In this paper, we review the results of patients referred to the service from 2005 to 2008. The analysis of these patients illustrates the power and limitations of molecular diagnosis of PIDs. This programme is working well for New Zealand's small population (pop 4.2 million) and can serve as a model for other PID diagnostic services.

Methods

Mammalian genes are usually coded by exons with intervening introns. In our laboratory, genomic (DNA) sequencing is undertaken. All exons are sequenced with primers designed to anneal to introns, in order to identify potential splice site mutations. Splice site mutations can alter the sequence of mRNA leading to clinical disease as a result of absent or dysfunctional proteins.

Wild type gene sequences are downloaded from public databases such as Genbank™ and Ensembl. Primers flanking the exon regions are designed using Oligo version 6.44 (Molecular Biology Insights, Cascade, CO, USA).

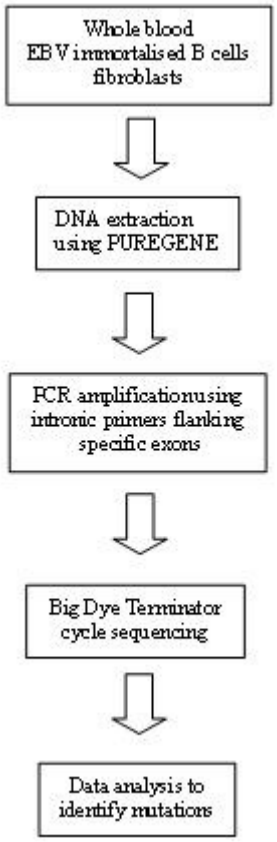
Genomic DNA from blood samples are extracted using PUREGENE DNA Purification Kit (Gentra Systems, Minneapolis, MN, USA). Genes of interest are amplified using polymerase chain reaction (PCR).

The amplicons then undergo BigDye® Terminator sequencing cycle sequencing and the products are subjected to electrophoresis in an Applied Biosystems (ABI PRISM®) 3100 Genetic Analyzer. The DNA sequence files are compared to wild type sequence using SeqMan v5.01 software (DNASTAR, Madison, WI, USA).

The laboratory creates immortalised Epstein-Barr virus (EBV) transformed B cell lines, which can be the source of DNA for genetic studies. Fibroblast cell lines are useful after bone marrow transplantation, as B cells may be of donor origin. These cell lines obviate the need for multiple blood tests. Creation and storage of the cell lines are undertaken with the consent of the patient or family in the case of children.

The laboratory also offers analysis of T cell receptor excision circles (TRECs), which is a marker of T cell production by the thymus.[6] This assay has a variety of uses including confirmation of a Severe Combined Immune Deficiency (SCID) phenotype, when the mutation is not obvious. It can also be used to follow T cell maturation following bone marrow transplantation.

Figure 1. Laboratory workflow of genetic testing



Results

The number of samples received by the laboratory is such that a rapid turnaround time can be achieved. If necessary, a repeat sample can be rapidly tested for confirmation. A list of patients referred to the service is outlined in Table 1.

Table 1. Genetic testing results of the patients referred to the molecular immunology diagnostic service

Proband / family number	Suspected diagnosis	Gene tested	Number of family members tested		Results	Comments
			male	female		
1†	XLP	SH2D1A	2	7	all males are normal; 2 females are carriers	One female carrier status is determined from lymphoma tissue block [5]
2		SH2D1A		1	normal	Family has extensive history of lymphoma; awaiting X-linked inhibitor of apoptosis (XIAP) gene analysis
3		SH2D1A	1		normal	
4		SH2D1A	1		normal	
5		SH2D1A	1		normal	

6		SH2D1A	1		normal	
7		SH2D1A/ XIAP	1		normal SH2D1A, base change in XIAP	XIAP: c.1268A>C, Q423P; 50% Africans have the SNP‡
8		SH2D1A/ XIAP		1	normal SH2D1A, base change in XIAP	XIAP: heterozygous c.1268A>C, p.Q423P; 5-8% Asians have the SNP
9	XLA	BTK	1		splice site point mutation in intron 8	first nucleotide G of intron 8 was substituted with an A (IVS8+1G>A)
10		BTK	1		splice site point mutation in intron 15	second to last nucleotide A of intron 15 was substituted with a C (IVS15-2A>C)
11		BTK	1		deletion of 4 nucleotides (TTTG) in exon 16	4 base pair deletion (g.66795_66798delTTTG, c.1581_1584delTTTG)
12		BTK	1		normal	
13		BTK	1		normal	
14	XHIM	CD40L	1	2	point mutation detected	proband: c.475G>A, p.W140X, leads to premature stop codon; mother is a carrier
15			1		normal	
16			1		normal	
17			1		normal	
18				1	normal	
19	AR-HIM	UNG/ AICDA		1	normal	
20	WAS	WASP	2	4	Point mutation detected	WASP: c.431G>A, p.E133K, known pathogenic mutation, mother, grandmother and grand aunt are carriers
21	X-SCID	IL2RG	1		normal	
22	SCID	RAG1/ RAG2/ Artemis	1	3	normal sequences of RAG1 and RAG 2; point mutation in Artemis	Single copy of c.728A>G, p.H243R; present in healthy older female sibling; inconclusive result
23		JAK3	2	1	2 point mutations detected in proband, both parents are carriers	Proband is a compound heterozygote (c.1351C>T, p.R451X; c.2148G>A, p.W716X)
24		JAK3		1	normal	
25		DNA ligase 4/ Cernunnos factor		1	normal	
26*	Type III HAE	Factor XII		5	normal	*DNA sent to Sonic Laboratories in Sydney (after discussion with patients)
27	ALPS	FAS	1		normal	

Abbreviations: ALPS: autoimmune lymphoproliferative syndrome, AR-HIM: autosomal recessive hyper immunoglobulin M syndrome, HAE: hereditary angioedema, SCID: severe combined immune deficiency, WAS: Wiskott-Aldrich syndrome, XLA: X-linked agammaglobulinemia, XHIM: X-linked hyper immunoglobulin M syndrome, XLP: X-linked lymphoproliferative syndrome, X-SCID: X-linked severe combined immune deficiency.

‡ Single nucleotide polymorphism (SNP) is a small genetic change, or variation, that can occur within the DNA sequence of an individual; * Currently DNA from patients with suspected type 3 HAE are sent to Sonic laboratories in Sydney, which offers a quick and cost effective service. Patients are made aware of the need to send samples overseas; † The original mutation analysis of the proband was undertaken in Perth, during the time the service was being established. The mutation was subsequently confirmed in New Zealand.

Discussion

Funding and the role of genetic services—Genetics services in New Zealand are centrally funded. Testing is thus free to New Zealand citizens and permanent residents. Diagnostic studies are undertaken after patients undergo genetic counselling. The benefits and limitations of testing are explained to patients.

The laboratory offers a fee-for-service testing programme. The referring clinical service is invoiced for the testing. The cost depends on the size of the gene. The recombination-activating gene 2 (RAG2) gene, implicated in some cases of SCID, attracts a higher fee due to its larger size in comparison with genes such as the CD40 ligand. Once the mutation is identified, only the abnormal exon is sequenced in other family members and therefore the cost is proportionately less. Government funding is available for testing family members.

The exact cost of testing also fluctuates based on the value of the NZ dollar, as reagents have to be imported. In general the cost is considerably less than overseas diagnostic laboratories based in Europe or the United States. Furthermore, many overseas diagnostic laboratories do not sequence the full gene. Mutations in less commonly affected areas of the gene may thus be missed.

The programme employs one full time molecular biologist (S.-T.W.) and a part time immunopathologist (R.A.). The use of shared molecular diagnostic resources at Lab Plus has minimised costs. Currently the service at Auckland City Hospital is financially self-sufficient with revenue covering costs. Samples have been received from around New Zealand and also Australia.

Advantages of genetic testing—The ability to identify a disorder at the genetic level in most cases eliminates any uncertainty about the underlying diagnosis. Genetic diagnosis may allow treatment decisions to be made with more confidence. The identification of a PID has profound implications for other family members. This is illustrated by family 1 with X-linked lymphoproliferative syndrome (XLP). Currently no males in the immediate family are at risk of disease.[5]

The two brothers (family 20) identified with Wiskott-Aldrich syndrome (WAS) have undergone bone marrow transplantation. The decision to undertake bone marrow transplantation in these children was based on the results of mutation analysis by the molecular immunology diagnostic service. In WAS, the phenotypic severity of the disorder can be predicted in many instances, based on the nature of the mutation.[7] These two patients were predicted to have severe disease based on their mutation (E133K).[8]

If the situation is urgent, such as a baby with a Severe Common Immunodeficiency (SCID) phenotype needing bone marrow transplantation, testing can be undertaken immediately to confirm the genotype. Confirmation of the diagnosis may assist with the decision to undertake bone marrow transplantation. The type of SCID may influence treatment decisions such as whether to offer conditioning prior to bone marrow transplantation.[9,10] A detailed analysis of advantages of PID genetic testing, based on our experience, will be the subject of a future review. (Ameratunga R, Woon S-T and Neas KN submitted)

Limitations of genetic testing—Despite the advantages of genetic testing, the limitations of the technology must be made clear to the patients. This underscores the importance of genetic counselling. The testing strategy described here has some disadvantages. Promoter mutations and complex DNA rearrangements for example, may not be identified by DNA sequencing of the coding region of a gene. Some mutated genes such the C1 inhibitor have a higher probability of complex mutations.[11] Identification may require Southern blotting and/or analysis of cDNA. These additional tests are available through the laboratory.

Mutation analysis can be problematic. The significance of an identified mutation may be uncertain (e.g. patient 7). A mutation may be non-pathogenic and therefore does not alter cellular function. Several mutations (e.g. patients 7 & 8) may represent single nucleotide polymorphisms (SNPs). Furthermore, some patients may be compound heterozygotes, where the second mutation has not been identified. This was seen in one of the SCID patients, who may have had Artemis deficiency (patient 22). The second mutation has not been identified.

Another baby with SCID was identified as having JAK3 deficiency as a result of compound heterozygosity. The second mutation was not obvious in the patient and required careful evaluation of both parents. Both babies had very low numbers of T Cell Receptor Excision Circles (TRECs), confirming the SCID phenotype. A protein or functional assay may be able to determine deleterious effects of the mutation but could not be performed as the two patients are deceased. Creating cell lines may allow functional assays, such as cell signalling and phosphorylation studies, with greater ease.

As illustrated by several patients in this series, a causative mutation may not be identified in spite of the patient having the classical phenotype. This is seen in several patients with suspected XLP (patients 3–6) and suspected XLA (patients 12 & 13). One possibility is genocopy, where mutations in unrelated genes can cause a similar phenotype. A good example of genocopy is a defect of BLNK, where the phenotype produced is very similar to X-linked agammaglobulinaemia. [12]

The results of testing are only meaningful if they are interpreted in the appropriate clinical context. The laboratory offers an extensive panel of tests for PIDs including flow cytometry, lymphocyte proliferation and vaccine antigen responses. Weekly meetings are held to discuss results and progress with clinical staff. The results of other tests including flow cytometry are also discussed at the same time.

Diagnostic tests in research laboratories—Some research laboratories offer free testing as part of their research programme. These laboratories are often run by leading authorities in the field with extensive clinical knowledge of these disorders. While the main advantage is free testing, potential disadvantages need to be carefully evaluated. The cost of the DNA extraction and sample transportation need to be considered. Some overseas research programmes require patients to travel to their institutions before being offered free testing. The cost of travel needs to be balanced with a free service.

Another concern is a long turnaround time. Samples may be batched in research laboratories until a sufficient number have been received. Sometimes results may not be available for months, which could impact on the ability to offer a family prenatal

diagnosis, where time is of the essence. Genetics services in many centres including Auckland require the results from research laboratories be confirmed in a diagnostic laboratory before being used for prenatal diagnosis.

Molecular studies are expensive and labour intensive. Because of cost constraints, testing may be performed by a junior staff member or a student in a research laboratory. Testing could be discontinued abruptly if a research grant is not renewed or the senior investigator moves to another institution. We also had the experience of free testing for a limited time after the discovery of a novel disease-causing gene. Free testing is not offered after some time, presumably because new mutations cannot be published in high-impact journals.

Research laboratories may not be obliged to participate in external quality assurance programmes, which can be an expensive process. Sample mix ups and PCR contamination can occur in any laboratory. Without close clinical communication, there may not be an easy way to identify an error in a remote laboratory. Repeating a test may also take a considerable amount of time, especially in a distant country.

Cultural issues need to be considered. *Tikanga* is the traditional system of beliefs, values and spirituality of Māori. For Māori there is concern about sending tissue and DNA samples abroad. For some Māori, there may be added concerns about long-term storage of DNA samples in overseas laboratories. Culturally appropriate disposal of tissue and DNA samples is important. The Auckland City Hospital follows *Tikanga*-recommended best practice policy. If safe to do so, there is the option of returning specimens to patients if requested. Samples are stored long term only with the consent of the patient.

If a mutation cannot be identified in a diagnostic laboratory, the condition being investigated may not have been previously described. In such cases, a candidate gene approach may need to be considered. Genes that are likely to be mutated, based on the known physiology of the suspected gene can be analysed with ethics approval and patient consent. Alternatively samples could be sent to a research laboratory once ethics and cultural issues have been addressed. In this specific situation, research laboratories can play a complementary role to diagnostic laboratories.

Conclusions

The model presented here is an efficient and cost-effective solution for a small developed country. It allows self-sufficiency in PID diagnosis. We have shown here that a dedicated PID programme allows rapid diagnosis, leading to early treatment and improved patient outcomes with reduced mortality and morbidity. A similar model may be feasible for other specialties in New Zealand, where genetic diagnosis plays a critical role. More importantly, close involvement of referring clinicians is likely to improve the quality of the results.

Competing interests: None declared.

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Outcome and prognostic factors on 57 cases of infective endocarditis in a single centre

Chi Wing Wong, Graeme Porter, Jonathan Tisch, Calum Young

Abstract

Aim We aim to evaluate the clinical characteristics and outcome of infective endocarditis in our hospital, and the prognostic significance of recurrent endocarditis.

Methods A single centre retrospective review of all cases of infective endocarditis (IE) was undertaken for a 5-year period from June 2002.

Results There were 57 episodes of IE in 47 patients. Seventy percent were definite IE using the modified Duke Criteria (2000). The most commonly isolated organisms were *Streptococci* (37%) and *Staphylococcus aureus* (35%). Forty-nine percent of patients remained event-free from death, recurrence, or operation at the end of follow-up period. Five cases (8.5%) had early recurrence of endocarditis within 60 days. Eleven patients (23%) died during follow-up (mean 14 months). There was no significant increase in mortality of patients with history of recurrent endocarditis (38% vs 28%; p=0.39). *Staphylococcus aureus* was associated with increased mortality or need for valve surgery (OR 4.5; 95%CI 1.38–14.8), risk of neurological events (OR 8.9; 1.5-52), renal failure (OR 7.2; 1.7-30) and thrombocytopenia (OR 5.6; 1.4-22).

Conclusions The mortality of IE remains high. Less than half of this cohort remained event-free. The micro-organism involved is more predictive of mortality or need for surgery than recurrent endocarditis.

Despite improvement in medical and surgical care, recent studies indicate that the morbidity and mortality of infective endocarditis (IE) remains high.[1–4] Recurrence of IE is common and has been reported in up to 10% patients.[3] Over the last few decades, the pattern of disease has changed. The overall frequency of *Staphylococcus aureus (S. aureus)* IE has increased dramatically. *S. aureus* is also associated with higher mortality.[5,6]

Previous endocarditis was identified as predisposing risk factor for IE.[3] Studies on recurrent endocarditis are relatively sparse. We evaluated the frequency of operation, complications, and risk factors for recurrent endocarditis.

Methods

We performed a systematic retrospective review of all endocarditis classified as definite or possible according to the Modified Duke criteria (2000) in Tauranga Hospital for the 5-year period from June 2002 to June 2007. We searched by ICD codes (133.0, 133.9, 101.1, 138, 139, and 109.1) to identify potential cases and then reviewed the hospital notes.

The search was complemented with the echocardiogram database and clinicians' recall of cases. Our hospital is a secondary referral centre serving a population over 250,000. Close to 15% of the population are aged 65 years and over. The clinical characteristics of all patients are listed in Table 1 including age, sex, predisposing factors, echocardiographic findings (previous valvular disease, valve

involved), culture results, laboratory data (including white cells count, platelets, ESR, CRP), indication for cardiac surgery if performed and antibiotic duration.

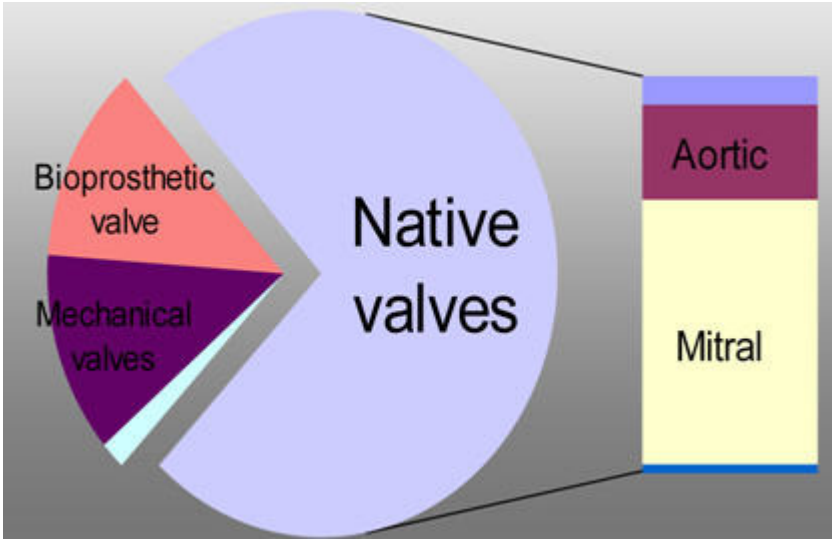
The outcomes measured were cardiac surgical interventions, recurrent endocarditis— early defined as within 60 days or late defined as >60 days, early complications—defined as within 30 days (NYHA III/IV heart failure, acute renal failure (defined as serum creatinine >200 mmol/L), neurological events, embolic events, complete heart block), late complications (30 days to 12 months) and mortality.

Statistical analyses was carried out with unpaired t-test on continuous data, including haematological parameters; and Chi-squared test on categorised data, including micro-organisms involved. Categorical risk factors were assessed using Fisher's exact test. The odds ratio and 95% confidence interval were also calculated for each factor.

Results

Fifty-seven episodes of bacterial endocarditis in 47 patients were treated in the 5-year period; 41 cases native valve IE, 15 bioprosthetic/mechanical valve IE, and 1 permanent pacemaker lead endocarditis (Figure 1).

Figure 1. Frequency of native valve vs prosthetic valve endocarditis

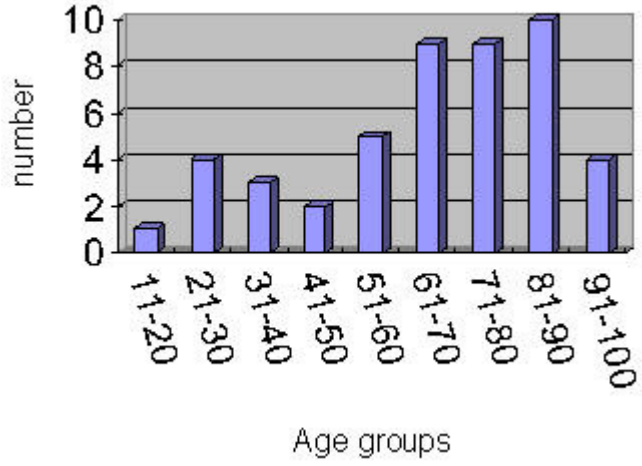


Forty-one episodes (72%) were definite and 16 episodes were possible endocarditis (Table 1). The mean age was 66 years and ranged from 16 to 93 years. The incidence showed a bimodal peak at age group 21–30 and 81–90 years (Figure 2). There were 36 males (77%) and 11 females.

Table 1. Demographic characteristics of patients

Characteristic	N=47
Age (years)	66 (16–93)
Male	36 (77%)
Definite IE	41 (72%)
Inpatient operation	7(15%)
Mortality	11(23%)
Underlying heart conditions	**N=57**
Prosthetic valve	16(28%)
Rheumatic heart disease	11(19%)
Mitral valve prolapse	8(14%)
Aortic stenosis	5(9%)
Congential cardiac disease	2(4%)
Past endocarditis	5(9%)
Structurally normal heart	10 (17%)

Figure 2. Age distribution



Overall, the mitral valve (58%) was most frequently involved. However, aortic valve involvement was more common in prosthetic valve endocarditis (Figure 3). Seventeen percent had a structurally normal heart (Figure 4). Two patients developed early endocarditis after cardiothoracic surgery. One happened 5 weeks after porcine mitral valve replacement and the other one within 8 weeks after permanent pacemaker insertion.

Mortality, surgery, and recurrence—Eleven patients (23%) died. Five deaths occurred early within the first 60 days. The early deaths were due to septic pulmonary embolus, septic cerebral infarct, heart failure, sudden death, and intracerebral haemorrhage. The late deaths were from acute valvular perforation, stroke, heart failure (three patients), and fractured neck of femur. One patient developed complete heart block 12 months after the episode of IE.

Figure 3. Distribution of valve involved in native valve endocarditis (Left) versus prosthetic valve endocarditis (Right)

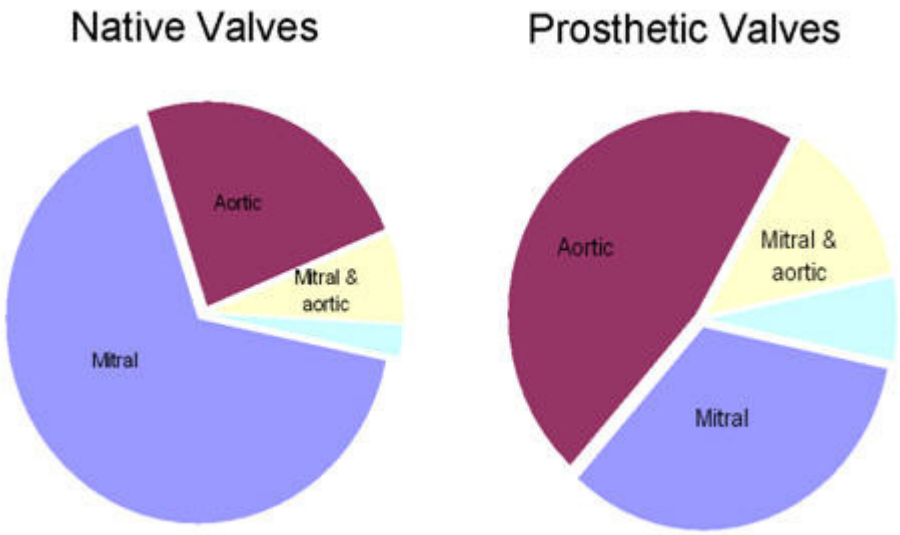
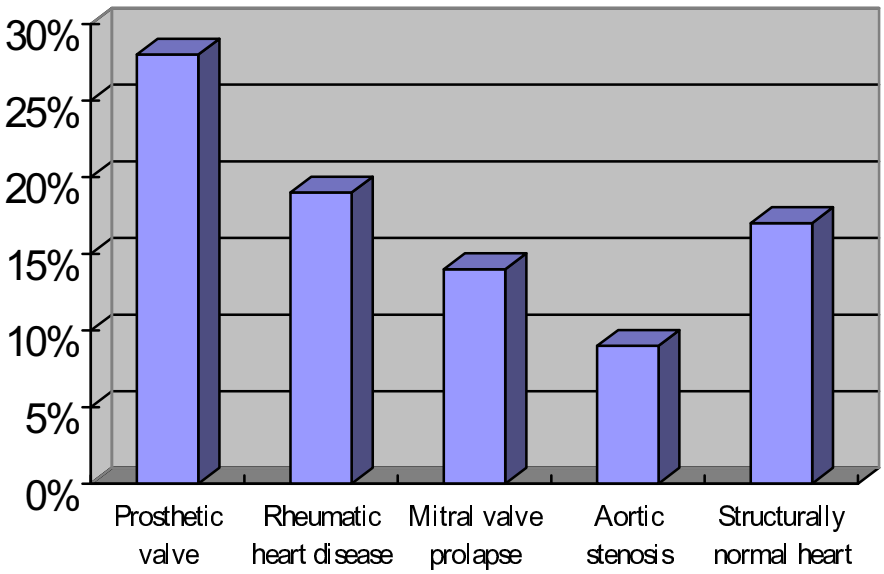


Figure 4. Underlying heart disease



Ten patients (21%) underwent cardiothoracic surgery during the mean follow-up of 14 months. Seven of the 10 patients had inpatient surgery within 60 days. The indication for early surgery was embolic event (two patients), heart failure (three patients), removal of infected pacing wire and aortic root abscess (one patient).

One patient had a complication of atrial lead displacement due to surgery that required repeated surgery for manipulation of pacemaker lead. The early surgery group appears to have a favourable outcome compared to the rest. There were non-significant trends towards lower mortality (one late mortality from fracture neck of femur was excluded from analysis); OR 0.23 (0.03–1.57).

Only one patient died in the surgery group. There was one IE recurrence. No cardiac or IE related death occurred within the study period. Three cases had elective surgery in a mean waiting period of 11 months. Creatinine, haemoglobin, platelet, white cell count, neutrophils, or ESR were not associated with higher mortality or ultimate operation.

Recurrence of IE was diagnosed in 8 (17%) patients within the study period. A second recurrence occurred in two patients. Time to IE recurrence ranged from 3 weeks to 41 months (mean 8.9 months). Four patients had remote history of IE outside the study period. Five patients (8.8%) had early recurrence of IE within 60 days. Two of the recurrence involved a prosthetic valve. Two of the patients with recurrent IE died. However those with more than one episode of IE had no increase in mortality comparing to those with only one (Table 2; 25% vs 23%; p=1.0). Three episodes of recurrent IE involved same organism. Four other episodes were culture-negative and 75% were early relapse within first 60 days.

Table 2. Risk factors of recurrent endocarditis; immunosuppressive status defined as those with underlying diabetes mellitus, haematological disorder, or being on immunosuppressants therapy

Parameters	Total	Recurrence	No Recurrence	p
Underlying heart conditions		N=8	N=39	
Prosthetic valve	13	1	12	0.41
Rheumatic heart disease	9	1	8	1.0
Mitral valve prolapse	8	1	7	1.0
Aortic stenosis	4	2	2	0.12
Immunosuppressive status	11	4	7	0.06
Mortality	11	2 (25%)	9(23%)	1.0

Causative microorganisms—Although *S. aureus* has become the most frequent isolated organism in some studies,[4,7,8] *Streptococcus* species remains the most frequent organism in this cohort; 38.6% vs 35% (Figure 5).

S. aureus is the infecting organism in 45% of the patients who died, and 56% of the patients who required surgery. Table 3 shows a comparison of mortality, operation rate across the main groups of microorganisms. *S. aureus* (including MRSA) was significantly associated with increased mortality or need for surgery.

Table 4 compares the number of major complication between patients with *S. aureus* endocarditis and endocarditis from other microorganism. *S. aureus* were associated with higher likelihood of neurological events, renal failure or thrombocytopenia comparing to other microorganisms.

We had three patients with native valve endocarditis from nutritionally variant streptococcus. There was one patient with recurrent abiotrophia endocarditis 5 years apart. No microorganism could be identified in 7 episodes (12%). Two microorganisms were identified concomitantly in 1 patient.

Figure 5. Distribution of microorganisms

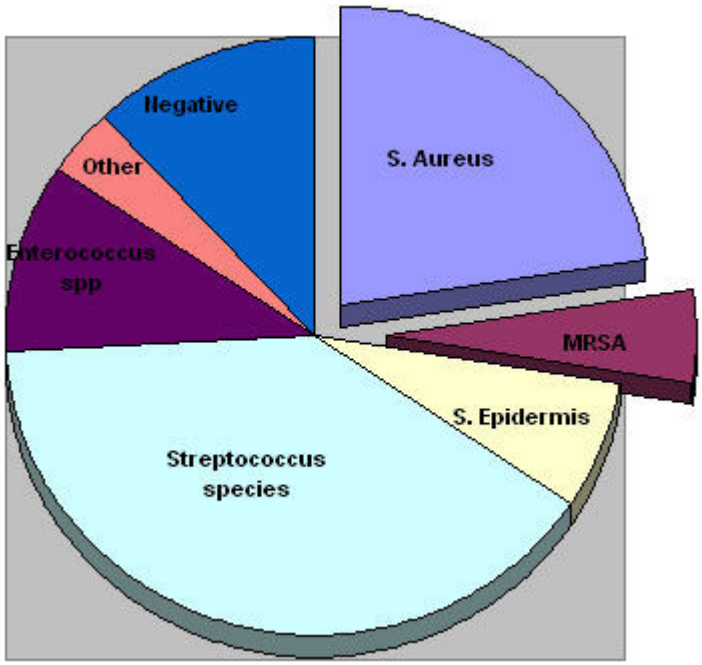


Table 3. Comparison of mortality, operation rate across main groups of microorganisms

Variables	Total (n)	Early death	Early Operation	p	Late mortality	Late Operation	Total (n)€	Survive/no surgery	Operated /dead	p
Age (mean)		62	60		80	72		66	64	0.83
S. aureus	16	3	3	0.26	2	2	12	3	9	0.02
CNS	4	0	1	1	0	0	4	2	1	1
Streptococcus	23	2	2	1	1	1	21	14	6	0.37
Enterococcus	6	0	1	1	2	0	5	3	2	1
Culture negative	7	0	0	1	1	0	3	3	0	0.25
Other	2	0	0	1	0	0	2	2	0	0.50
Total	58*	5	7		6	3	47	27	20	

CNS, Coagulase-negative staphylococcus; * Two microorganisms were identified concomitantly in 1 episode; € Microorganisms involved on Index admission.

Table 4. Complications among those Staphylococcus aureus endocarditis comparing with other organisms

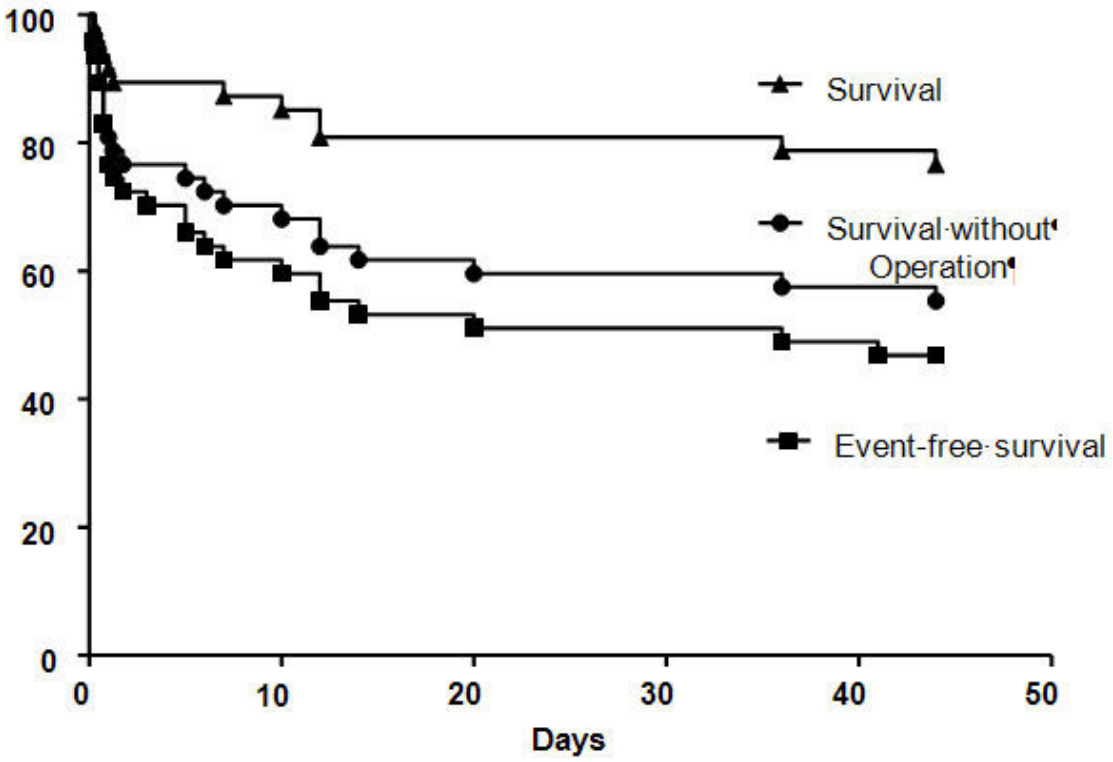
Variables	*S. aureus* n =16	Others n=41	Odd ratio (CI)	P value
Neurological events	5	2	8.9 (1.5–52)	0.02
Renal failure (creatinine >200)	7	4	7.2 (1.7–30)	0.01
Other systemic emboli	4	3	5.0 (0.9–29)	0.09
NYHA III/IV heart failure	4	8	1.4 (0.3–5.6)	0.72
Thrombcytopenia (platelet < 150)	7	5	5.6 (1.4–22)	0.03

Discussion

The mortality of infective endocarditis in our cohort was high, consistent with results published in the numerous other studies.[3,6,9] Less than half of the patients in our cohort remained event free from recurrence, cardiac operation, or death (Figure 6).

Increased *S. aureus* IE has been implicated as an important factor of persistent high mortality. In this study, the patients with *S. aureus* endocarditis were significantly more likely to need surgical intervention and carried higher morbidity including neurological events, renal failure and thrombocytopenia.

Figure 6. Kaplan-Meier curve for survival, survival freedom from operation and event-free survival (survival free from operation or recurrence) of the cohort



There was marked geographic variation in microorganisms involved and the underlying cardiac conditions amongst studies.[10,12,13] Our cohort showed more underlying rheumatic heart disease (19% vs 1.6%) and less structurally normal hearts (17% vs 40%) compared with a similar study in Dunedin.[7] In contrast, the rate of underlying rheumatic heart disease was as high as 45% in South Auckland Study.[14] The different rate of rheumatic heart disease is likely attributed to the proportion of Māori and Polynesian population in the different regions.[11]

New Zealand has one of highest rate of rheumatic heart disease in the developed world. As a consequence, the mitral valve was the commonest valve involved in our cohort contrary to aortic valve in the Dunedin cohort.

The optimal timing of surgical intervention is controversial. Early surgery has been associated with lower mortality in some studies although that was not supported by most other studies.[4,12,15–17] Our study showed a non-significant trends towards lower mortality with an odd ratio of 0.23 supporting early surgical intervention. Our cohort has a lower surgical mortality rate compared with two other published New Zealand cohorts.[7,18] Only one operated patient died during the 5 year period. We acknowledge that treatment selection bias limits comparability between different cohorts.

Sy et al recently found thrombocytopenia as a novel marker of increased mortality with infective endocarditis.[6] Although our results failed to demonstrate this association, we did find a strong association between *S. aureus* and thrombocytopenia. *Staphylococcus* induced procoagulant changes in monocytes might explain the pathogenesis of thrombocytopenia.

We did not find a significant association between mortality or need for surgery with recurrence of endocarditis. Our results suggest the microorganisms involved were the most important prognostic factor rather than an episode of recurrent endocarditis. Our study does have several limitations. The sample sizes were small and the cases of recurrent endocarditis was even smaller. In addition, the data are retrospective from a single centre. A larger register might help to develop a better prognostic estimation system.

Competing interests: None known.

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Utilisation of inpatient cardiology services including by Māori: a study of hospital discharges for patients enrolled with Partnership Health practices for the 2 years ending June 2007

Laurence Malcolm, Ross Barnett

Abstract

Aims Some previous studies have shown that Māori utilise cardiology inpatient services at a much lower rate than would be expected by their health status and mortality. Using more recent data, this study seeks to determine whether this is still the case by examining Māori rates of utilisation of cardiology inpatient services.

Methods Practice enrolment data for 354,383 patients, including age, gender, ethnicity (19712 Māori), deprivation score (patient domicile) and other variables were sent by the Partnership Health Primary Health Organisation (PHO) to NZHIS. Discharge data for 127,426 patients for the 2 years ending June 2007 were attached to the enrolment data. These were analysed for rates of utilisation including cardiology in patient services by diagnosis related groups (DRGs). Māori rates were standardised to the age mix of the total population.

Results Standardised Māori rates of utilisation for almost all major cardiology diagnosis related groups (DRG) categories were substantially higher than the non-Māori population. Overall rates for cardiology DRGs were 1.47 times higher for Māori. Standardised Māori rates were higher than the non-Māori population for higher deprivation scores. Māori cardiology inpatients had almost twice the level of Care Plus levels than the non-Māori population.

Conclusion The findings indicate that Māori have much better access to cardiology inpatient services than shown in some previous studies. They therefore appear to be benefiting from such services. However the higher rate of hospital utilisation suggests that improved data rather than increased access is the explanation, It raises questions as to whether the additional Care Plus funding being received is having the desired outcomes. Further perhaps targeted action is needed at the primary care level to improve both access to and utilisation of such services.

Cardiovascular disease is the most important cause of mortality in New Zealand.[1,2,3] It contributes in a major way to the utilisation and the cost of hospital services. Cardiovascular disease is an especially important cause of mortality for Māori. However previous estimates of hospital use of cardiology services by Māori have indicated that such services are underutilised when their need for services is considered.[3,4] It was not clear from such studies as to whether this was real or due to defective classification of ethnicity.

The Health and Independence Report 2007[1] indicated that although comparative rates of cardiac artery bypass surgery (CABG)s and angioplasty for Māori had increased

they were still well below what might be expected from the much higher mortality rates suffered by Māori for coronary artery disease. It is not clear whether the reported increase in rates is due to improved recording of ethnicity or a real increase. The Canterbury Heart Health Strategy[4] reported much lower rates for Māori than expected but the data were from 1995 to 1999 and are drawn from Christchurch Hospital data. Not only are these figures seriously out of date but they appear to be based on gross underreporting of ethnicity.

Low rates of cardiac surgery have also been evident in the United Kingdom where Asian population groups had significantly fewer angiograms and angioplasties than might be expected according to need[6] while a further study, although not specifically investigating ethnic variations, reported that the lowest rates of CABG interventions occurred in areas with the highest need.[7]

In the light of such concerns, this study examines Māori and non-Māori rates of utilisation of cardiology inpatient services by linking PHO practice records with New Zealand Health Information Service (NZHIS) hospital data. This study of cardiology services has been undertaken by linking the enrolled population of Partnership Health with hospital discharge data obtained from NZHIS using NHIs for linkage between the two data sets. Hence it avoids discrepancies related to different classifications of ethnicity as the numerator classification is identical to that of the denominator. It is part of a larger study on the completeness and accuracy of the Partnership Health enrolled population data including ethnicity[8,9]

Ethnicity data collected by PHOs is self reported. The latter study included an analysis of discharge data for the 2 years ending June 2007.

Methods

Partnership Health—Partnership Health is the largest PHO in New Zealand.[10] The enrolment figures as at December 2007 were 354,383 with 20,937 Māori and 7513 Pacific People. This is approximately 75% of the Canterbury district population.

Partnership Health is comprised of 102 general practices which are Christchurch and Selwyn based. It has a broadly based governance structure with strong representation from community groups including Māori and Pacific people. Partnership Health places a strong emphasis upon health promotion and is actively working to expand its Care Plus programme to improve access for high-need patients.

The Partnership Health information system is based upon the well developed system developed by the Pegasus Health IPA over the last 12 years. Pegasus Health is contracted to by Partnership Health for the management of its enrolment data. Ethnicity recording is based on the Ministry of Health coding system level 2 [11]. The Pegasus Health data base is one of the few situations in the country where access to and utilisation of primary care services for Māori and disadvantaged patients can be reliably documented.

The methods used in the study have been reported in detail elsewhere.[6,7] Patient enrolment data for Partnership Health practices was sent to NZHIS. Data, linked to the patient NHI relating to hospital discharges, were attached to the practice enrolment data for the 2 years ending June 2007 and returned to the researchers with the NHIs encrypted. Discharges totalled 127,246. The data were analyzed for rates of hospital discharges related to a range of variables including age, gender, ethnicity, deprivation using the NZ Dep 2001score an index of deprivation based on the mesh block scores for nine variables of disadvantage[9]) high use health cards (HUHC) and Care Plus, special funding to improve access.

For this study the discharge DRGs related to cardiology services were identified and an analysis undertaken of the use of such services relating particularly to age, ethnicity and deprivation. Rates of utilisation of cardiology services per 1000 population were calculated for the Māori and non-Māori population. Given that Māori are, in general, a younger population a standardised rate of utilisation for Māori relating to age was calculated by comparison with the age distribution of the total population.

Confidence intervals were calculated for male, female, European, totals and for DRGs between Māori and totals.

Findings—Table 1 summarises practice enrolment data in Partnership Health practices. Ethnicity recording was relatively complete at 92.8% but varied widely between practices. Māori enrolment was 5.9%. HUHC and Care Plus enrolments again varied widely between practices. The percentage of Māori in the hospital records was 6.1% compared with 7.0% in the PH records relating to discharged patients. In other words the hospital records appeared to be identifying less Māori than were PH practices. At practice level there appeared to be no relationship between measures of disadvantage such as deprivation and ethnicity and access to additional funding such as HUHC and Care Plus.

Table 1. Summary of data on Partnership Health practices and enrolment.

Variables	Total	Practice mean	Range
Enrollment	345,247	3352	104–11,989
Ethnicity recording—total not stated	25,336	92.8%	0.5–99.2 %
NZ Dep mean	–	4.7	2.1–8.6
Māori enrollment	19,712	5.9%	0.0–37.3%
HUHC	10,448	3.0%	0.0–20.2%
Care Plus	7496	2.2%	0.0–24.0%

HUHC=High use health card.

Table 2. Numbers and annual rates/1000 discharges for non-Māori and Māori patients, both crude and standardised, enrolled with Partnership Health practices for cardiology DRGs for the 2 years ending June 2007

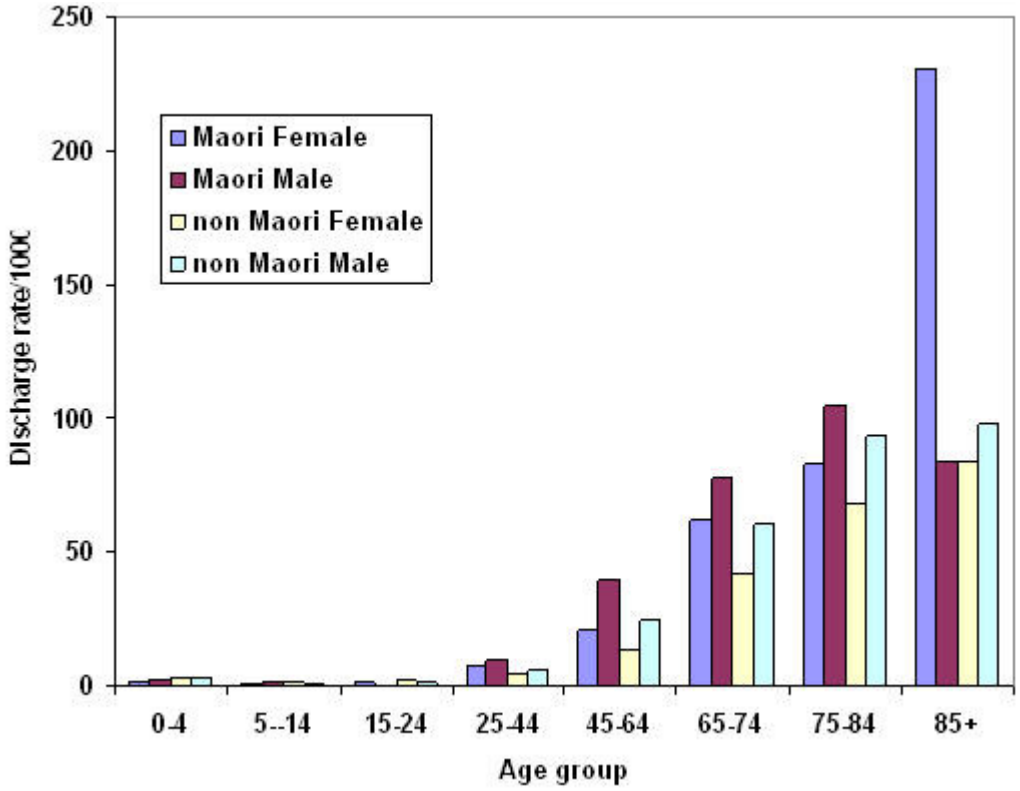
Cardiology condition	DRG	Numbers over 2 years		Annualised rate and 95% confidence limits			
		Non-Māori	Māori	Non-Māori	Māori crude	Māori standardised	Ratio standardised to non-Māori
Chest pain and circulatory disorders	F74Z F42A/B	3326	158	5.1±0.16	4.0	8.94 ± 0.62	1.75 *
Myocardial infarction	F41A/B F60A/B/C	882	29	1.32 ±0.08	0.74	1.64 ±0.27	1.24
Arrhythmias	F70/B F71A/B	1181	38	1.81 ±0.1	0.96	2.15 ±0.31	1.19
Percutaneous CI	F10,15,16,19Z	950	44	1.46 ±0.09	1.12	2.49 ±0.33	1.71 *
Heart failure	F62A/B	628	31	0.96 ± 0.07	0.79	1.75 ±0.28	1.82 *
Coronary bypass	F05A/B F06A/B	214	14	0.33 ±0.04	0.36	0.79 ±0.19	2.41 *
Pacemaker	F12Z 17Z	209	3	0.31 ±0.04	0.08	0.18 ±0.09	0.53
Cardiac valve procedure	F04A/B	73	5	0.11 ± 0.02	0.13	0.28 ±0.11	2.55 *
Other	–	3391	103				
Total		**10,854**	**424**	**16.33 ± 0.29**	**10.8**	**24.0 ± 0.02**	**1.47 ***

* p<05

Table 2 presents the findings of the analysis of the numbers and annual rates/1000 for non-Māori and Māori patients enrolled with Partnership Health practices for cardiology DRGs for the 2 years ending June 2007. Age standardised Māori rates related to the non-Māori enrolled population by age showed that Māori had overall 1.47 times the discharge rate. The standardised rate for Māori for all conditions is higher, in some cases markedly so, than the non-Māori population. Only with respect to pacemakers is the ratio of Māori standardised to non-Māori significantly less than 1.

Figure 1 shows the annual discharge rates/1000 total population and for Māori by age group for cardiology DRGs for patients enrolled with Partnership Health for the 2 years ending June 2007. At all age groups and total Māori have a higher rate of discharge for cardiology conditions than non-Māori. The difference for the population over 85 years is especially marked but this is probably an artifact due to the small numbers of Māori discharges in this age group.

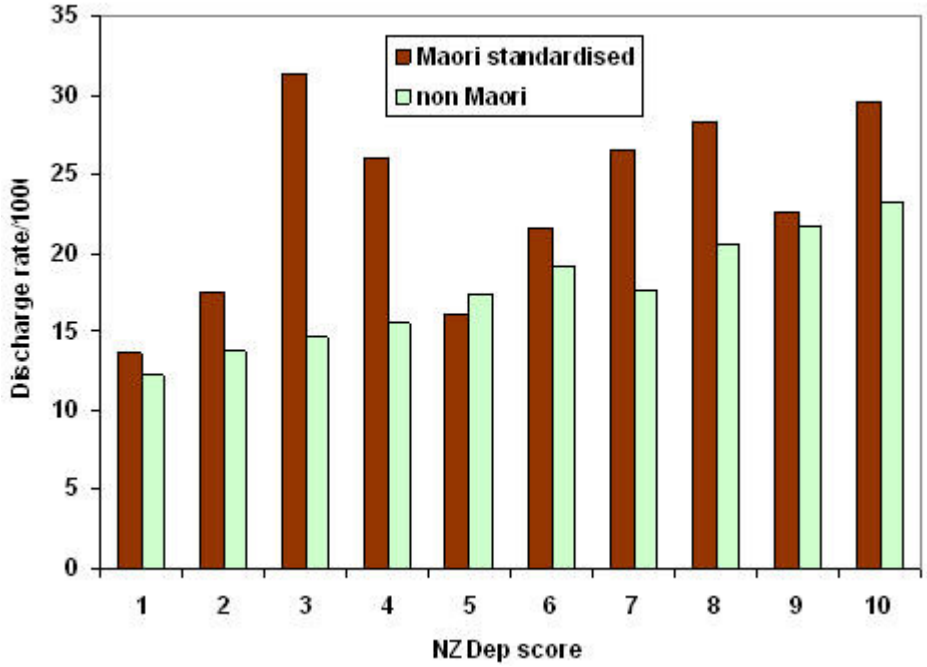
Figure 1 Annual discharge rates/1000 by age group for cardiology DRGs for the population enrolled with Partnership Health for the non-Māori and Māori population by age and gender group for the 2 years ending June 2007



Note: All differences statistically significant at p<0.001 except for age group 85+.

Figure 2 shows the annual discharge rates/1000 for cardiology DRGs for the population enrolled with Partnership Health by NZ Dep categories both Māori and non-Māori. Māori rates have been standardised to the total population. There is an increase in discharge rates with increasing deprivation for both groups, All differences beyond the fifth deprivation decile are statistically significant at $p<0.05$ In other words Māori appears to be a factor in utilisation independent of deprivation at least for higher scores.

Figure 2 Standardised annual discharge rates/1000 for cardiology DRGs for the population enrolled with Partnership Health for the non-Māori and Māori population by NZ Dep scores



Note: All differences statistically significant at $p<0.05$ except NZ Dep scores 1–5

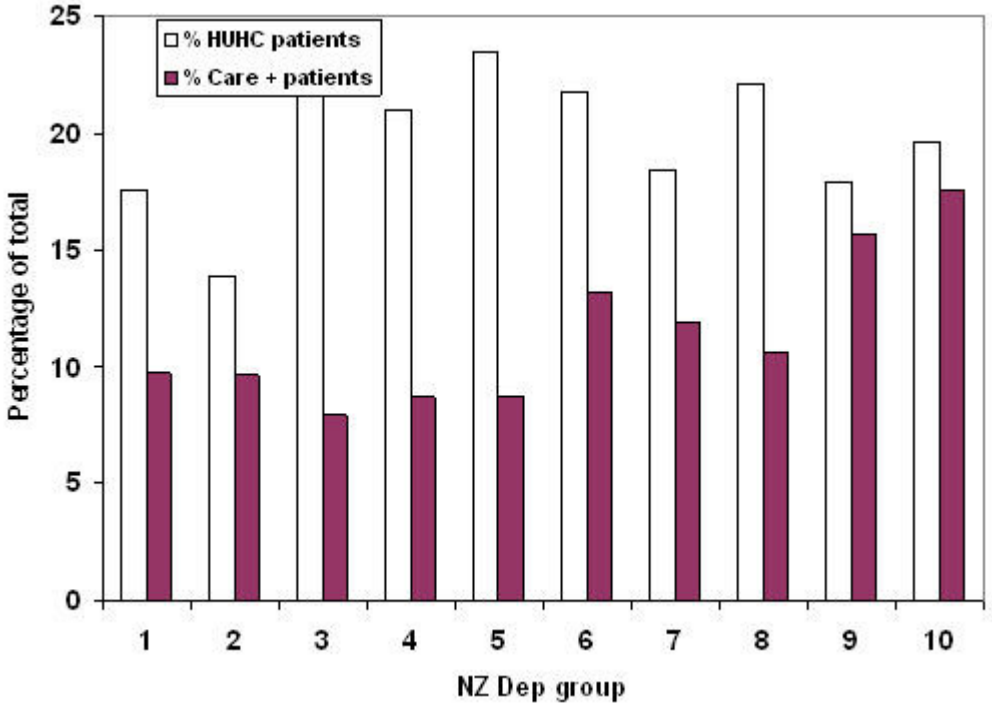
Figure 3 shows the percentage of Care Plus and HUHC patients, by deprivation decile, discharged with cardiology DRGs. The percentages of these patients, especially HUHCs with cardiology DRGs, is very high. The percentage for HUHCs for general patients is 12.0% and for Care Plus patients 6.3%. In other words, cardiology patients are given special funding recognition for need for GP services compared with the 3.0 and 2.2% for general patients (Table 1).

With regard to NZ Dep groups there is no correlation between HUHCs and deprivation. However there is a high correlation between Care Plus percentages and NZ Dep scores (0.80). Hence there is a clear recognition for these patients of special needs related to deprivation.

Table 3 compares the percentages of DRG cardiology patients with HUHCs and Care Plus for both Māori and non-Māori. The special needs of Māori appear to be

particularly well catered for with Care Plus and is consistent with the high level of Māori utilisation of cardiology services presented above.

Figure 3 Percentage of HUHCs and Care Plus patients discharged with cardiology DRGs for the population enrolled with Partnership Health by NZ Dep scores



Note: All differences between HUHC and Care Plus are statistically significant at $p<0.05$with the exception of NZ Dep scores 9 and 10

Table 3. Comparison of percentages of non-Māori and Māori cardiology DRG patients with HUHCs and Care Plus

Ethnicity	HUHCs	Care Plus
Non-Māori	19.9	10.5
Māori	17.7	18.4

Note: The differences between HUHC and Care Plus for non-Māori and between Care Plus for Māori and non-Māori are statistically significant at $p<0.05$.

Discussion

Quality of the data—The quality of the data used in this study has been discussed in related papers.[8,9] Of particular relevance and importance is that the same ethnicity classification from the denominator data is applied to the numerator hospital data. This study is therefore almost unique. These reports also showed that the PHO recording of ethnicity was more complete for the discharged patients than the hospital

recording, 7.0% v 6.1%. ($p<0.001$) Calculations of rates of hospital discharges in other studies have used census rather than practice data for the denominator. There is emerging evidence that PHO data may be more accurate than census estimates for the classification of ethnicity.[12] These are reasons why these findings for the higher utilisation of cardiology services by Māori are different from previous reports. There are three key findings in this research. First, the results indicate that Māori have much higher rates of utilisation of cardiology inpatient services than for non-Māori especially when the rates are age standardised. Second, the utilisation of cardiology services increases with deprivation both for the Māori and non-Māori population, with Māori having much higher rates of utilisation at higher levels of deprivation. Third, identified disadvantaged patients, classified as HUHCs and Care Plus, have much higher rates of utilisation and for Māori this is especially true for Care Plus. In other words patients with disadvantage, whether this be related to ethnicity, deprivation score or practice factors, overall have much higher rates of cardiology inpatient services utilisation.

The findings presented above show a different picture from that of some previous reports and studies. Recent national figures from the Health and Independence Report 2007[1] show standardised rates for coronary artery bypass grafts for Māori have increased and for 2007 just exceed the rates for other populations. Similarly standardised discharge rates for angioplasty for Māori and other populations have steadily increased but Māori rates are still lower than for other populations.

Given that particular efforts have been made in recent years by DHBs to improve ethnicity recording the increasing rates for Māori may be due to an improvement in this recording but these rates may still be below the true figures. Standardised rates for Pacific populations for CABGs, but not angioplasties, have been higher than both Māori and Other for some years which may be due to better identification of Pacific peoples in hospital recording.[1]Some increase may be due to the recent focus on the issue of inequalities in access. This study has shown that the general practice recording of Māori is better than hospital recording and could be further improved by targeting practices with less complete recording. Furthermore PHO data may be more accurate and up-to-date than census estimates for calculation of rates and funding.

Hauora: Māori Standards of Health IV reported on hospitalisations for Māori for the years 2000-2005.[3] The study found that the overall standardised rate of Māori hospitalisations for circulatory diagnoses was 1.74 times the rate for non-Māori although this figure also included cerebrovascular and other conditions. However, recognising that hospital ethnicity recording was incomplete their study increased the numbers for Māori by up to 15% based on mortality and tenancy data. Their rate for heart failure was 4.7 times non-Māori much higher than the 1.83 of this study. In so far as comparison can be made their general rate ratios are similar to those of this study. However we are not able to comment on the adequacy of the rate of interventions for CABG.

The figures reported in this study are much more in line with the expected figures based on standardised mortality rates.[1] For Māori these are more than double those of the total population and are therefore in agreement with the morbidity ratio figures from this study.

An extensive study was undertaken by Chan et al on ethnic and socioeconomic disparities in the prevalence of cardiovascular disease in New Zealand[13]. They used hospital and some pharmaceutical data to identify the numerator population and linked this with the NHI to the national population data base. The study was inclusive of all cerebrovascular conditions. Their overall findings were similar to those of this study with a standardised Māori to non-Māori ratio of 1.67 times overall morbidity with similar findings in age, gender and deprivation. However as this study has shown there are questions about the completeness of the hospital collection of ethnicity which contributes to the national database.

Implications—The findings of this study have both positive as well as negative implications. From a positive perspective they indicate that Māori are accessing cardiology inpatient services to a much higher extent than previously thought and are probably therefore receiving the significant benefits offered by cardiology inpatient services, including angioplasty and CABG.

However from a negative perspective the high rate of utilisation suggests the need for better access to appropriate primary health care services, including preventive services.. It is clear from the findings that Māori appear to be receiving access to Care Plus services. However as shown in Table 1 access to both HUHC and Care Plus varies widely between practices. This is an issue which needs to be addressed by Partnership Health through Pegasus Health.

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Why New Zealand must rapidly halve its greenhouse gas emissions

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Abstract

New Zealand must commit to substantial decreases in its greenhouse gas emissions, to avoid the worst impacts of climate change on human health, both here and internationally.

We have the fourth highest per capita greenhouse gas emissions in the developed world. Based on the need to limit warming to 2°C by 2100, our cumulative emissions, and our capability to mitigate, New Zealand should at least halve its greenhouse gas emissions by 2020 (i.e. a target of at least 40% less than 1990 levels). This target has a strong scientific basis, and if anything may be too lenient; reducing the risk of catastrophic climate change may require deeper cuts.

Short-term economic costs of mitigation have been widely overstated in public debate. They must also be balanced by the far greater costs caused by inertia and the substantial health and social benefits that can be achieved by a low emissions society.

Large emissions reductions are achievable if we mobilise New Zealand society and let technology follow the signal of a responsible target.

The New Zealand Government has announced a 2020 greenhouse gas emission target of 10–20% below 1990 levels,[1] leading into international climate change negotiations culminating in Copenhagen on 7-18 December.[2,3] This target range has strict conditions attached and, unlike many developed nations, New Zealand has not offered an alternative emissions target if these conditions are not met.[4,5]

We consider New Zealand needs to do much more to adequately respond to the climate change threat. We summarise why health professionals should care about this problem, and why it is our duty (to our patients and the wider public health) to act now, before it is too late.

Why health professionals?

Climate change has been described as the biggest global health threat of the 21st Century.[6,7] Doctors have a professional duty to work to tackle it,[8,9] and health benefits should be fully included in decision-making,[10-12] as should the harms of inaction.

A recent high profile[13,14] review in *The Lancet*[6] noted major threats—both direct and indirect—to global health from climate change. These effects occur through water and food insecurity, threats to shelter and human settlements, population displacement and migration, extreme climatic events, changing patterns of disease,[6,15,16] risks to security (e.g. war), and loss of economic potential.

Direct threats to health are powerful motivators for action—often more powerful than discussions about distant threats to rainfall, ocean currents, and fish stocks. Hence those who manage health effects, such as health professionals, are in a strong position to advocate responses to this global threat, for three reasons.

First of all, health professionals are citizens. Secondly, they are privileged by their education, access to power, and a professionally compassionate role in society. Thirdly, they have the ability to assimilate complex evidence and a role in advocacy for health, making them potential leaders.

Sir Muir Gray in The Times has compared climate change to cholera in 19th Century England as needing an all-encompassing response, saying the medical profession must be in the vanguard of this new revolution in public health for "the health threat that will come to define our age."[14] We have ethical obligations and professional duties to use our best efforts to mitigate climate change in whatever way we can.[17–20]

Impact and equity: by how much should we reduce?

The latest Intergovernmental Panel on Climate Change (IPCC) assessment from 2007[21] reports that a reduction of at least 25–40% of 1990 greenhouse gas emissions levels by 2020 (leading to 80–95% by 2050)[22] is required by the developed world to be confident that the world will avoid 2°C warming. This level of warming was proposed by the IPCC as the climate change 'guard rail'; beyond 2°C the risks of tipping points with dangerous (and potentially unstoppable) climate change increase steeply.[21,23,24]

According to Sir Peter Gluckman, the Prime Minister's Chief Science Advisor,[26] we risk the consequences of a changing global climate becoming another 'tragedy of the commons'[25]—where if collective action is not taken then everyone will suffer.[26] The German Advisory Council on Climate Change (WBGU) has commented that relaxing the trajectory of one country results in other countries picking up the bill, as "there is no carbon offset for Planet Earth as such" (see endnote *).[16]

New Zealand has the fourth highest per capita greenhouse gas emissions in the developed world[27] and one of the biggest increases in gross emissions since 1990 (see endnote †).[28] Calls for a 40% reduction target on 1990 levels by 2020[29] for New Zealand, as with the developed world overall, have been based on climate science (the upper end of the 2007 IPCC 25–40% range for developed countries)[22,24,33] and equity.[30]

Approaches to determining countries' individual emissions targets are described internationally,[16,31–37] often based on defined global emissions budgets (the global amount of tolerable emissions over a period of time) after which the available emission rights can be divided among countries according to different rules (see endnote ‡).[16,32,37]

The 40% reduction target for New Zealand is based on the Responsibility and Capability Index (RCI) approach, instigated in Europe,[32] and which has been adapted by Oxfam International.[34] This explicit, principle-based framework is one of many that incorporates both science and fairness—how much countries have emitted already, and what they can afford; the RCI combines (1) the emission reductions needed globally to limit warming to 2°C with (2) countries' responsibilities (i.e. their cumulative emissions) and (3) their capability to mitigate (using wealth as a proxy for the capability for action) (see following table and later endnotes §, **, and ††).

In Table 1, New Zealand's RCI is 0.34% of UNFCCC Annex I (§) countries' overall target, and is ranked fourth for total greenhouse gas emissions per capita, requiring in fairness a 40.6% reduction by 2020 on 1990 levels (with 40.0% for Annex I countries overall).

Table 1. Mitigation targets—Oxfam International calculations (2009):[34] Fair shares of overall Annex I(§) mitigation target (40% below 1990 levels by 2020)

	1	2		3		4		5	
	RCI (fair share of Annex I target)	Emissions per capita (2005)		2020 mitigation targets, expressed as: Reduction per capita, relative to 2005 levels		Reduction below 1990 level (CO_2e excl. LUC)		Reduction below 2005 level (CO_2e excl. LUC)	
	%	tCO2e	Rank	tCO2e	Rank	%	Rank	%	Rank
Australia	2.29	25.9	1	13.4	1	39.7	9	51.6	8
Belarus	0.34	7.7	13	-2.7	15	19.7	16	-35.4	16
Bulgaria	0.31	9.0	10	-3.0	16	19.8	15	-33.6	15
Canada	3.51	23.4	3	12.8	3	43.0	7	54.7	4
Croatia	0.15	6.9	16	2.3	11	35.9	10	33.6	11
EU *	33.93	10.6	9	4.2	10	44.4	6	39.6	10
Iceland	0.03	14.2	6	7.6	6	48.9	4	53.8	5
Japan	9.71	10.6	8	6.3	7	56.2	3	59.0	3
Liechtenstein	0.00	8.6	12	4.4	9	27.1	11	51.4	9
Monaco	0.00	3.1	17	0.7	12	21.2	13	21.2	12
New Zealand	0.34	18.7	4	9.8	4	40.6		52.3	7
Norway	0.48	11.7	7	8.6	5	71.4	2	73.7	2
Romania	0.72	7.1	15	-1.9	14	21.4	12	-27.1	14
Russian Federation	8.21	14.9	5	-1.8	13	20.2	14	-12.0	13
Switzerland	0.59	7.2	14	6.0	8	82.3	1	82.6	1
Ukraine	1.67	8.8	11	-8.3	17	13.3	17	-94.3	17
USA	37.80	24.5	2	12.8	2	44.6	5	52.4	6
Total: Annex 1	100.00	14.2		5.46		40.0		38.4	

Metrics: fair share of emissions reductions for each Annex I country (endnote §), calculated using both countries' partial history of past emissions (cumulative emissions for 1990–200538 for responsibility, see endnote **), and their current levels of income (total income above a 'development threshold' for capability, endnote ††).

Key: *Column 1* shows fair shares of any aggregate Annex I mitigation target for individual Annex I countries, based on a responsibility-capability index (RCI);
New Zealand's RCI is 0.34% (its fair share of the Annex I target).
Column 2 is per capita emissions in greenhouse gases (GHG) in 2005;

New Zealanders emitted on average 18.7 tonnes CO2-equivalent GHGs for each person that year, ranking it fourth highest.
Column 3 is 2020 emissions-reductions targets for individual Annex I countries (based on respective fair shares of the total combined minimum reductions target of 40% below 1990 levels for Annex I as a whole), presented in terms of per capita reductions relative to 2005 levels;
New Zealand's target is a 9.8 tonne CO2-equivalent reduction for each person by 2020 compared with 2005.
Column 4 is total reductions relative to each country's 1990 emissions;
New Zealand's target is a 40.6% reduction in CO2-equivalents for each person by 2020 compared with 1990. This ranks eighth out of the 17 countries listed in terms of percentage emission reductions necessary.
Column 5 is total reductions relative to each country's 2005 emissions;
New Zealand's reduction by 2020 therefore translates to 52.3% compared with 2005 (ranked seventh).
LUC is Land Use Change.

Source: Table 4 of Oxfam International 2009[34] http://www.oxfam.org/en/policy/fair-climate-deal-copenhagen pages 10-11,28,30-31. Reproduced with permission of Oxfam New Zealand.

In terms of gross emissions, a 40% reduction below 1990 levels for New Zealand means halving our current emissions (51%) (see endnote †). Our previous inaction[39] (since 1990) has led to this scale of emissions and the need to reduce them so substantially—we cannot afford to delay again.

Future adaptation to catastrophic climate change will be much *less* achievable and affordable. Furthermore, transferring these costs and consequences to future generations would be irresponsible.[26]

Using the latest assessments, even halving New Zealand's current emissions may be insufficient. The latest IPCC assessment is now more than 2 years old, and the science in this area is fast-moving.[33] According to more recent reviews[16,24,33,40–43] (including the UN Environment Programme's 2009 compendium on climate change science[43]), climate change is proceeding at or beyond the upper projections of the 2007 IPCC assessment, with the chair of the IPCC recently quoted as saying "things are going to get substantially worse than what we had anticipated."[44]

A synthesis released in March 2009[24] concluded that atmospheric CO_2 concentrations are already at levels predicted to lead to global warming of 2.0–2.4°C, and to meet the targets proposed by the IPCC, global emissions need to reduce by 60–80% immediately.[24] Calls are mounting for more stringent levels of atmospheric greenhouse gases at 350 parts per million (ppm) CO_2 or CO_2-equivalents or even less[33,40–42,44-46] (CO_2 levels are currently 387.81 ppm CO_2[47]; the current CO_2-equivalent level will be higher[48]).

Action is necessary, but too expensive?

Comprehensive international analyses such as the United Kingdom (UK)'s 2007 Stern review[49] and Australia's Garnaut review[50] point to probable economic *gains* by moving quickly on emissions reductions. Conversely they indicate the greater economic damage long-term from inaction.

To protect New Zealand's economy, including its agricultural advantage, we need to move quickly to reduce emissions.[51]

As described by Lord Stern, the costs of taking action to stabilise the climate will be high but much less than the costs of inaction.[49] Recent analysis suggests that past important costings of adapting to climate change, used to drive global policy, have been at least 2–3 times too low.[52] Delay will be dangerous, and action is needed now.[49] The Stern review also exposed the economic cause of climate change: market failure on the greatest scale the world has ever seen.[49] In short, we have had too cheap a ride.[16]

The World Bank, which in the past has tended to down-play the seriousness of long-term environmental risks, warns that even the current international financial crisis is no justification for inertia over climate change; "while financial crises may cause serious hardship and reduce growth over the short- to medium-term, … the threat of a warming climate is far more severe and long-lasting."[53]

At the time New Zealand's conditional 10–20% target was announced, much publicity had been given to the NZIER/Infometrics report to Government.[54] This report was used by the Government to help decide on the target. However, its macroeconomic modelling approach had been criticised as being the wrong tool for the job and a poor basis for major public policy.[55,56]

The report's key flaws included:

- *Ignoring the effects of climate change itself*. The business-as-usual modelling looked only at the cost to New Zealand of reducing emissions; it completely overlooked the greater costs (including health impacts) of climate change if we fail to reduce emissions in time.[55] For the world as a whole, and most individual countries, the long-term future costs of catastrophic climate change greatly exceed the costs of reducing greenhouse gas emissions to avoid this.[49,50]

- *Using the wrong baseline*. The report ignored New Zealand's established legal commitment under the Kyoto protocol[57] to meet its net emissions target—when it is highly unlikely New Zealand would renege on this commitment. Recalibrating the NZIER/Infometrics results to exclude these sunk costs gives positive improvements in the economy under many assumptions—e.g. pushing technical change in agriculture/land use (see endnote §§) would yield significant gains in emission reductions at low cost.[56,58]

- *Assuming no advances in technology or changes in behaviour despite market signals*. Yet the whole purpose of placing a real price on emissions is to stimulate technological change and influence consumer behaviour, making this assumption implausible.

- *Assuming that New Zealand is an expensive place to reduce emissions*. On the contrary, many agricultural emissions will be cheap to abate, and some will actually profit farmers[58] (see endnote §§). We have abundant renewable energy sources yet can still make substantial gains (endnote ***);[59] forestry has economic potential as a carbon sink (§§). So the 40% target may well be easier to meet in New Zealand than many OECD countries.[51]

- *Ignoring possible international sanctions*. The report did not count the potential economic consequences for exports and tourism of New Zealand appearing inactive and failing to do its fair share.[26]

In essence, the NZIER/Infometrics report was a partial analysis that greatly overestimated abatement costs and ignored the profoundly changing world around us.[55] Compared with unabated climate change, perceived economic 'hardship' is a luxury problem.[37]

Less publicised was the report's conclusion that, if the rest of the world moves to similar regimes, then economic effects on New Zealand may be minimised.[54] A responsible target by New Zealand[26] will help that move.

Such econometric projections inherently cannot and do not indicate the feasibility or engineering involved in reducing our dependence on fossil carbon. However, any lack of current technology (not itself a given—see below) is no reason for inaction, and for the technology to advance needs an acceptance of the reality and urgency of climate collapse.[24,33,60,61]

We must not confine our target setting to what current technology we think is cost-effective; rather, setting the necessary targets can spur the development of the changes we need. Recall the turnaround of US industry in 1942–43 to meet military needs, where President Roosevelt set production targets (for tanks, for example) based on need, not existing capacity.

NZIER/Infometics reported that a 15% emissions reduction target would mean average disposable incomes in 2020 will increase from $38,500 currently to $47,650, rather than $49,000.[62] Thus, if we cut emissions 15%, by 2020 people would still be much richer than today; just marginally less rich than if we took no action. And even this estimated projected shortfall, of about $1500, is overstated, for the reasons stated earlier.[56]

We think discussion of this issue can and should be more balanced.[26] During public consultation, figures of $3200 per capita income loss and doubling of energy costs[63] were widely quoted. These figures were alarmist, selectively reporting only the most extreme of scenarios analysed (a very high carbon price of $500/Ct), and came from work funded by specific interest groups[63] rather than any of the formal advice to Government.[54] Such soundbites should be tempered with health warnings.[56]

The World Bank says that a climate-smart world is within reach if we work together now to overcome inertia; the costs for getting there will be high but still manageable. "There are real opportunities to shape our climate future for an inclusive and sustainable globalisation, but we need a new momentum for concerted action on climate issues before it is too late."[53]

Action is affordable, but not our responsibility?

The Kyoto Protocol concentrates on countries' recent emissions alone. This downplays the importance of historic emissions—their cumulative emissions over time. In this respect, per capita, New Zealand has made disproportionately large historic contributions to the atmospheric greenhouse gas load.[51]

Developing countries are disproportionately affected by climate change.[6,53] As the World Bank notes, this is a crisis that is not of their making and for which they are the least prepared.[53]

While the Oxfam International RCI calculations, described above, allocate equitable shares across Annex I countries, they do not say that a 40% reduction below 1990 levels by 2020 equates to rich countries' full capabilities and overall responsibilities to the world. Indeed, there are good reasons to think that the fair share of Annex I countries involves much more.[16]

Applying measures of responsibility and capability globally, the Greenhouse Development Rights (GDR) framework[32] has assigned more than three-quarters of the total required global effort to developed countries in 2010. Assuming a 2°C pathway, this means significantly stronger obligations[34] for developed countries than the above IPCC 25–40% range for rich-country reductions by 2020.[22]

According to Lord Stern[64] and others[16] there are powerful equity arguments for rich countries paying for all actual greenhouse gases emitted. Viewed from this perspective, even a 40% target for New Zealand may be too weak. We may not want to pay more than we should, but we must still pay our fair share.[65]

A fair deal[32,34] means both keeping global warming as far below a 2°C increase as possible and delivering sufficient resources, so that poor people—who will bear the brunt[6,34,53]—can avoid the worst impacts of already inevitable[26] climate change. The World Bank notes that the poorest and most exposed countries in particular will need help in adapting to the changing climate.[53]

Fairness also dictates that those countries most responsible for past emissions and most able to help, take a lead to cut emissions first and fastest. The World Bank states that advanced countries, which have produced most of the greenhouse gas emissions of the past, must act now, cutting their emissions aggressively.[53] Oxfam International agrees that a fair and adequate global climate regime will require a massive effort across the board to reduce the risks to lives and livelihoods that poor people face first and most.[34]

Although deep emissions reductions in rich countries are critical, Oxfam and the World Bank also say that climate security will now be won or lost depending on cooperative efforts, where rich countries finance large-scale reductions in emissions in developing countries.[34,53] According to the new analysis for WWF International,[37] by 2050 developed nations as a group need to reduce emissions by up to 157% of 1990 levels (GDR methodology); given they cannot cut domestic emissions by more than 100%, developed nations will have to finance substantial emissions reductions in other countries to keep within their share of the global carbon budget (‡).[37]

The World Bank is calling for all countries to act now and act together, saying that no one nation can take on the interconnected challenges posed by climate change;[53] global cooperation is needed.[16,53]

As the Prime Minister's Chief Science Advisor has stated, "This is a global challenge, and a country like ours that aspires to be respected as a leading innovative nation cannot afford to appear to be not fully involved. Indeed, such a perception would compromise our reputation and potential markets."[26]

Neither should we underestimate our country's ability to lead the world on important issues of justice and security. New Zealand has wielded genuine influence on matters such as extending the vote, community child health, abolishing nuclear weapons, and settling colonial grievances. It is our generation's responsibility to now rekindle this influence and lead on the matter of climate change.

Health benefits of action?

The threat of impending climate catastrophe demands urgent and drastic action in its own right.[66] However, "mitigating climate change also presents unrivalled opportunities to improve public health,"[67] especially if we can align climate change, health, and equity goals.[68–71]

Policies to reduce greenhouse gas emissions could also bring about substantial reductions in heart disease, cancer, obesity, diabetes, road deaths and injuries, and air pollution.[67] Such health co-benefits arise because climate-change policies necessarily impact on some of the most important determinants of health, especially energy intake (nutrition) and expenditure (physical movement).[67]

Particular health benefits should include:

- A low carbon transport system that involves more walking, cycling, or using public transport will reduce road traffic crashes, pedestrian and cyclist deaths, urban air pollution, and the impacts of obesity and cardiovascular disease (see endnote ‡‡).[72,73]
- A low fossil-fuel society necessarily means reducing animal-based foods in our diets.[74] Moderation of the use of animal products will—by reducing the amount of saturated fat and meat in the diet—reduce the incidence of cardiovascular disease and bowel cancer,[75] and similarly with carbon-intensive fats and refined sugars for the obesity pandemic.[76]
- Reduced rates of overweight and obesity, as well as obvious health improvements, will also reduce the climate change impacts of extra fuel consumption needed for transporting extra weight and contributing extra food consumption and waste.[77,78] Food itself has important implications for climate change through production, distribution, quantity, composition, and waste.[78,79]
- Improvements in the efficiency of residential energy use could reduce mortality and morbidity from the extremes of heat and cold and reduce the vulnerability of the poor to fluctuations in the price of energy.[80–82]

To give just one example, research in Auckland estimates that shifting 5% of short urban trips by private motor vehicle to bicycles would save each year about 22 million litres of fuel and 0.4% of transport-related greenhouse emissions. The health effects would include 116 deaths avoided annually as a result of increased physical activity, and nominal economic savings of approximately $193 million per year.[83]

These important health co-benefits will dramatically reduce the cost to society from taking strong action to mitigate climate change, and thus failure to count these benefits could have serious consequences.[67] Health professionals have a particular responsibility to ensure that the health benefits of environmental policies are understood by the public and by policymakers.[67]

Our problem, but not achievable?

The potential for runaway climate collapse transcends the public health benefits from such changes as increased exercise, reduced pollution, and improved community engagement. Mitigation alone will need profound reengineering of New Zealand's structure and function.[84]

We need to prioritise mitigation efforts according to effectiveness and cost effectiveness (the ability of each action/technology to effect overall emission reductions versus its cost), and negotiate tradeoffs.[26] The science and fairness simply indicate the extent we need to responsibly reduce our emissions quickly, but do not say how to do this.[26]

However, mitigation ideas are detailed in the 4th IPCC mitigation report,[21] country-specific marginal abatement cost curves,[85–89] and elsewhere.[33,84,90,91] This is apart from known things we can do now in agriculture that should actually profit farmers and protect our key export earning sector (endnote §§).[51,58] Much of this conceptual work has already been done for Australia,[86,92–94] and to a limited extent in New Zealand.[51,84,87–90,95]

Aside from economic instruments,[16,35,36,51,91,96] which are necessary but insufficient in themselves,[97] investment in education and social networking (e.g. transition towns, http://www.transitiontowns.org.nz/) to promote carbon reduction may prove cost-effective. Mitigation technology and ideas will advance with the right signals/environment, including responsible targets. We must not underestimate the technology that already exists[51,58] but simply lacks planning, prioritisation, and implementing.

Agriculture is a significant source of diverse emissions—half of our greenhouse gas emissions[2,98]—with separate causes requiring diverse solutions.[89,99,127] It is incorrect to clump these emissions together.[2] Agriculture is clearly a big part of the problem, and reforming land use could be a big part of the solution. Endnote §§ lists a number of possibilities for Agriculture, as does endnote *** for Energy.

We also need to manage population growth,[100–103] projected to increase 9.9% by 2020 for New Zealand,[104] which will significantly increase the emissions reductions needed (see endnote †††). Our population growth rate is high compared with other OECD countries—mainly from natural increase rather than migration.[105,106] The long-term effects of sub-replacement fertility will not accrue until the mid 2040s, and will be countered by a likely increase in immigration, including climate refugees from the Pacific. Education, employment, and social policies that accelerate our transition to low natural population growth will be a necessary part of any mitigation strategies.

We can design our mitigation policies to improve (rather than reduce) the quality of life of low-income families, and ensure that any financial costs are carried by those who can most afford it.[30] Whether we end up with a genuine Emissions Trading Scheme (ETS) or in effect a carbon tax (see endnote ‡‡‡),[51,96,107,108] policies should be progressive (particularly central government revenue recycling) to protect the wellbeing of low-income households (endnote §§§).

How will we get there?

Since political inaction has delayed progress for so long, action on both national and global scales is now extremely urgent.[33] The next 6 years to 2015, by which time global emissions must peak,[24] will be critical to keeping within the global carbon budget (‡).[16,32,37] Delaying reductions by even only 5 years could have significant consequences. For example, starting absolute global emission reductions around the year 2015 would require annual reductions of 5% (large decreases), but delay to 2020 would require 8–9% reductions (huge decreases, see endnote ****).[16,37]

Addressing climate change is one of the biggest public policy challenges of our time—complex, urgent, and having serious implications for the economy.[65] We need a policy mix that will work effectively and equitably across all sectors and shift the economy to a low-carbon one.[65]

Large-scale acceptance of emission targets by the public is a political necessity.[26] But much of the debate has focussed on potential difficulties with meeting the targets. A more positive and empowering approach would recognise the wealth of innovation and knowledge within the New Zealand population, along with an ability to adapt and get on with it.

There is a large body of indigenous knowledge that has enabled Māori to develop sustainably in Aotearoa for centuries, with significant potential to contribute to national action on climate change. *Tangata whenua* have also adapted to a variety of environmental challenges and worked collectively to develop innovative solutions to social problems.

New Zealand has a proud history of adapting, a ‘can-do’ approach, and working together to counter peril, for example the sacrifices made across society in the world wars. Climate change is the new challenge, calling on this capacity for action and innovation, to again save lives.

Intensified efforts to ensure buy-in of the public are crucial.[33] Greater public awareness is needed of the urgency of climate change and the broad consequences of inaction, which goes beyond just direct immediate economic costs. It is easier to make changes, or accept mitigation effects, if you are convinced of the impact and urgency of the situation. New Zealanders will do what is right if they know it is needed.

In the United Kingdom, the 10:10 campaign[109–111]—where individuals, businesses and organisations commit to cut their carbon emissions by 10% in 2010[33]—shows how people and groups can take action immediately. People are measuring their own emissions and committing to real reductions over a year (not the 11 years for New Zealand[1]). Numerous individuals and organisations have already signed up for 10:10, including the entire British Cabinet,[112] parts of the National Health Service,[113] and Local Authorities. Such small but immediate targets can be meaningful,[111] are achievable with small steps, and are less daunting than long-term targets that are less tangible and more difficult to engage with.

As in the UK,[114,115] difficult choices may need to be made across all sectors of society, the economy, and government to reduce New Zealand’s emissions.[84,88,116,117] Approaches will need to be both top-down and bottom-up.[84,117] Mitigation will inevitably change lifestyle choices.[117] However, many people are changing their

attitudes, actions, and choices already—with sometimes unexpected benefits. With leadership, others too may be willing to make those changes once they know the consequences of inaction and the possibilities for action.

The challenge for New Zealand, health professionals included, is to mobilise society.[33] We need to generate even more social resilience to respond effectively to the emerging realities of climate change.

Such mobilisation for large-scale change across human and natural systems has a strong theoretical and empirical basis;[118–121] engaging the public towards a greater sense of belonging and working to make a difference,[16] wider sustainable views of the economy[117,122–125] with comprehensive not partial economic analyses,[56] and a community of interest with affiliation, goals, norms, and using intrinsic rewards.[33,117,124]

Health professionals cannot be inactive observers of this process. We have a significant role and responsibility to lead this challenge—and we must be involved wherever possible.

We have overspent our atmospheric resources[16,126]—and now need smart sustainable solutions.[33,117] The pace of climate change is accelerating.[16,24,33,40–43] Halving the current level of emissions is urgent, responsible, just, and possible.

Inaction would be negligence and malpractice on a global scale.

What health professionals can do now

Political

- Lobby for an urgent effective all-sectors all-gases Emissions Trading Scheme with an uncapped market price on our emissions. Submissions close **Tuesday 13 October 2009**. www.parliament.nz/en-NZ/PB/SC/MakeSub/a/d/f/49SCFE_SCF_00DBHOH_BILL9597_1-Climate-Change-Response-Moderated-Emissions.htm
- Join the international day of 350 action on **Saturday 24 October** www.350.org.nz, and the global day of action on **Saturday 12 December** www.globalclimatecampaign.org
- Support the 40% emissions target. Sign on at www.signon.org.nz and www.oxfam.org.nz. Spread the word with your address book.
- Lobby widely for other emissions reduction measures by central government.
- Monitor and promote local government initiatives to rapidly reduce emissions at www.sustainablecities.org.nz
- Join a group—us at www.nzchg.webs.com/ or any other climate action group.
- Take the Climate and Health Council pledge at http://www.climateandhealth.org/pledge/

Professional

- Educate and encourage patients and colleagues in climate change action

- Write letters for eligible patients to get subsidised home insulation www.energywise.govt.nz/funding-available/insulation-and-clean-heating
- Make Green Prescriptions (www.greenprescription.org.nz) truly green—advise the health AND climate benefits of increasing transport-related physical activity and eating less meat
- Reduce your workplace footprint—see www.1010uk.org/business

Personal

- Be informed; start with www.tcktcktck.org, http://en.cop15.dk, and watch 'The Age of Stupid' film
- Live smart and healthy—measure and reduce your own household footprint www.sustainability.govt.nz/content/25-easy-steps-towards-sustainability. Start with 10% less in 2010—see www.1010uk.org

For more ideas, come to www.nzchg.webs.com/

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Endnotes:

* According to the German Advisory Council on Climate Change (WBGU), even now there is discord between the industrialised countries and the emerging economies. "Governments still appear to be fixated on the task of supposedly establishing, maintaining or restoring their national economic competitiveness rather than on preserving the natural lifesupport systems which are the basic prerequisite for any form of economic activity. The situation is reminiscent of the nuclear arms race which ended just 20 years ago, when the apparently compelling logic of 'mutually assured destruction' (MAD) brought our civilisation to the brink of the abyss more than once. The climate issue is without doubt a different type of problem, for every country is both the cause and the victim of climate change, albeit to widely varying extents. Nonetheless, the threats to our societies are just as overwhelming and the mutual distrust which prevails today is still as paralysing as the doctrine of MAD in the past."[16]

WBGU notes "the 'social dilemma' concept in game theory aptly describes the current situation, for individual and collective rationality are tragically at odds here. In a social dilemma, players attach more weight to their short-term individual interests than to the long-term mutual benefits of a cooperative solution—thereby ultimately harming everyone, including themselves. With many countries currently inclined to scale down their own climate change mitigation efforts to the bare minimum due to a short-

sighted focus on competitiveness, the international community could well find itself locked into a non-sustainable course for centuries to come."[16]

According to WWF International, "unabated climate change will cost much more socially, economically and environmentally. It will wreak havoc on global food security and freshwater availability, and its impacts will be disproportionately felt by poor and vulnerable communities."[37]

† Source[98]: Energy Greenhouse Gas Emissions 2009. Ministry of Economic Development (Energy Information and Modelling Group), 2009.
http://www.med.govt.nz/upload/68779/Energy%20Greenhouse%20Gas%20Emissions%202009.pdf
Table 1.1: New Zealand Total Greenhouse Gas Emissions and Removals 1990-2007 (kt CO_2-e).

Calculations:

1990 actual (base) = 61,852 CO_2 equivalent (kt), all gases (gross); 2007 actual = 75,550.
Gross emissions therefore increased by 22.1% between 1990 and 2007 (1-[75550/61852]).
If 2020 goal = 61852 less 40%; then this goal = 37,112 kt.
Comparing 37,112 with 2007 actual, the reduction needed is 1-(37112/75550) = 1-0.49 = 51%.

Notes (source: MED[98]): "Gross emissions do not include carbon sinks of land use, land-use change, and forestry (LULUCF), which is included in net emission calculations. Net emissions in 1990 were 43,714 kt CO_2-e, with 51,714 kt in 2007. CO_2 equivalent emissions estimates are based on the global warming potential (GWP) of each greenhouse gas expressed as the effect of 1 kilogram of CO_2 on global warming over a given time horizon. Non-CO_2 emissions are multiplied by the appropriate warming potential to convert to a CO_2 equivalent basis. The GWPs for CH_4 and N_2O are 21 and 310 respectively, which are for a 100-year time horizon; these are from the IPCC Second Assessment Report (1995)."

‡ Global emissions budgets are totals set according to the global amount of greenhouse gases that may be emitted between now and 2050 to keep within the 2°C guard rail, distributed among the world's population per capita.[16,32,37] For example, the German Advisory Council on Climate Change (WBGU) calculates a budget of 110 tonnes left per person between 2010 and 2050 (based on 660–750 billion tons CO_2 globally to have a two-thirds to three-quarters chance of keeping within 2°C warming).[126]

§ Signatories to the United Nations Framework Convention on Climate Change (UNFCCC) are split into three groups: 1. Annex I countries (industrialised countries); 2. Annex II countries (the subgroup of developed countries who pay for the costs of developing countries); and 3. Developing countries.

- Annex I countries agree to reduce their emissions of greenhouse gasses to targets that are mainly set below their 1990 levels. They may do this by allocating reduced annual allowances to the major operators within their borders. These operators can only exceed their allocations if they buy emission allowances, or offset their excesses through a mechanism that is agreed by all the parties to the UNFCCC.
- Annex II countries are a subgroup of the Annex I countries, comprising the member countries of the OECD excluding those that were economies in transition in 1992.
- Developing countries (Annex III) are not expected to de-carbonise their economy unless developed countries supply enough funding and technology.

New Zealand is included in Annex II (and hence Annex I). Annex I countries (industrialised countries) comprise: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States of America (40 countries and separately the European Union). See http://unfccc.int/parties_and_observers/items/2704.php, http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php.

** Responsibility under the Oxfam International calculations is based on emissions of all six greenhouse gases included in the UNFCCC, from 1990, when the first IPCC assessment report was published, to 2005, the most recent year of internationally comparable data. The measure includes emissions from land use change and forestry.[38] Responsibility is measured as cumulative emissions over the period 1990–2005.[34]

†† Capability under the Oxfam International calculations is based on the absolute value of a country's gross national income (GNI) that accrues to the population living above a per capita income threshold of $9000 per year.[34]

‡‡ Worldwide, road traffic crashes account for 1.2 million deaths each year and 10 times as many serious injuries.[73] Death rates for pedestrians and cyclists exhibit steep social gradients, and reducing traffic volumes and speeds would have important equity implications. Urban air pollution—much of which is related to transport—causes a further 800,000 premature deaths each year.[72] Walking, cycling, or using public transport instead of travelling by car would reduce the use of energy from fossil fuels; it would also reduce traffic injuries and air pollution. By increasing physical activity it would tackle the output side of the personal energy balance equation, with positive implications for obesity and cardiovascular disease.

§§ Agricultural and land use mitigation.[51,58,79,89,90,99,127] Immediate action can include diet modification (low methane forage crops, charcoal feed, supplementary maize feed, monensin to improve rumen fermentation); soil carbon sequestration, and nitrogen management through grass pasture and other active land management, nutrient budgeting, no-till crop production, crop rotation, fallow periods, new grasses, improving soil drainage, wintering barns, feed pads and standoff pads; changes in management practices and reduced intensity e.g. lower dairy stocking rates; reduced fertiliser use, nitrification inhibitors for crop growth and N_2O reductions; carbon sequestration though biochar; converting marginal agricultural land back to shrubland and/or forest; measuring and monitoring (use of DNDC). Other potential action can be subjected to accelerated research (e.g. dairy genetic selection (including low methane stock); methane vaccine; biofilters).

Forestry has large potential as carbon sinks, both retaining or reforestation with indigenous and exotic forests/bush.

An emerging agricultural mitigation strategy is the use of low carbon-intensive feed stocks as an alternative to high carbon-intensive feed stocks such as palm kernel, used primarily in the dairy industry. Over one million tonnes of palm kernel/nut oil cake were imported in 2008[128] (mainly from Indonesia and Malaysia) at a value for duty of almost $225 million. Of note, imports may be trending downwards, as the 2009 second quarter (Q2) imports were approximately half those of Q1 and less than one-third of Q2 2008 imports. Palm kernel is the main byproduct of the palm oil industry, which is a key cause of rain forest deforestation and release of greenhouse gases.[129,130]

*** Energy mitigation. Although compared with other developed countries (e.g. UK and Australia) we already have a high level of electricity generation from renewables (currently around 70%), we can still make substantial gains in this area. Modelling suggests that a target of 90% electricity generation by renewables is achievable by 2025 with the current technology, and without incurring substantial costs or reducing the security of supply.[59]

New Zealand has the cheapest wind power in the world, because of our high wind speeds and low population density; we are a long narrow country set at right angles to the prevailing winds that are consistent, with suitable sites that are close to major infrastructure and the national grid (which keeps costs down), the technology is available in New Zealand, and New Zealand companies will benefit greatly with wind energy development—including job creation. Our trees grow faster than almost anywhere in the world—not in remote areas but reasonably close to population centres where they can be turned into high-value products plus energy from residues, let alone acting as carbon sinks. We have substantial geothermal and hydro power potential. Our solar and marine energy are also world-class; especially once the tidal/wave energy technology is honed further—and, again, there is economic potential for New Zealand companies through innovation of this technology.

††† Under a business as usual scenario, possible total greenhouse gas emissions in 2020 are projected to be 84.6 megatons (Mt) CO_2-equivalents. This is based on the 17.87 tonnes CO_2-equivalents per capita emissions in 2007 (75.6 Mt CO_2-e total for New Zealand [NZ][98]), and a projected population for NZ of 4.735 million by 2020[104] (where per capita gross GHG emissions derive from total gross emissions for 2007[98] and the estimated NZ population for 2007,[104] and total gross emissions derive from total net emissions and LULUCF[98]). The 2020 projection is 9.1 Mt greater than the 2007 actual (84.6 minus 75.6 Mt), a 12% increase (see Table 2).

Table 2. GHG emissions predicted for 2020, compared with target of 40% reduction from 1990 levels

year	1990	2006	2007	2020
(total net kt CO_2-e)	43,714	53,722	51,714	
(total LULUCF kt CO_2-e)	-18,138	-23,877	-23,836	
total gross kt CO_2-e	61,853	77,599	75,550	84,619
% incremental change			22.1%	12.0%
population (projected from 2006 base, Series 5 medium fertility medium migration)		4,184,600	4,227,900	4,735,400
% incremental change			25.7%	12.0%
gross tons per capita CO_2-e		18.54	17.87	17.87
target (40% reduction on gross 1990)	37,112		37,112	37,112
per capita target (tons CO_2-e)			8.78	7.84
emissions reductions (gross kt CO_2-e)	-24,741		-38,438	-47,507
% reduction needed	-40%		-51%	-56%
per capita reductions (tons CO_2-e)			-9.09	-10.03

‡‡‡ Technically, the Emissions Trading Scheme (ETS) as proposed for New Zealand would not be a genuine ETS as such, but rather an emissions tax, as there would be a cap on prices.[107,108] Urgently needed is an effective all-sectors all-gases ETS with an uncapped market price on New Zealand's emissions.

§§§ Progressive policies to moderate the financial impacts of mitigation efforts will in particular require central government revenue-recycling to programmes that moderate effects on low-income households.[96] This is where the Government will acquire revenue out of either carbon taxation or an emissions trading scheme. Some of this revenue will be used to pay for required carbon credits, but the remaining excess could either go into Treasury's general pool or be directed (tax hypothecation).

Such a scheme is progressive (as opposed to regressive) when taxes are directed to programmes that mitigate inequities (e.g. free insulation for low income households, or public transport subsidies). In the European Union, carbon pricing is said to have had regressive social effects, but there are also signs that the negative impacts can be softened, avoided altogether, or even reversed by revenue recycling.[96]

Arguably, the intensity-based ETS as proposed could be a regressive (not progressive) taxation system, as it provides substantial and unlimited taxpayer subsidy of emitting industries[107,108] for years to come, which is likely to affect other areas of Government spending.

**** The German Advisory Council on Climate Change (WBGU)[16] states that the reversal of the emissions trend must start as soon as possible—for in view of the very limited CO_2 budget, any delay will result in almost unachievable reduction requirements.

"With a reversal of the trend (and the emissions peak being crossed) by 2010, global emissions would need to fall to 50–80 % below the 1990 baseline by 2050, with further reductions towards zero emissions being achieved thereafter. Even a slight delay in the reversal of the trend, i.e. postponement of the peak year to 2015, would trigger annual global emissions reduction requirements of up to 5% (relative to 2008). See Figure 1 below. In other words, the world would then have to meet annual emissions reduction targets equivalent to those established by the Kyoto Protocol for a full 2 decades."[16]

"Delaying the peak year even further to 2020 could necessitate global emissions reduction rates of up to 9% per year—i.e. reductions on an almost inconceivable scale, entailing technological feats and social sacrifices on a scale comparable to those of the Allied mobilisation during the Second World War"[16] (see Figure 1).

Figure 1. Necessary emissions pathways—WBGU calculations (2009):[16] Global emission pathways for the period 2010–2050 with global CO2 emissions capped at 750 Gt during this period

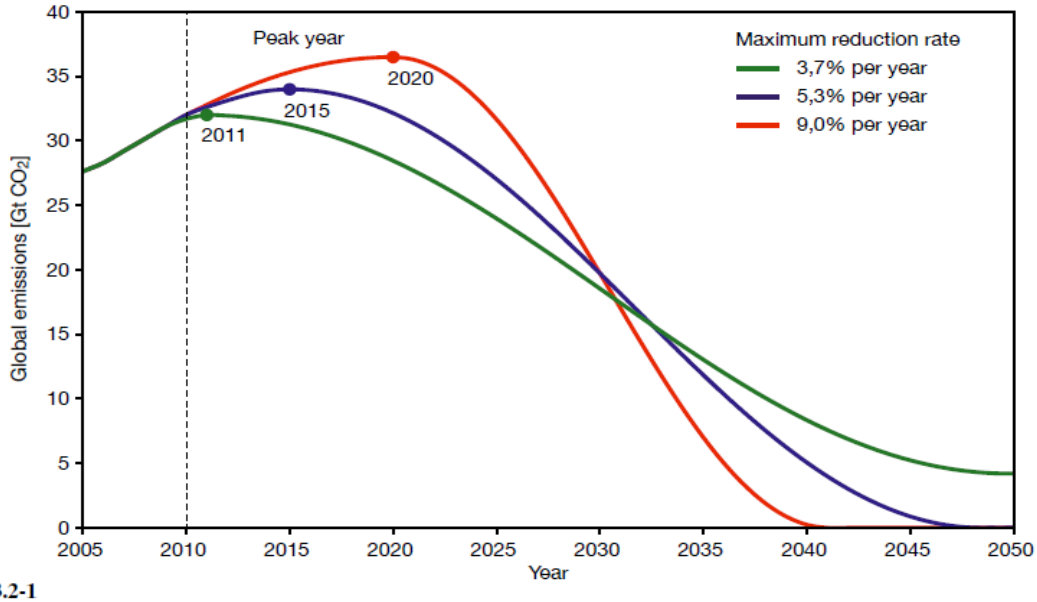

Figure 3.2-1
Examples of global emission pathways for the period 2010–2050 with global CO_2 emissions capped at 750 Gt during this period. At this level, there is a 67% probability of achieving compliance with the 2°C guard rail (Chapter 5). The figure shows variants of a global emissions trend with different peak years: 2011 (green), 2015 (blue) and 2020 (red). In order to achieve compliance with these curves, annual reduction rates of 3.7% (green), 5.3% (blue) or 9.0% (red) would be required in the early 2030s (relative to 2008).
Source: WBGU

Source: Figure 3.2-1 of WBGU 2009[16] http://www.wbgu.de/wbgu_sn2009_en.pdf pages 15-16. Reproduced with permission of the German Advisory Council on Climate Change (WBGU).

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The power of apology

Viewpoint article based on Humanity in Healthcare Lecture (Centre for Compassion in Healthcare, Waitakere Hospital, Auckland, New Zealand, 16 February 2009)[1]

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Abstract

In the aftermath of an adverse event, an apology can bring comfort to the patient, forgiveness to the health practitioner, and help restore trust to their relationship. According to the Health and Disability Commissioner: *"The way a practitioner handles the situation at the outset can influence a patient's decision about what further action to take, and an appropriate apology may prevent the problem escalating into a complaint to HDC"*. Yet, for many health practitioners saying "I'm sorry" remains a difficult and uncomfortable thing to do. We can help to bring down this wall of silence by developing a clear understanding of the importance of apologies to patients and health practitioners; appreciating the difference between expressing empathy and accepting legal responsibility for an adverse outcome; knowing the key elements of a full apology and when they should be used; and supporting those who have the honesty and courage to say "I'm sorry" to patients who have been harmed while receiving healthcare.

Justin Micalizzi was a healthy 11-year-old in the United States; he loved to play basketball and go bowling with his friends. One day, Justin came home from school with a fever and ankle pain. Over the next 2 days he saw three different doctors, and was eventually taken to hospital for surgery to incise and drain the swollen ankle.

Justin was dead by 8am the next day, leaving behind two grieving and bewildered parents who desperately wanted to know why their son had died. But medical care was to fail the Micalizzis twice—first their son died, and then no-one would explain to them why, or apologise for the loss of their son.[2] The silence from the doctors and nurses in the days, months, and years that followed Justin's death was deafening.

Nearly 8 years later, Justin's mother—Dale Ann Micallizi—writes:

> …I am still waiting for, and still need that conversation. Not receiving an apology and explanation from someone caring for your child when something goes wrong is incomparable to any form of inhumanity in medicine or in society. It is simply not right. Justin was our child and we were owed an explanation and an apology. We didn't expect anyone to say "I'm sorry that I screwed up", but perhaps simply "I am so very, very sorry that your son has died in our care. I will do everything in my power to help you and your family heal and explain to you everything that I honestly know about the event."
>
> Justin's surgeon would have been my hero if he said that to us but instead they said "these things happen in medicine" and we were expected to accept that. As a parent, I couldn't.

Wall of silence beginning to crumble

Historically, health practitioners—and in particular doctors—have been noted for their reluctance to offer apologies. Health practitioners have high expectations of themselves and, not surprisingly, many find it difficult to discuss adverse events

openly with patients. Some are afraid of losing patients' trust, some shy away from difficult conversations, while for others the fear of medicolegal consequences and professional sanctions is cited as an impediment to apologising. Whatever the reason, for many health practitioners *"sorry seems to be the hardest word*".

But the "wall of silence" is beginning to crumble, as health practitioners are increasingly called on to openly disclose adverse events, apologise for the harm caused, and acknowledge responsibility if a preventable error has occurred. (For the purposes of this paper, "adverse event" refers to harm caused by medical management rather than the patient's underlying disease. Many adverse events are unpreventable, but can nevertheless cause patients significant suffering and distress. The term "preventable error" refers to events involving a departure from the accepted standard of care.)

Internationally, a number of institutions have instituted training programmes to help medical students and doctors who are *"illiterate in the language of apology"*.[3] In New Zealand, medical schools recognise the critical importance of communication skills, and seek to equip their students with the reflective attitudes required to respond to adverse events in an open and patient-centred manner.

According to Dr Lynley Anderson, a Senior Lecturer at the University of Otago's Dunedin Medical School:[4]

> Students are encouraged throughout the curriculum to be responsive to patient needs and reflective about their own actions, and that includes in situations where adverse events or error occurs. When done appropriately, apologising for medical error is seen as part of the care of the patient and their family as well as being attentive to the ongoing doctor-patient relationship

Why are apologies important to patients and their families?

Those who deal with adverse events on a regular basis have long believed that *"patients primarily want two things when things go wrong: first, an apology; second, reassurance (to the extent possible) that steps have been taken to reduce the likelihood of a repeat of the event."*[5]

Research supports this view that injured patients who take legal action following an adverse event are primarily seeking communication and corrective action, rather than financial compensation or sanctions against the health practitioner.[6] For example, a review of letters to the Health and Disability Commissioner found that 40% of complaints were motivated by a desire for more satisfying communication, such as an explanation or apology. (A further 50% of complainants sought some reassurance that corrective action would be taken to protect future patients from similar harm.)

Following an adverse event, many patients and families feel abandoned or betrayed by the very people they entrusted with providing them care.[8] The person whom they literally trusted with their life has let them down. By apologising, the health practitioner acknowledges these feelings and provides reassurance to the patient and the family that they will not be shut out at this most vulnerable time.

Paradoxically, some patients and families have more trust in the healthcare system after an adverse event, than before, if an adverse event is handled openly and honestly.

For others, an apology provides important confirmation that the health system, and not the patient or family, caused the injury. Many patients and families (particularly the parents of children who have died or suffered permanent disability) wonder whether they were in some way to blame for the harm that occurred.[9] Truthfully acknowledging the extent to which the injury was caused by healthcare can lift that burden of uncertainty and guilt from their shoulders, and provide an understanding of how and why things went wrong.

In cases involving a preventable error, an apology sends an important signal that the health practitioner regrets the error and wishes to avoid it happening again. The frightening reality is that around 1 in 10 hospital admissions is associated with an adverse event, of which around one third are preventable.[10] An apology helps to reassure patients that lessons have been learnt and unsafe practices will change.

And finally, an apology helps to facilitate the process of forgiveness and healing. A heartfelt *"I'm sorry, we made a mistake"* helps patients and families to stop endlessly speculating about what happened, and begin to grieve the loss they have suffered.[11]

Why are apologies important to the health provider

Patients are not the only ones who can benefit from an apology after an adverse event. Wayne Cunningham's research demonstrates the deep impact of adverse events and complaints on health practitioners. Typical feelings include anger, shame, guilt, and a loss of confidence in their abilities.[12]

According to Aine McCoy from the Medical Protection Society:

> Doctors tend to cope in varying ways with the realisation that an error has occurred. Typically negative strategies are denial, discounting, distancing oneself from the issue and one's colleagues and family, and covering it all up. Needless to say these do nothing to promote a resolution[13]

For the health practitioner, the benefits of apologising fall into two categories: internal and external. The internal benefits include alleviating guilt, and maintaining self-esteem. The sense of perceived failure associated with an adverse event can impact heavily on a health practitioner's sense of self, potentially resulting in feelings of shame and loss of joy in medical practice.[14] A heartfelt apology, particularly when followed by forgiveness from the patient, may help to lift that burden of self-reproach.

The external benefits of apologising relate to the way that a health practitioner is perceived by his or her patients, colleagues, and community. Health practitioners who apologise are demonstrating their commitment to enduring principles of medical ethics: telling the truth, and acting with charity and kindness. It takes great strength of character to face someone we have hurt, acknowledge responsibility, and to show compassion for his or her suffering.[1] In addition, the process of apology invariably calls for candid self-reflection and, as a result, may lead to better and safer care.[16]

And finally, saying sorry when someone has been hurt is simply the right and caring thing to do. One lawyer who initially advised her clients to break off communication after bad outcomes explains:

> At some point, it just struck me that a non-communicative, dehumanizing, adversarial process was at complete odds with the mission of healing, delivering compassionate care and treating patients with dignity and respect[17]

Or more simply, in the words of Justin's mother, Dale Micalizzi, *"It's about being human and treating each other with respect and kindness, nothing else"*.

Dr Robin Youngson recalls an episode during his anaesthetic training when he performed an arm block in the wrong arm of a patient with a hand fracture:

> With horror I realised my mistake, just as we were transferring Mr M into the operating theatre. The block couldn't be repeated on the other arm because I had already used the maximum safe dose of local anaesthetic, so I did my best to make sure he would be comfortable and spent the whole case feeling guilty and worried.
>
> Mr M woke up in the recovery room to find that he had one arm in a plaster cast and the other arm was heavy and numb. I said, "I'm so, so sorry. I made a mistake. I did the arm block in the wrong arm." I provided him with additional pain relief, and reassured him that the function in his good arm would be restored later in the day.
>
> Back in theatre I found it difficult to concentrate: I was feeling like an idiot and was fearful of another mistake. Soon after, the recovery nurse approached me: "Mr M asked me to give you a message." I felt sick; sure that I was about to be notified of a complaint or other legal action. The nurse relayed Mr M's message: "Can you tell that doctor to stop worrying about his mistake". An enormous burden lifted from my shoulders. I couldn't believe that he could forgive me so easily. In later years, I came to understand that patients would forgive almost any mistake so long as I was honest about what had happened, showed that I cared, and did my very best to make amends[18]

How do apologies affect medicolegal risk?

In the New Zealand context, the availability of no-fault compensation for all treatment injuries means that health practitioners are almost entirely protected from the threat of medical malpractice litigation. Nevertheless, the risk of a complaint to the Health and Disability Commissioner, or other form of medicolegal inquiry, concerns many health practitioners, and is sometimes cited as an impediment to disclosing adverse events and saying sorry for the harm that has occurred.

In fact, health practitioners in New Zealand have a legal duty to communicate openly and honestly with patients in the aftermath of an adverse event.[19] In addition, patients have a legal right to receive the information that a reasonable patient, in that patient's circumstances would expect to receive, and to receive honest answers to questions.[20] Alongside this duty of candour, stands an expectation from the Commissioner that health practitioners will apologise when patients are harmed as a result of a breach of the Code.[21]

Importantly, saying *"I'm sorry"* does not automatically imply fault or error—it's all about context. As discussed below, in the aftermath of an adverse event where no preventable error has been identified, a "partial apology" or expression of regret and empathy does not require any admission of fault or responsibility.

In situations where a preventable error has occurred, injured patients may in fact be less likely to take legal action if health practitioners communicate openly and apologise appropriately, than if the patient perceives a "cover up". For example, the mother of a baby who required surgery after delayed diagnosis of an imperforate anus wrote to the Health and Disability Commissioner: *"Had the doctor apologised as soon as he found out about the problem, or had he enquired after baby's health, I would not be making this complaint now."*

Internationally, a number of studies support the view that a policy of open disclosure coupled with a sincere apology may actually reduce the likelihood of time-consuming and expensive legal disputes.[23–26] Closer to home, the Health and Disability Commissioner has commented that: *"The way a practitioner handles the situation at the outset can influence a patient's decision about what further action to take, and an appropriate apology may prevent the problem escalating into a complaint to HDC"*.

In this context, responding to adverse events with an approach of "candour and compassion" seems both medicolegally and ethically preferable to alienating patients and their families with an inflexible policy of "deny and defend".

The language of apology

Most health practitioners will, at some point in a successful career, have to confront at least one unanticipated, serious, or even catastrophic outcome. In the words of Lucian Leape, *"error is an inevitable accompaniment of the human condition, even among conscientious professionals with high standards"*.[28]

Yet, as alluded to earlier, apologising can be a formidable challenge for many health practitioners. One anaesthetist who approached a patient's family following an intra-operative cardiac arrest explains: *"I felt personally responsible for what had happened and compelled to communicate with the family. I thought I would be able to provide a factual account of the event to the husband but to my shock, the husband came at me with full emotional and physical force … I was now forced to confront my own emotional distress and I realised my complete lack of training in how to manage this situation."*[29]

It is therefore important for health practitioners to be adequately trained in open disclosure and apology, to be provided with adequate support in the aftermath of an adverse event,[30] and to be allowed enough time to prepare—both factually and emotionally—for these difficult conversations.

The requirements for an effective apology will vary from case to case, depending on the injured person's hopes, needs, and fears, and the relationship between the two parties. However, broadly speaking, an authentic apology is likely to include the following five elements: (1) recognition of the event that caused harm, (2) an expression of regret and sympathy (the partial apology), (3) an acknowledgement of responsibility—where appropriate—once the facts are fully understood (the full apology), (4) effective reparation, and (5) one or more opportunities to meet again after a period of reflection.[31]

The non-apology

Each of these steps will be considered in turn. But first, a few words about so-called "non-apologies". It almost goes without saying that not every sentence that starts with *"I'm sorry …"* is an apology[32] (although some non-apologies are more difficult to identify than those of the obvious *"I'm sorry you're so stupid"* sort).

Non-apologies are typically used when people want to take the heat off a situation and keep the offended person quiet, without actually demonstrating humility, remorse, or a commitment not to repeat the offence.[33] In effect, the offender is trying to reap the benefits of apologising without having earned them. Other non-apologies are self-

focused, with the wrongdoer only feeling sorry for themselves and the predicament they are in.[34]

Consider for example, the case of a woman who underwent a pelvic ultrasound at a public hospital. She was upset that a male registrar in training observed the procedure, without her consent, and she felt that the consultant radiologist spoke to her in a brusque way that made her *"feel demeaned"*. The radiologist said *"I am sorry that she has misinterpreted my voice and manner"*[35] and went on to say that Ms A was the only patient to criticise the radiologist's bedside manner in 20 years of doing similar examinations.

In another case, a baby was misdiagnosed with an ear infection, when in fact she was suffering from whooping cough. The GP called the baby's mother to *"express his disappointment at the way things had turned out"*.

The mother found the phone call intimidating:

> He was very quick to let me know his qualifications. He also pointed out that I did wait 2 days, after seeing him, before taking my baby to hospital. I resent his implications very much . I find it unacceptable to try and make me feel guilty … I was not prepared to return to that surgery for a 4th time, just to be sent away again![36]

A common feature of non-apologies—present in both of these cases—is that the so-called "apology" is in fact a deflection of responsibility, which implies that the victim is the one who is in the wrong. In other cases, the non-apology may offer explanations that are dishonest, arrogant, manipulative, or an insult to the intelligence of the patient or the family. In all of these situations, the non-apology may actually escalate the situation.

Recognition

The first step towards an effective apology involves recognising the injured person's feelings, and clarifying the event that caused offence or harm. Recognising and acknowledging harm is not always an easy task. Often, the need for an apology arises when two people do not share the same perspective, and it is important to seek a common understanding of what was perceived as wrongful before trying to move on.

Recognising the need for an apology requires practitioners to reflect on their own practice, and to be sensitive to the emotional as well as physical needs of their patients. The support of a supervisor, trusted colleague, or peer group may help to facilitate this process of recognition and assist the practitioner to prepare for the conversation to follow.

Regret

Next comes an expression of regret: *"I'm sorry for your suffering"*. Patients are likely to feel hurt and vulnerable after an adverse event, and this initial expression of empathy and compassion is a caring and humane response to the harm that has occurred, regardless of the cause.[37] It can take place without knowing exactly what went wrong or why, in the same way that we would express sympathy and concern for any injured human being. In the words of David Costa: *"People need to stop being so worried about communication of compassion for those we serve."*[38]

The conversation might go something like this:

> I am so very sorry this happened. This is not the outcome that either of us had hoped for. The doctors and nurses caring for your son will work with you to ensure he receives the best possible care. We are carrying out an investigation to find out what happened, and we will share that information with you as soon as we can. Is there anything else we can do for you or your family at this point? I will be back in touch with you in the next day or so. In the meantime, if you have any questions, you can call me on this number at anytime of day

Notice that the health practitioner has said sorry, without admitting fault, assigning blame, making guesses, or jumping to conclusions. This initial conversation is all about expressing heartfelt sympathy, conveying compassion, and rebuilding trust. It brings the injured patient and family closer, rather than pushing them away, and promises to maintain open lines of communication.

This offer of empathy and compassion is what Justin's mother Dale was seeking when she explained that she just wanted to hear the doctor say: *"I am so very, very sorry that your son has died in our care."* A partial apology of this sort does not accept blame or responsibility, but the expression of genuine caring and concern does allow healing to begin.

Responsibility

The third element is the one that distinguishes a full from a partial apology: recognition of responsibility and accountability *("I'm sorry that I hurt you. I accept responsibility for my mistake.")*. A thoughtful and well-timed full apology can facilitate forgiveness and strengthen the relationship with the patient. However, ill-prepared or misplaced admissions of fault can have harmful consequences for both health practitioners and their patients. When deciding how best to address issues of responsibility and accountability, practitioners are therefore well advised to seek early support and assistance from their legal advisor, senior colleagues, and insurer.

If a simple and obvious preventable error has occurred, it may be appropriate to immediately acknowledge that a mistake was made, apologise, and commit to ensuring that it does not happen again. However, in many situations, a quick admission of guilt, even when expressed with genuine feeling, will be the wrong choice.

Once a full apology has been made, it cannot be taken back, and trying to retract information that was wrongly given in the heat of the moment only gives rise to suspicions and mistrust. It is therefore important that health practitioners take time to reflect on what has happened and, where appropriate, seek advice from others before offering a full apology.

Taking time to reflect on what has happened before offering a full apology has advantages for both the patient and the health practitioner. Such reflection can help to ensure that health practitioners do not unfairly blame themselves, in situations where no preventable error has occurred, or jump to wrong conclusions about the cause of the adverse event. It also helps to ensure that patients and their families receive a factual, constructive, cohesive response[39] from all those involved rather than being subjected to the shifting sands of assumption and speculation. The inquires that are required before a decision is made regarding the need for a full apology may be completed within hours, or may require several weeks if the circumstances leading up

to the adverse event are complex. During this time, every effort should be made to ensure that the patient feels safe and that channels of communication remain open.

Healthcare is fraught with uncertainty and complexity, and there are many occasions when a patient suffers a poor outcome, despite the best efforts of everyone involved. If an investigation shows that the patient received appropriate care, the patient or family should be provided with full information and offered an opportunity to ask any further questions. This may also be a good time for the health practitioner to reiterate feelings of empathy and concern for the harm that the patient has suffered.

If the investigation shows that a preventable error has occurred, it may well be appropriate to provide a full apology—acknowledging that aspects of care fell below the expected standard and accepting responsibility for those failings. In this situation, an apology that fails to accept accountability for any identified shortcomings in care may be viewed as hollow and meaningless.

In some cases, particularly those involving systems errors, it will be appropriate for both the health practitioner caring for the patient and the person ultimately responsible for that episode of healthcare (whether that be the practice manager, or even the chief executive) to offer an apology.

Reparation

Fourthly, an authentic apology involves taking some steps towards putting things right. Ideally, the remedy should both address the problem the patient is experiencing, and outline efforts to protect others from the same untoward result. In the New Zealand context, assisting the injured patient to obtain compensation and access rehabilitation services through an ACC treatment injury claim, may be an important part of the remedy.[40]

Effective reparation also includes a commitment to understanding what went wrong—at both an individual and systems level—and mounting an effective response in order to ameliorate the risk of future harm. The patient needs to know why it happened, to the extent that that can be answered, and he or she needs to know what is going to be done to reduce the potential of such an event happening again.

Reflection

Finally, it is important to remember that offering and accepting an apology may require time and patience. Immediately following an adverse event, the patient may indeed be upset and not yet ready to forgive.

Injured patients and their families should not feel pressured by subtle—and not so subtle—reminders that ‘good’ people are ‘forgiving’, or assurances that, after all, nobody meant to harm them—at a time when they remain profoundly distressed by not knowing what really happened, or by inadequate acknowledgment of their suffering. We need to be prepared to allow the other person to express their disappointment and frustration, and to validate their feelings, rather than expecting instant forgiveness.

Just as a wound does not heal the moment that treatment is started, so too can it take time for both parties to experience healing after an apology is extended. We need to be patient. The injured patient may need days, weeks, or longer to understand and

psychologically assimilate what has happened. The health practitioner and patient may need to meet on several occasions to talk things through, and understand the implications for the healthcare relationship. Remember this wisdom from Shakespeare: *"How poor are they that have not patience! What wound did ever heal but by degrees."*[42]

Conclusions

For many health practitioners, talking about apologies still feels uncomfortable. It can be helpful to remember that, years ago, health practitioners in New Zealand were similarly uncomfortable talking about informed consent. Now it has become a standard part of the healthcare relationship.

As the "wall of silence" continues to crumble, we can expect to hear more discussion about the importance of saying "sorry" in the health sector. We can all support the work that needs to be done to improve health practitioners' literacy in the language of apology, and to address the fears and misperceptions that prevent health practitioners from expressing sympathy and, where appropriate, apologising in the aftermath of an adverse event. We can hope for an increasing recognition that saying *"I'm sorry"* can be a sign of strength, rather than weakness. It is an act which requires honesty, generosity, humility, commitment, and courage.[43]

While an insincere pseudo-apology can do more harm than good, heartfelt expressions of sympathy and sincere apologies can have profound healing effects for all parties. They can bring comfort to the patient, forgiveness to the health practitioner, and restore trust to the relationship.[44]

This paper finishes where it began, with the story of Justin Micalizzi. Years have now passed since Justin's death, and still his mother Dale has not received an apology, or even an expression of sympathy, from some of the health practitioners with whom she entrusted her son's life. Over that time Justin's mother has become a powerful advocate for safe, compassionate, patient-centred care.

It seems appropriate to conclude this paper with the quote that appears on the back of the bookmarks that Justin's mother, Dale, distributes in her son's memory:

> Integrity: "The highest courage is to dare to be yourself in the face of adversity. Choosing right over wrong, ethics over convenience, and truth over popularity...these are the choices that measure your life. Travel the path of integrity without looking back, for there is never a wrong time to do the right thing."

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Swine H1N1 influenza in a post liver transplant patient

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We describe a case of a 43-year-old post liver transplant European female with comorbidities who was hospitalised with leg ulcers and developed cardiorespiratory complications including coinfection with H1N1.

We believe this is the first case report of H1N1 in a post liver transplant patient in Australasia.

Case report

A 43-year-old woman, who was 13 months post liver transplantation for end stage liver disease secondary to hepatitis C cirrhosis, was transferred to Waikato Hospital from Australia in early July 2009 for ongoing management of bilateral heel ulcers.

She was first diagnosed with hepatitis C viral infection in 2002 (genotype 1A). Her risk factors included previous intravenous drug use, previous blood transfusions, and tattoos. Her other comorbidities include insulin-dependent diabetes mellitus, hypertension and dyslipidaemia. She also had a previous right 4th toe amputation due to osteomyelitis.

She was treated with pegylated interferon and ribavirin for 48 weeks but was a non-responder remaining HCV RNA-positive throughout treatment. She experienced symptoms of depression during treatment for which she was started on SSRI therapy. She was noted to have oesophageal varices and moderate portal gastropathy on gastroscopy in October 2006. She underwent transjugular intrahepatic portosystemic stent shunt (TIPPS) for diuretic resistant ascites in March 2007, but subsequently developed recurrent hepatic encephalopathy which required hospitalisation.

Her workup pre transplantation involved extensive cardiac investigations which included an echocardiogram, CT angiogram, and a dobutamine stress echocardiogram. She underwent orthotopic liver transplantation-deceased donor for end stage liver disease secondary to chronic hepatitis C on May 22 2008 at the age of 42. Her pretransplant MELD score was 12. Her pre-transplant weight was approximately 86 kg and her BMI 34. She was HIV negative and isolated hepatitis B core antibody positive. She was cytomegalovirus (CMV) antibody positive (IgG and IgM).

She was suspected to have graft dysfunction which was confirmed on liver biopsy at day 6 post transplant which was managed by an increase in tacrolimus dose. She had then been subsequently maintained on an immunosuppressive regimen of tacrolimus and low-dose prednisone.

In the 7 weeks preceding her admission to Waikato, she was hospitalised in Australia with bilateral heel ulcers. These were managed with intravenous antibiotics and multiple debridements of the left heel with VACC dressings. Her most recent wound

swabs prior to departing Australia were unremarkable and antibiotic therapy was discontinued.

Her medications on transfer to Waikato included tacrolimus, prednisone, insulin, prophylactic low molecular weight heparin, carvedilol, omeprazole, simvastatin, oxycontin, felodipine, prazosin, atacand, neorecorman, and frusemide. On presentation to Waikato, she was noted to have left foot and right heel ulcers which did not appear infected.

On the third day of admission, the patient developed acute dyspnoea and flu-like symptoms. She was noted to be in pulmonary oedema and commenced on intravenous diuretics. On the 6th day of admission she deteriorated and developed worsening pulmonary oedema and commenced on low molecular weight heparin, aspirin, and clopidogrel with the presumption of a non-ST elevation myocardial infarct.

On the 8th day she became febrile with persistent flu-like symptoms and worsening hypoxia. A septic screen was conducted and oral augmentin was commenced to cover a lower respiratory tract infection. An urgent echocardiogram showed a mild global pericardial effusion with no evidence of tamponade and satisfactory left ventricular function. She subsequently developed acute on chronic renal failure necessitating urgent haemodialysis. An abdominal ultrasound showed evidence of ascites but patent portal vein, hepatic arteries, and veins with normal hepatopetal flow.

She further deteriorated and subsequently ventilated in Intensive Care Unit on day 11 with type 2 respiratory failure. She was hypoalbuminamic (albumin 17 g/L) and fluid overloaded. A suspicion of H1N1 was raised and nasopharyngeal swabs were taken with strict isolation precautions instituted.

She was commenced on a 10-day course of oseltamivir and 7 days of intravenous meropenem. She also commenced on mycophenolate and her tacrolimus dose was increased to 2 mg twice daily. Enteral feeding was commenced and haemodialysis was continued until her discharge from the Intensive Care Unit (ICU).

Multiple stool, urine, and blood cultures were negative. Bronchoscopy with bronchoalveolar lavage was performed but was negative for *Nocardia*, *Pneumocystis jiroveci*, and *Legionella* as well as CMV DNA, HSV DNA, and herpes virus 6 DNA—but positive for influenza A matrix PCR. Several days following her discharge from ICU, further testing revealed her to be positive for swine H1 PCR. Her most recent hepatitis C viral load is 14,325,442 IU/ml.

Following discharge from ICU, she was supported with nutritional supplements, and intravenous diuretics. She had persistent diarrhoea for which a flexible sigmoidoscopy to the splenic flexure was essentially normal. Mycophenolate was thought to be a major contributor to her diarrhoea and this was discontinued.

Her respiratory symptoms, diarrhoea, and renal function gradually improved over her subsequent clinical stay and she did not require further dialysis. She continued to be hypoalbuminemic, albumin levels ranging from 20 to 24 g/L with persisting peripheral oedema but was on high calorie nutritional supplements.

It was later found that her 3-week-old granddaughter (whom she met briefly at the airport on her arrival to New Zealand) had also contracted swine influenza and was hospitalised under the Paediatric Service at the same hospital. Moreover, the infant's

father had been unwell with viral symptoms prior to our patient's deterioration although not tested for influenza.

Discussion

This case report describes a case of H1N1 in a post liver transplant—a population of patients recognised to be at risk due to immunosuppression. The latest data from the New Zealand Ministry of Health (MOH) Pandemic HINI (Swine Flu) Updates recorded 2585 laboratory confirmed cases with 11 deaths nationwide as of July 24, 2009.[1]

It is recognised that the level of illness would be higher than the number of laboratory confirmed cases as testing is now done only in the management of severe cases. All 11 deaths had underlying comorbidities and up to July 24, 2009 73 patients are hospitalised with confirmed swine flu.

Swine H1N1 influenza—An outbreak of H1N1 influenza A virus was first detected in Mexico in late March and early April 2009 with confirmed cases in many countries within a few months.[2,3] In June 2009 the World Health Organization (WHO) raised its pandemic alert to the highest level, phase 6, indicating widespread community transmission on at least two continents.[4]

The pandemic was caused by H1N1 influenza A virus that represents a quadruple reassortment of two swine strains, one human strain, and one avian strain of influenza with the largest proportion of genes from swine influenza.[5–8]

Influenza in pigs was first recognised during the influenza pandemic of 1918 to 1919 and a swine influenza virus was first isolated from a human in 1974.[9,10] Between 1958 and 2005, 37 cases of swine influenza among civilians were reported.[9]

As of July 6, 2009, over 94,500 laboratory-confirmed cases had been reported in over 100 countries.[3] The WHO has ceased reporting the number of confirmed cases due to widespread community spread and surveillance has focussed on newly affected countries.

Whereas seasonal influenza is more likely to cause severe disease in infants, young children, and elderly individuals, pandemic influenza occurs disproportionately in individuals who are not at the extremes of age. From the period late March to late April, 87% of deaths and 71% of pneumonia requiring hospitalisation and intensive care occurred in patients between ages 5 to 59 years.[11]

Virology—H1N1 is the most common subtype implicated in swine and human infections. Other porcine subtypes include H1N2, H3N1, and H3N2—but human cases of swine H3N2 influenza virus have been rarely reported.[9] Pandemic H1N1 influenza appears to involve sustained human-to-human transmission, and isolates from the United States have been found to be genetically identical to isolates from Mexico, thus supportive of a human-to-human transmission.[12] The probable incubation period ranges from 1 to 7 days but the exact duration of viral shedding has not been established.[13]

Clinical manifestations—The signs and symptoms of influenza are similar to those of seasonal influenza i.e. fever, cough, sore throat, malaise, and headache, but infants, elderly and immunocompromised hosts may have atypical presentations. In a recent

publication, the most common risk factors for influenza complications were chronic lung disease, immunosuppressive conditions, cardiac disease, pregnancy, diabetes mellitus, and obesity.[14]

Pandemic H1N1 influenza A infections in elderly patients has been uncommon to date. Complications of H1N1 include severe pneumonia, respiratory failure, and acute respiratory distress syndrome.

Fatalities have included cases of bacterial coinfection and multiorgan failure.[15] In addition, increased rates of spontaneous abortion and preterm birth have been reported in pregnant women.[14]

Diagnosis—Diagnosis will be based largely on clinical presentation. To establish the diagnosis of pandemic H1N1 influenza A, an upper respiratory sample should be collected. In most individuals, routine collection of nasopharyngeal samples in primary care is not recommended.

Current MOH clinical indications for nasopharyngeal swab testing include patients with severe clinical influenza-like illness regardless of whether they are admitted to hospitals, hospitalised patients with upper or lower respiratory tract symptoms, and persons with influenza-like illness at high risk of influenza-related complications.[1] Testing is also recommended if there is a public health or infection control rationale—i.e. people who work in high-risk institutions or for the purpose of cluster identification.

A confirmed case of novel influenza A virus infection is defined as a person with laboratory confirmed H1N1 infection by one or more of the following tests: real time RT (reverse transcriptase) PCR for influenza A, B, H1, and H3.

Viral culture–Four-fold rise in novel influenza (H1N1) virus specific neutralising antibodies.[1]

Treatment—The vast majority of strains of swine H1N1 influenza A appear sensitive to the neuraminidase inhibitors, oseltamivir, and zanamivir but all strains tested have been resistant to amantadine and rimantadine.[4,16,17]

Treatment should be initiated as soon as possible and in patients who are clinically compromised therapy can be initiated even past 48 hours. As of 8 July 2009 three isolates of H1N1 influenza with resistance to oseltamivir have been detected.[18] Two of the three patients had been taking oseltamivir prophylaxis before becoming ill and all three isolates were sensitive to zanamivir and all three recovered without complications. No clinical studies have confirmed benefit of pre exposure or post exposure prophylaxis for H1N1 influenza infection.

Summary—This case report highlights a novel infection in a population recognised to be at risk of swine H1N1 influenza due to immunosuppression and complicating comorbidities.

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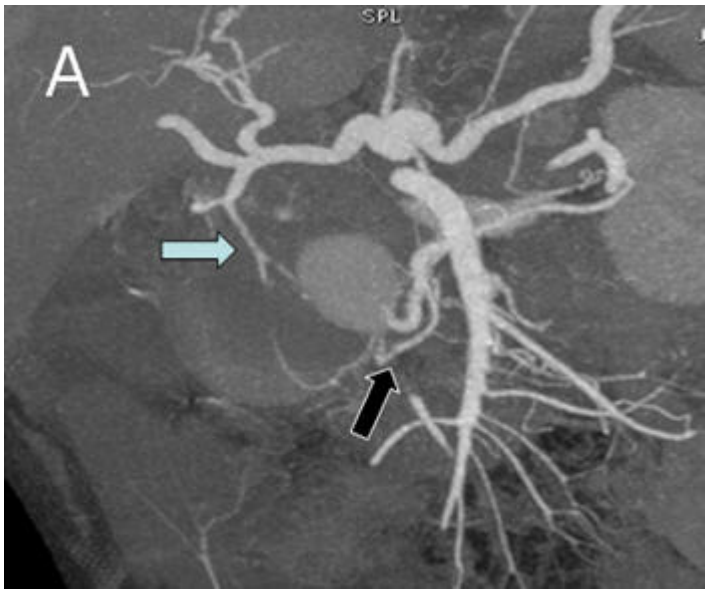
Combined surgery and repeated angioembolisation for a post-pancreatitis pseudoaneurysm

Mohamed Al Bashir, Abdullah Saleh, Ayman Saleh, Fikri M Abu-Zidan

Clinical

A 41-year-old man with AIDS and alcoholic pancreatitis pseudocyst developed abdominal pain and hypotension. Abdominal CT angiogram revealed active bleeding into a pseudoaneurysm, near the head of the pancreas, measuring 2.7×1.8 cm (Figure 1A).

Figure 1A. CT angio (A) revealing a pseudoaneurysm arising from the superior (white arrow) and inferior (black arrow) pancreaticoduodenal arteries



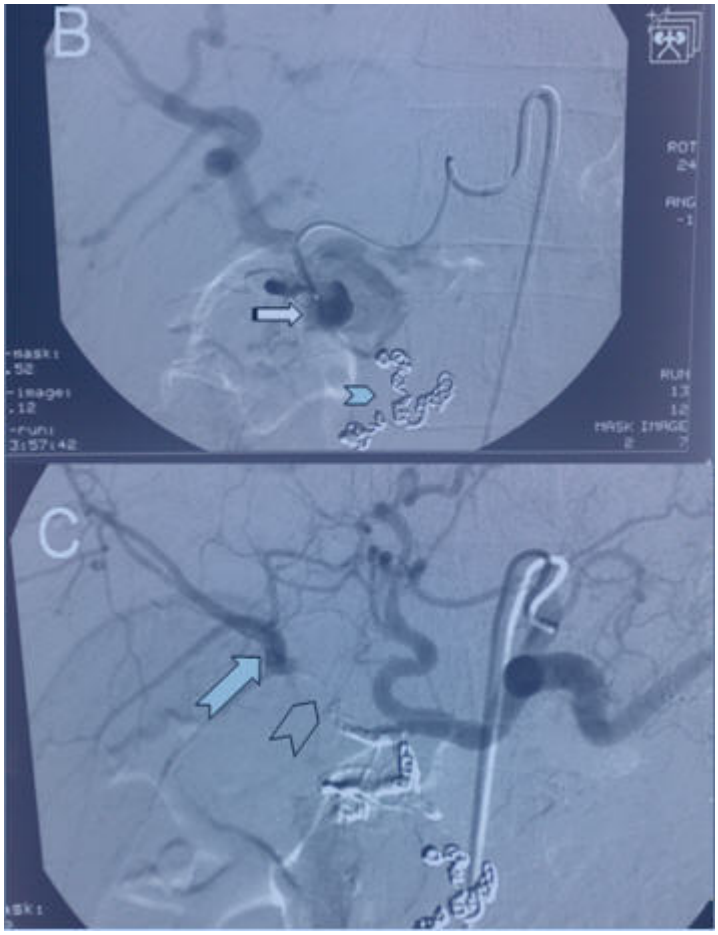
Superior mesenteric angiogram revealed active bleeding from the pancreaticoduodenal arcade. This bleeding area was then accessed through the hepatic artery and coiled distally and proximally. Bleeding stopped after the procedure.

Eight days later, the patient became hypotensive and dropped his haemoglobin level. He had an emergency laparotomy which revealed a 5 cm pancreatic pseudocyst with haemorrhage. The pseudocyst was opened through the medial wall of the duodenum, ligation of the bleeding intracystic vessels, and cysto-doudenostomy were performed. Postoperative course was uneventful and the patient was discharged home on postoperative day 16.

Five days later he was readmitted with haematemsis and anaemia. Coeliac angiogram revealed bleeding from the gastroduodenal artery which was embolised (Figure 1B

and Figure 1C). He died 5 months later due to HIV nephropathy without any evidence of rebleeding.

Figures 1B and 1C. Selective angiogram (B) through the gastroduodenal artery showing vascular blush (arrow) and coils of the previous angioembolisation (arrow head). Post angioembolisation of the gastroduodenal artery (C) without any evidence of bleeding. There is non visualisation of the proximal right hepatic artery (arrow head) with refilling of its distal part (arrow) through collaterals from the common hepatic artery



Discussion

Bleeding pseudoaneurysm within a pancreatitis pseudocyst has a high mortality.[1] Angioembolisation has a success rate of approximately 80%.[1] We think that rebleeding occurred because angioembolisation was highly selective the first time and rebleeding occurred more proximally.

A successful re-embolisation in a patient with pseudoaneurysm has been reported.[2]Angioembolisation is useful in the management of pancreatic pseudocyst with haemorrhage, and can be repeated if needed.

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A case of lumbodynia

Varun Dhir, Gautam D Chaudhary, Yogesh P Singh, Able Lawrence, Amita Aggarwal, Ramnath Misra

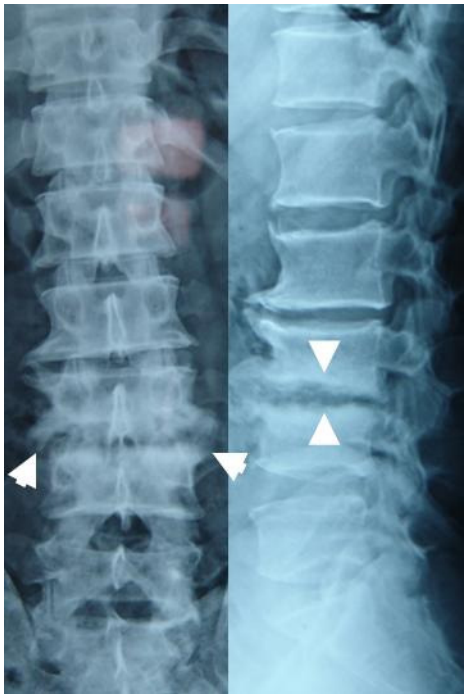
Clinical

A 55-year-old man who had recently been diagnosed with diabetes was admitted with a moderate fever, severe back pain, productive cough, and dyspnoea. There were crepitations in the left infrascapular area but no spinal tenderness.

Blood tests revealed a haemoglobin of 10.5 g/dl and a leucocyte count of 28,000. A chest radiograph showed left lower zone infiltrates and a lumbosacral spine radiograph showed degenerative changes (images not included). Blood cultures grew methicillin-sensitive *Staphylococcus aureus* (MSSA), and the patient was successfully treated with parenteral cloxacillin for 14 days followed by oral cloxacllin for 7 days.

He returned after 6 weeks with recurrence of back pain and increased fatigue. A repeat lumbosacral spine radiograph was obtained (Figure 1).

Figure 1. Lumbosacral spine radiograph

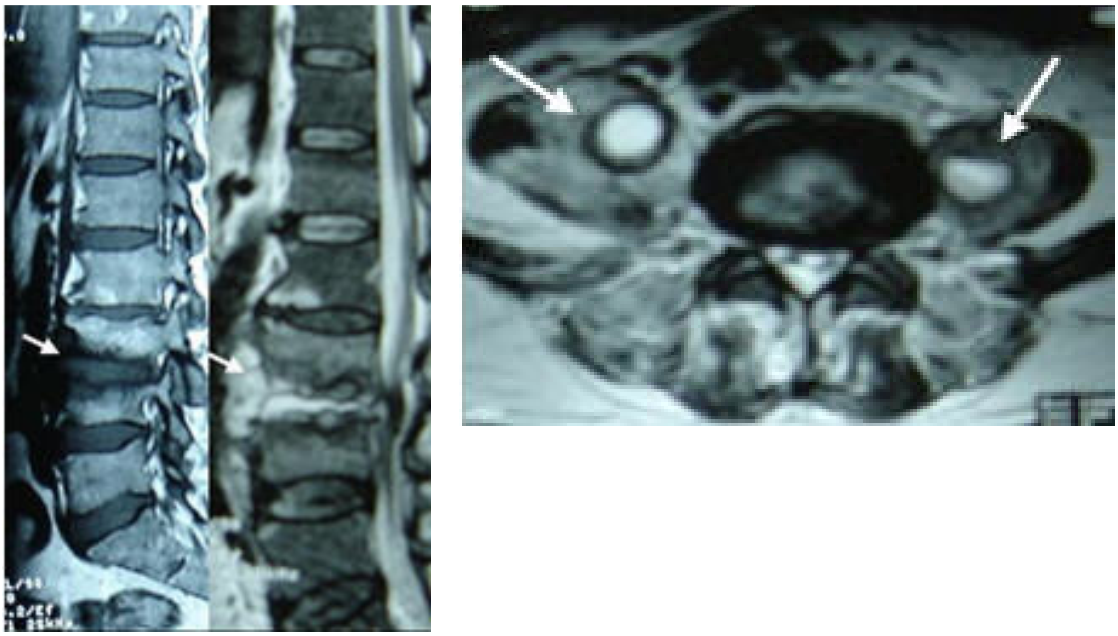


What is the diagnosis and how could it be confirmed?

Answer

Infective discitis and osteomyelitis. MRI of lumbar spine confirmed osteomyelitis, with large anterior collection and bilateral large psoas abscesses (Figure 2).

Figure 2. MRI images. Left: Coronal T1-weighted and T2-weighted images showing disc involvement, erosions and anterior collection (arrows). Right: Axial image showing bilateral psoas abscesses (arrows)



Under ultrasound guidance, 100 ml of pus was aspirated from the psoas abscess, which again grew *Staphylococcus aureus*. The patient required prolonged IV antibiotic therapy and repeated ultrasound-guided aspirations from the psoas muscle.

Discussion

Pyogenic osteomyelitis is the most common type of vertebral infection; however it is infrequent (1 case/100,000–250,000 population/year). It occurs most commonly as a result of haematogenous spread from a distant focus of infection. Large collections, especially those outside the spine, should be drained percutaneously.

Mortality is around 10% and about 15% of patients experience permanent neurologic deficits. Recrudescence of infection may occur in 2–8% of patients.[1–3] A high index of suspicion for spinal osteomyelitis and early MRI scanning in patients with pyrexia and back ache may lead to earlier diagnosis and treatment.

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President's Address (part 1)

Excerpts of a speech delivered at the Annual Meeting of the British Medical Association in New Zealand on February 21st, 1910, by James Purdy M.B.C.M., Hutt. Published in NZMJ 1910;8(33):1–14.

My first and most pleasing duty is to thank you for the honour you have done me in electing me President of this Association. I have next to offer to the visitors a most cordial welcome to this city of Wellington. We, the local members of the Wellington Division, extend you a hearty greeting; we are glad to see so many visitors present, and pleased to think that this Conference bids fair to be the largest attended of any yet held in the Dominion. All are welcome to this city; we hope you will enjoy your visit, derive benefit from the scientific fare, and pleasure from the hospitalities it has been our joy to prepare.

The position of New Zealand as an integral part of the British Empire is not to be measured by the standard of her present population. New Zealand numbers scarcely at million, yet she is capable of maintaining many millions. This Britain of the South has aptly been termed "The Fortunate Isles." Fortunate she is indeed in the possession of natural beauties of scenery unsurpassed for grandeur and variety by any other country in the whole world, a temperate and equable climate, the lowest death-rate (under 10 per thousand), and almost limitless natural resources.

The development of the country has been to a great extent the work of the people themselves. The majority of the white population is engaged in agriculture. The soil for the most part is naturally fertile.

The virgin bush country has been partly turned into lovely pasture land. Originally colonized by the best of British stock, who followed in the wake of the pioneers or screen of missionaries, whalers, and traders in the earlier years of the Victorian era, the descendants have enjoyed the advantages of a healthy environment.

Probably no other oversea dominion offers a better field for studying the effects of a healthy and natural environment on a people for the most part drawn from the British Isles. Whilst the country is probably too young to have developed a distinct type, yet it is already a matter of ordinary observation that such is being gradually evolved.

The important factor in the rearing of a healthy nation is the possession of a well qualified, well trained and conscientious medical profession. Although people come into this world and leave it, without the assistance of a medical man or woman, yet there is a percentage who could not arrive alive without such assistance; and according to the law of this as of other British lands no one who leaves it (except a Maori) is entitled to burial without either a medical certificate of death or a coroner's inquest.

Thus apart from accident and the occurrence of disease there is still even in this healthy country some employment for medical men.

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HPV (human papillomavirus) vaccine for both genders?

Infection with the HPV is strongly associated with the development of high-grade cervical intraepithelial neoplasia (CIN2+/CIN3+) and the subsequent development of cervical cancer in young woman. HPV vaccination of young females is well regarded.. This paper describes the use of human papillomavirus (HPV) 16/18 AS04-adjuvanted vaccine—said to be more immunogenic because of the addition of an alumium hydroxide combination. This international group reports that enhanced HPV 16/18 AS04-adjuvanted vaccine showed high efficacy against CIN2+ associated with HPV 16/18 and non-vaccine oncogenic HPV types HPV-31, 33, and 45. This is good news as these five types are responsible for more than 80% of all cervical cancers. An editorial is commendatory and points out infection with the oncogenic HPV types (mainly 16, 18, 31, and 45) is not only a prerequisite for cervical cancer, but also a primary cause for anal cancer, and contributes to a substantial proportion of penile, oropharyngeal and tonsillar cancers, all of which are predominant in men. Hence, immunise all youngsters—apparently this is already happening in some countries.

Lancet 2009;374;301–14 & 268–70.

Assessment of the severity of community acquired pneumonia (CAP)—what about the C-reactive protein (CRP)?

CAP is common and its severity determines how aggressively it should be treated. The pneumonia severity index (PSI) is cumbersome as it involves 20 criteria. On the other hand, the CURB and the CURB-65 score (confusion, urea >7mmol/L, respiratory rate ≥30 min, low blood pressure and age ≥65 years) have been popular because of their simplicity. That is what we said on this topic last year (*NZMJ* 28/11/08). At that time the discussion centred on simplifying the CURB-65 by dropping the blood urea and possibly the diastolic blood pressure. This time a research group are reviewing the utility of adding the CRP into the equation. They used a cut off level of CRP at <25 or ≥25mg/dl (normal <5) and demonstrated that adding CRP levels to PSI, CURB65, and CRB65 scales improves the 30-day mortality prediction. They showed that patients with a CRP ≥25 fared worse and died more often of their pneumonia irrespective of their CURB65 or CRB65 scores. Not an unexpected result.

Thorax 2009;64:587–91.

Coffee and the heart

In this paper the possibility that drinking coffee during the recovery stage after a myocardial infarction might be harmful. Hence this trial. Patients recovering from an infarction were randomised to receive regular coffee (caffeinated) or de-caffeinated coffee using a randomised controlled double-blinded design. Heart rate variability was assessed 5 days post-infarct to assess the effect of caffeine on autonomic

function. It was demonstrated that in the group randomised to regular coffee, parasympathetic activity increased by up to 96% ($P = 0.04$) after 5 days. However, coffee drinkers can relax as no detrimental effect of regular coffee on cardiac rhythm post-infarct was seen.

Q J Med 2009;102:555–61.

Statin-related myopathy

The 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors, or statins, have revolutionised the management of cardiovascular disease. When used appropriately they reduce the incidence of vascular events (coronary artery disease and strokes) by up to 25%. However, they can cause myopathy—myalgias, myositis, and rhabdomyolysis. Myalgias can affect up to 10% of persons prescribed statins, whereas rhabdomyolysis is rare. The cause is unclear but risk factors include high dosage and use of medications metabolised through cytochrome P450 3A4. Their views on management include switching agents or use of fluvastatin, low-dose rosuvastatin, nondaily dosing, and ezetimibe or bile acid-binding resins.

In the same issue a randomised trial of a "natural" alternative is reported. Sixty-two patients with dyslipidemia and history of discontinuation of statin therapy due to myalgias were assigned by random allocation to receive red yeast rice. 1800 mg (31 patients), or placebo (31 patients) twice daily for 24 weeks. The red yeast rice patients had a significant decrease in LDL cholesterol without an increase in blood creatine kinase or myalgia. However, the authors of this report are cautious and recommend medical supervision as all of the myopathies have been reported with this natural product. Also, I note that a chemical analysis shows that 1800mg of red yeast rice contains 6mg of lovastatin.

Ann Intern Med 2009;150:858–68, & 830–9.

Ocular inflammation treated with immunosuppressive drugs—any increase in overall or cancer related mortality?

This study involved 7957 US residents with non-infectious ocular inflammation, 2340 of whom received immunosuppressive drugs during follow-up. The immunosuppressive agents in question were antimetabolites, T cell inhibitors, alkylating agents, and tumour necrosis factor inhibitors. And the results after studying the cohort over 66,802 person years (17,316 after exposure to immunosuppressive drugs) were encouraging. Patients who used azathioprine, methotrexate, mycophenolate, mofetil, ciclosporin, systemic corticosteroids, or dapsone had overall and cancer mortality similar to that of patients who never took immunosuppressive drugs. In patients who used cyclophosphamide, overall mortality was not increased and cancer mortality was non-significantly increased. Their findings concerning tumour necrosis factor inhibitors, however, demonstrated an increase in overall and cancer mortality rates. They comment that these latter findings are less robust than the other findings.

BMJ 2009;339.b.2480.

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A design fault in New Zealand's health research funding system exposed by pandemic influenza

Much information on New Zealand's experience with novel pandemic influenza A(H1N1) in 2009 has been published. This information has covered data from various surveillance systems,[1–3] key epidemiological parameters,[4] virus characteristics,[5] and hygiene behaviour.[6] The Ministry of Health website has also provided regular and detailed updates on the pandemic as it has evolved in this country.[7] Further research is being commissioned by the Ministry of Health, notably an influenza serosurvey.

However, there have been no requests for investigator-led research proposals from official research funders or government agencies. Because of the importance of such research it is being carried out by the goodwill of health workers and academics. This situation contrasts with Australia where health research agencies have requested and funded rapid research proposals on pandemic influenza.[8]

Since pandemics may only occur a few times a century, rapid opportunistic research is vital. Valuable opportunities will be missed if researchers have to wait many months (sometimes more than a year) as part of the normal investigator-led research application and funding cycle. Indeed, many other surprise events of public health importance can occur (e.g. SARS epidemic, infectious disease outbreaks, earthquakes, floods, extreme climate events, chemical contamination incidents) for which rapid research may be highly appropriate. New Zealand is likely to learn more about emerging health problems if we have a mix of both commissioned and investigator-led research.

Consequently, we encourage the Health Research Council, Foundation for Research Science and Technology, and government agencies involved in health (e.g. the Ministry of Health, NZ Food Safety Authority, Department of Labour), to consider establishing mechanisms for rapid funding of research directed at fast moving events which may have major public health impacts.

Competing interests: Several of the authors have conducted funded research work on influenza and other emerging health threats. Most of the authors have also contributed voluntary time to responding to and investigating the current influenza pandemic.

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Comprehensive strategy towards delivering better communications and better health care to non-English speaking New Zealanders?

We are writing primarily in response to the original article by Drs Yang and Gray—*NZMJ* 2008;121(1282):15–28. *Bilingual medical students as interpreters—what are the benefits and risks?* http://www.nzma.org.nz/journal/121-1282/3273—on the issue of bilingual medical students as interpreters. In conjunction to this, we will also comment on some of the most recent papers concerning interpreting.

We are very pleased to read the observations and analyses of Drs Yang and Grey who have conducted the first such study in New Zealand giving us insight into one aspect of this complex issue deserving of further study and debate. We know this practice is taking place in hospitals and GP clinics across New Zealand. Now we have a better understanding of how prevalent it is and the impact on its practitioners. For that alone, we congratulate them.

Whilst fully aware of the pragmatic aspects of communication across language barriers, especially in emergency situations, we are strongly against the proposed guidelines as set out in the appendix.

Publication of such guidelines, as annexed, could be perceived as condoning the use of medical students as interpreters. This undermines the body of research which has demonstrated that the use of untrained interpreters poses unacceptable risks to patient care and to health heath care providers.[1–3] May we also append medical students to this list.

Medical students are there to learn the art and science of medicine, in all its myriad and diverse forms. The medical corpus, one would argue, reaches beyond that which the 6 years of curriculum can cover. Medical students who are charged with the responsibility of interpreting are diverted from the invaluable learning opportunities gained in ward teaching or other clinical education. Furthermore, given that students must juggle their autonomy, the interest of helping patients and pleasing their consultants, the paucity of refusal to interpret amongst medical students is hardly surprising.

While it would appear that bilingual or multilingual medical students might be much more suitable interpreters than hospital orderlies, cleaners or the patient's family members, they are not trained as interpreters and they should not act as interpreters, as engaging medical students or other members of the wider medical workforce as interpreters is counterproductive.[4]

The authors have also identified some of the reasons, the most pertinent being the lack of testing of language skills. Most if not all bilingual or multilingual students learn medicine in English, whilst their other languages are used in domestic or social contexts. The language they use as interpreters is likely to be simplified at best, and, though unintended, could be misleading or even simply incorrect.

Even if there were means and intentions to test medical students on their language skills, would this problem be solved? No. The authors have further identified that few medical students are aware of the Code of Ethics or standards required of an interpreter. Rather than training interested individuals on this specific, specialised area, it would be much more beneficial to devote resources towards training future doctors on how to communicate with non English speaking patients (NESPs),[5] especially in view of New Zealand's ever-changing demographics.

We are particularly appalled by the anecdote of medical student interpreting in the setting of a suspected NAI (page 18). This placed unacceptable risk on the medical student interpreting, the clinician eliciting the history and potentially jeopardised any future investigation. Handling of such cases would normally be conducted by senior registrars or consultants, in conjunction with members of MDT, and yet we rely on a medical student to interpret?

In addition, we note with serious concern that 14 (4 theatre, 1 ICU, 1 procedure, 8 consents) out of 63 interpreted communications involved complex explanations and/or consents. This especially put those involved, the medical student interpreter and the patient, at unacceptable risk, in the event of an adverse event. It is well known that inadequate communication is the main reason behind patient complaints.[6] It is therefore particular puzzling to see a lack of investment in communication.

Along the same vein, the questionnaire developed by Professor Windsor and his colleagues—*NZMJ* 2008;121(1286):92–9. *Telling the truth to Asian patients in the hospital setting*. http://www.nzma.org.nz/journal/121-1286/3378)—does perhaps facilitate patient care somewhat by documenting specific wishes of non-English speaking patients. But how will such information obtained? In the presence of family or their (undue) influence? This questionnaire should not replace detailed doctor-patient communications. Besides, would it be a binding document should the said medical encounter become the subject of an HDC investigation? Furthermore, we would find it improbable and unreasonable for any interpreter to confirm that the patient they have interpreted for has understood the questions. Patient understanding is not an HDC requirement, nor is it ever confirmable by a third party.

Professor Wilkinson (*NZMJ* 2008;121(1282):5–7. *The science of medical education.* http://www.nzma.org.nz/journal/121-1282/3263) rightly challenged the dogma asking whether use of interpreters has any effect on patient care. Whilst there has been no randomised control trial to date, a number of papers have demonstrated that medical consultations without the use of interpreters are more resource intensive with more and often unnecessary investigations and higher chance of involving medical errors.[5]

Without a doubt, there are interpreters who are poorly trained, untested and/or unprofessional. Dr Foggo—*NZMJ* 2009;122(1288):112. *Discussing end-of-life issues with Asian patients and their families*. http://www.nzma.org.nz/journal/122-1288/3446)—exposed the fact that there are interpreters who are less than professional potentially altering the tenor of end of life consultation.

Medical interpreters are not the silver bullet to improve non-English speaking patients' outcomes. But until the utopian circumstances where all migrant patients speak sufficient English for the purpose of medical encounters, properly trained,

tested, remunerated interpreters are the only means to minimise misunderstandings and unnecessary risks.

To conclude, there are many reasons why medical students are engaged as interpreters. One would suggest lack of awareness amongst clinicians of both the availability of interpreters, and of the potential risks would rank highly. In the GP setting, lack of dedicated funding for interpreting service is the main culprit as cited by Gray.

Drs Yang and Gray have clearly identified the need to address this. However, the annexed Guidelines are not the solution, even on a temporary or transition basis. A comprehensive strategy towards delivering better communications and thus better health care to non-English speaking New Zealanders is urgently needed. As the professional organisation for professional interpreters and translators, NZSTI would welcome future engagement on this discussion.

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THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

Tumbu and botflies: an underestimated nuisance for travellers in Africa and South America?

Recently an interesting case report[1] was published in the *NZMJ* about a botfly larva living in a traveller who returned from South America. Upon the patient's arrival in New Zealand, the living botfly larva had to be squeezed out of the patient's arm where it was happily feeding. In the discussion of that report, brief mention was also made of an equivalent African species.

I had the misfortune of being one of the victims of that species (tumbu fly—*Cordylobia anthropophaga*) while travelling in Kenya for 2 months in 1992 (no other health problems during my stay). Like the described case, I noticed a raised red boil-like lump on my arm 2–3 cm in diameter; I don't recall it being painful—just swollen, a little itchy, and noticeable. Thinking it was a developing staphylococcal skin infection or tropical ulcer (which I had experienced once before) my natural inclination was to squeeze it. However instead of pus, the head of a fly larva/maggot popped out and with continued even pressure the whole wriggling body eventually emerged (until that time I naturally thought that maggots only lived on dead tissue). Symptoms and all signs of the boil soon resolved once this parasite was removed.

After reading the case report[1] and information in Jane Wilson-Howarth's travel health guide,[2] I now consider my discovery and 'self-treatment' fortunate, since if left unchecked, symptoms (mostly itchiness but also pain) can worsen as the larvae grow larger; and if remnants of a larva remain after attempting removal then a nasty inflammatory reaction and infection is possible.[2]

Having said that I am told that, for the local populace, infestation with this fly is well known, quite common, and in most cases dealt with at home. This was confirmed by speaking to a neighbourhood family in New Zealand who lived in Malawi for several years. Tumbu fly (or putsi fly as it is known in Malawi) infested most of their family members at various times, often where the underwear waistband touches the skin. Even their pet guinea-pig was attacked (the fly feeds on both living mammals and humans indiscriminately).

They noticed the fly, an African relative of New Zealand's blowfly, was more prevalent in the rainy season—indeed, the fly is known to thrive best in certain hot humid regions of Sub-Saharan Africa.[2] As the adult fly lays eggs on clothing that is left hanging up to dry, they said they soon learned to iron all of their clothing thoroughly (including elasticised waistbands) to destroy the eggs that develop into larvae after contact with the skin of the host (I imagine a hot clothes dryer would be equally effective). However I doubt the average backpacking traveller would have the facilities or motivation to do this (not knowing about these flies), so, like me, they may be particularly susceptible to this form of parasitism.

It is suggested that petroleum jelly or oil is applied first over the 'two black dots'[2,3] (the breathing apparatus) on the surface of the boil, thus starving the larva of oxygen and driving it to the skin surface for easier removal.

Reading the health and travel information in my *Lonely Planet Kenya* guide prior to travelling to East Africa I don't recall seeing any mention of the tumbu fly; rather most health information was on the risk of mosquito bites causing malaria and yellow fever in particular, for which like most travellers I received antimalarial prophylactic drugs and a vaccination, respectively. Dealing with the most serious of illnesses is commendable, but I wonder whether the average traveller in tropical Africa would be more likely to be infected by the tumbu fly, as I was, and therefore some information should be added to the guides.

Checking recently published African and South American Lonely Planet guides,[4–8] I still couldn't find any mention of the tumbu or botflies (apart from a page in the specialised travel health publication *Lonely Planet Healthy Travel Africa* under the heading 'tumbu fly boils').[8]

Jane Wilson-Howarth's travel health guide has 2 out of 180 pages on the subject.[2] Her book describes how infestation by South American botflies *Dermatobia hominis* occurs via a mosquito vector and that non surgical methods for removal include using a used cigarette to poison them out with nicotine, using tape, and even laying strips of bacon over the boils to lure them out (apparently they love bacon).[2]

Lastly it occurred to me that technically a traveller bringing in a botfly or tumbu larva *in vivo* to the country is 'smuggling' in a living insect that could theoretically be a biosecurity risk to New Zealand upon its emergence. Indeed, Dr José Derraik (former senior human health adviser for MAF Biosecurity New Zealand) confirmed that occasional enquiries on this matter do reach the organisation.

In summary it seems that more could be written in travel guides about the threat of tumbu and botflies (especially since prevention and cure can be relatively simple if one knows how)—and better advice should be given to educate those travellers and health professionals from countries where the flies are not endemic.

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THE NEW ZEALAND MEDICAL JOURNAL
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Vaccinations (or lack of them) for student doctors

I am sending this letter to support the one sent to you by Lance Gravett.[1]

It seems totally stupid to think that young Drs can be lost all for the sake of a $40 vaccination.

I am sure that if it was available to students and they had to pay the $40 most would have it

Lyn Goddard

Reference:

1. Gravatt L. Informed choice—is the student doctor immunisation policy deficient? [letter] N Z Med J. 2009;122(1304). http://www.nzma.org.nz/journal/122-1302/3785

THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

Go and see

A Report by the Health and Disability Commissioner (HDC) (Case 08HDC04311) has criticised the management of a 2½-year-old child who was under the care of the Bay of Plenty District Health Board in 2007. The child died of asthma, having become much worse 16 hours after admission. A House Officer Dr B was held not to have provided the child with an appropriate standard of care. Having perceived that the young doctor was out of his depth, The HDC also held that the Board had to take some of the blame for putting him in that position.

The child, Master A, was seen as an outpatient by another specialist paediatrician for assessment of his asthma and food allergies. The medications used for his asthma were reviewed.

Four days later Master A was taken to Tauranga Hospital at 12.30 pm. On admission, he was seen by an ED doctor at 1.00 pm. He was most unwell. Heart rate 170/minute; respiratory rate 40/minute. Oxygen saturation 90%. Given salbutamol. At 2.15 pm, the child was seen by Dr E, whose status is given as senior house officer. At 9.30 pm, Dr E handed him over to Dr B whose status is given as paediatric house officer.

The course of the illness fluctuated. The treatment given to Master A was largely (but not entirely) Ventolin by inhalation, and much of the HDC enquiry was concerned with the dosage of this drug and the way it was administered.

The consultant Dr C was contacted three times by Dr E. The first call, at 2.15 pm, was 2½ hours after admission. The second time was at 3.45 pm, when he reported improvement. The third time was at 9.00 pm.

Dr B first saw the patient at 1.00 am, 3½ hours after handover. Heart rate was 145 pm, Oxygen saturation 97%. The child was unwell. He phoned the consultant at 3.30 am. Although it was claimed in a media report that he omitted key information about the medication, Dr B did tell Dr C that the heart rate was 170/minute, which was exactly what it was on admission 15 hours previously.

From this conversation Dr C “formed the impression that the patient had got worse then begun to improve.” She “detected no clues to indicate that he [Master A] would not continue to follow the usual course of improvement seen after the institution of appropriate therapy…overall the information provided led me to conclude that I did not need to attend at this time.” (She says that she did offer to do so.)

At 4.30 am, Dr B rang Dr C once more, very worried. She arrived at the hospital ten minutes later, having learned that things were going seriously wrong. The HDC enquiry found Dr B in breach of that part of the code of patients’ rights that states that “every consumer has the right to have services provided with reasonable care and skill.”

That right, as I see it, includes the right to a sound consultant opinion, since every inpatient is placed under the care of one specialist or another. A telephone conversation is a two-way street, with obstacles sometimes occurring on one or both

sides of it. In the case under discussion the consultant was contacted by telephone five times over the period of the admission, and she did not see the patient until he was terminally ill.

Dr John Doran, a specialist paediatrician, supplied a report (Appendix A). He wrote, "It is extremely important that the consultant on the case is aware of the level of competence of the junior staff they are working with and factor that into their decision making."

This comment takes us to the heart of the matter, and it should have been the main focus of the investigation.

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Retired GP
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THE NEW ZEALAND MEDICAL JOURNAL
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Owen William Lee Dine

MBChB, QSM (22 April 1930 – 11 May 2009)

The Napier Medical Community lost a very well known and highly esteemed member in May with the sudden passing of Dr Owen William Lee Dine.

Born one of five sons of Napier car painter Bill Dine and wife Ethel, he showed an early interest in matters medical, joining the St John Ambulance Brigade at the age of 9. Owen was raised in Napier attending Te Awa and Napier Boys High School, before going onto Otago Medical School in Dunedin from where he graduated in 1956. After 3 years as a House Surgeon at Rotorua and Napier Hospitals, Owen established a general practice in the Napier suburb of Westshore in 1958. The practice grew to be, at one time, the largest in Napier, with on some days over 100 patients being seen. Obstetrics was a forte of Owen's practice and he quite literally had a hand in delivering over 2000 Napier babies before retiring from this discipline in 1990.

It was thus little surprise that he developed a reputation as the areas most industrious doctor and one who displayed a caring and concerned approach to his patients. Speaking of his colleague at Owen's funeral, Dr Peter Foley, Chairman of the New Zealand Medical Association, stated that "Dr Dine was a Gentleman Doctor who was the epitome of the Old Fashioned GP always available and totally dedicated to his patients."

Owen was a strong advocate of General Practice. He felt strongly that it was the most cost-effective means of delivering health services, particularly as successive Governments have tried to contain the cost of health. He was a staunch promoter for attracting competent and caring generalists to the profession.

In addition to his own practice Owen was Doctor to the Salvation Army Hillcrest Home and later to the Omahanui Village. He was Honorary Surgeon and Doctor for St John Ambulance and served as doctor to the Girl Guides, the Napier Addiction Centre, Surf Life Saving, and other groups.

Owen was a former President of the New Zealand Medical Association's Hawke's Bay branch and for 16 years was a member of the Branch Disciplinary Committee serving as President for much of that time.

Owen received many awards for his contribution to the Napier Community including a Shield of Appreciation from the Salvation Army in 1984, Napier City Council Community Services Award in 1993, and the Queens Service Medal (QSM) in 1997 for Public Service.

In 2002, he received a New Zealand Medical Association Award for his contribution to the Hawke's Bay Medical Fraternity and wider Community over his 43 years in general practice.

On retiring in 2001 at the age of 71, Owen devoted the rest of his life to his other major passion, being local history. He had planned to publish a book on the history of the Petane District (area in which his practice covered) later this year, which his family now plans to complete on his behalf.

Owen died on May 11 the day after he and his wife Margaret celebrated their 51st anniversary of their wedding at Napier's St Paul's Presbyterian Church, where his funeral was held on May 15.

Owen is survived by his wife, daughters Elizabeth and Heather and sons Malcolm and Andrew, and 11 grandchildren.

Obituary written by Andrew Dine, youngest son of Owen.

THE NEW ZEALAND MEDICAL JOURNAL
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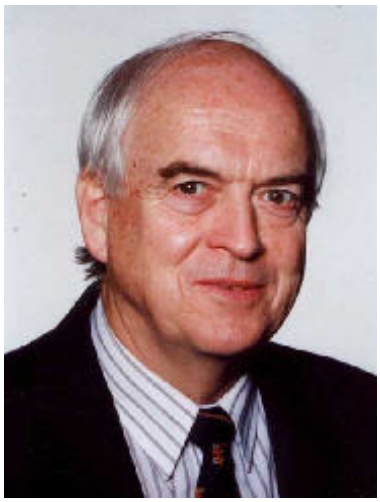
William Copland Shirer

MB ChB (NZ), FRCS (Eng), FRACS; 17 December 1927 – 6 June 2009

Bill was educated at Wellington College before moving to Victoria University for Premed then Dunedin to complete his medical studies.



Following an internship at Wellington Hospital from 1953–1955, Bill moved to London for further training before returning to Wellington as a Cardiac and Vascular Surgeon. From 1964–95, Bill was Consultant General and Vascular Surgeon and pioneered Vascular Surgery from infancy to its own speciality. He was Founding Chairman of the NZ Society Vascular Surgery. From 1995 to 2000, Bill went into private practice at Wakefield Hospital and was a Foundation Committee Member of that Hospital. Before his illness (motor neurone disease), he assisted at Wakefield Theatre and ran a clinic for leg ulcers for the Home of Compassion as well as researching leg ulcers and the efficiency of Leg Calf Pumps.

Bill's father was WF (Bill) Shirer who graduated from Otago Medical School in 1923 and worked as a house surgeon at Wellington Hospital until he took over a practice in John Street, Newtown. The Shirers lived above the surgery from 1924 and Dr Shirer Snr ran a large solo practice. In 1946 he was attending 250 deliveries a year and seeing 60–70 people a day.

The constant intrusion on the Shirers' private lives and the desire to experiment with what was then a new concept—a group practice—led them to move house. The upstairs was turned into a flat and the downstairs became John Street Doctors, Wellington's first group practice. His son, Bill Shirer, studied the practice for his medical school thesis. Bill's Wellington College class of "6A 1945" had 16 in the class; 5 received scholarships, 5 were on the credit list. Five became doctors (all surgeons); Ivan Cheer in Optical, Ron Hayward in Cardiac, Ray Windsor also in Cardiac, Frank Kwok in ENT, and Bill of course in Vascular.

Following Bill's death, the Wellington College Old Boys Association (WCOBA) received some moving correspondence from fellow classmates; in particular Bob Balchin who has been in communication between the classmates of Bill and subsequently Ron Hayward (see obituary in the same issue) who passed away a few days later.

Bill wrote or cowrote several published articles over the years including one on carotid endarterectomy for the *NZMJ*. Despite his illness, last year he managed to write and submit two articles to the *NZMJ* (unpublished): "Pasteur to politics" and "The diagnosis and management of leg ulcers."

Reprinted courtesy of WCOBA after minor changes and additions.

THE NEW ZEALAND MEDICAL JOURNAL
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Ronald Hamilton Hayward

7 November 1927–16 June 2009

Ron Hayward died in a Temple, Texas hospital. He had lived in the United States for many years.

He graduated from Wellington College in 1945 and Otago Medical School in Dunedin in 1951. He was a resident surgical officer in 1955 at Dunedin Hospital, becoming a Fellow of the College (the youngest at that time) and also did a Fellowship at the Mayo Clinic in Rochester, Minn. He received the Alumni Award for Meritorious Research and his PhD in surgery from the University of Minnesota and completed his training in cardiothoracic surgery.

In 1964, he accepted a position at Scott & White Clinic in Temple and began a new field of cardiac surgery for the institution.

He became the head of Department of Surgery, 1976–1989, and was elected to the Clinic Board of Directors.

He served as a Professor and Chairman of the Department of Surgery at Texas A&M College of Medicine, 1979–1989. He formally retired from practice in 1993. He wrote a book on the many archetypal concepts held by the human kind titled *Mind, Self, and Spirit. Exposing Immortal Images* (http://mindselfandspirit.com/)

Dr Bill Brabazon, who was in the same year as Ron at Otago, said that over the years there were regular class reunions, with Ron returned from Texas for at least two of them. Bill recalls: “At one of these, back in the 1970s, he amazed us with an account of the then-heroic cardiothoracic operations they were doing at the Scott and White Clinic.”

He was preceded in death by a son, Gregory Wells. Survivors include his wife Elizabeth of nearly 48 years; three children, Maureen Venable, Whitney John Hayward and Jennifer Bates; and five grandchildren.

Reprinted courtesy of WCOBA after minor changes and additions.

THE NEW ZEALAND MEDICAL JOURNAL
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Erratum

Melody Oliver—an author in article *Pacific Islands Families: Child and Parental Physical Activity and Body Size— design and methodology* published in NZMJ. 3 July 2009, Vol 122 No 1298; http://www.nzmj.com/journal/122-1298/3687 and http://www.nzmj.com/journal/122-1298/3687/content.pdf—advises the following:

> Unfortunately there was an error related to the number of participants invited to and involved with this study, and therefore a key error was the incorrect reporting of the study response rate. As further manuscripts are currently being prepared, we would like to be able to reference the article with the correct figures.

Please refer to the above links to view the corrected article.

THE NEW ZEALAND MEDICAL JOURNAL
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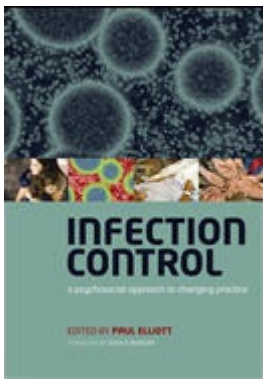
Infection Control: a psychosocial approach to changing practice

Paul Elliott, editor. Published by Radcliffe Publishing Ltd (Abingdon, UK), 2009. ISBN-13: 9781857756128. Contains 280 pages. Price £24.99 or US$45

This textbook on Infection Control is different from the usual authoritarian texts on what to do. It is an important book worthy of the readers' full attention.



The Editor of the book is one of the main authors. He is joined by a number of co-authors, who each analyse the subject from different perspectives.

The co-authors consist of a nurse consultant in Infection Prevention and Control, consultants in Medical Microbiology, a senior lecturer in Law and Criminal Justice, a senior lecturer in Social Work and a professor of Drama in Education. In turn they analyse the subject of "adherence" or "non adherence" to Standard Precautions. Their analyses are well referenced.

The book provides methods of analyses behaviour and explores the reasons why certain behaviours prevail in relation to psychosocial or psychometric factors. One author defines and relates it to a clinical setting. He reflects on the complex reasons why health care staff may not comply with Infection Control policy and procedures, ranging from their personal beliefs, how they are taught, to other events in their lives and the motivation of the individual.

The book caught my interest almost immediately. It made me aware of the importance of bringing the psychosocial aspect into focus when teaching Infection Control. It also made me reflect over the legal aspect of our behaviour and decisions during the provision of health services.

The language is strong at times and more pointed than we are used to, using terms like "breaching of statutory duty" and "criminal liability for healthcare-acquired infections." The chapter on how clown-doctors could help in facilitating safe infection-control was a beautiful contrast to the more stern sections.

It is a well written, entertaining book easy to read, and a valuable contribution to any discussion about Infection Control. It provides thoughtful information for all health care staff and managers of health services.

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THE NEW ZEALAND MEDICAL JOURNAL
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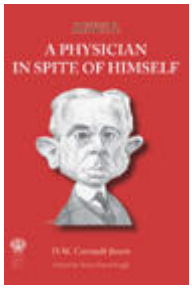
A Physician In Spite of Himself

DW Carmalt Jones (autobiography), edited by Brian Barraclough. Published by Royal Society of Medicine Press Ltd, July 2009. ISBN 9781853159053. Contains 268 pages. Price £35.00

This is the autobiography of Dudley William Carmalt Jones (who used the monogram CJ to sign his drawings and some published work).



On Christmas Eve 1919 he signed a contract with the University of Otago to become the first Mary Glendining Professor of Systematic Medicine, and for the next 20 years his tenure was marked by great improvement in the teaching of medicine. CJ chose his title from Mollier's (1666) "Le Medicin Malgre Lui" (the reluctant doctor), reflecting that when he was admitted a Member of the Royal College of Physicians, and appointed Casualty Physician at St Mary's he had become an embryo physician malgre moi.

Mary Glendining, the widow of businessman Robert Glendining gave 8000 pounds (equivalent to 320,000 pounds in 2007) to the University of Otago to endow two part-time chairs in medicine and one part-time lectureship in medicine. The Government matched the gift pound for pound.

In England senior hospital medical staff had been private practitioners acting as unpaid consultants to the residents. On repatriation, CJ found that his small pre-war practice was gone, and not relishing a return to that way of life, he aspired to join a "Clinical Unit". About that time, five London Hospitals established "Clinical Units" with paid staff, but since his Westminster Hospital was not one of them he went to Oxford to ask Sir William Osler if the unit system was likely to spread. Osler responded, "Oh, you want an appointment of that kind. Do you mind going abroad?" "Well there is an appointment going in New Zealand (NZ)", and he went on to speak very highly of the New Zealanders, and of their hospitals which he had visited during the war.

When the three Otago posts were advertised in the UK, Australia and NZ, CJ applied with the expectation that there must be a large department of Medicine there, but grounds for disappointment soon became apparent. "I had not so much as a peg of my own on which to hang my hat."

We are indebted to Brian Barraclough for garnering from far flung sources CJ's vibrant, penetrating, colourful descriptions of his background, education, life and times, the freshness of which reflect his education, familiarity with the classics, and acute perception. The editor's footnotes are a feature, providing lively guidance to the conventions, personalities, relationships, and jargon of bygone times.

There is something here for everyone. He considered his service at a shell shock centre in World War 1 as, "the most useful clinical work I ever did," and in an appendix the editor explains how the forces' unpreparedness for the psychiatric neurosis casualties caused a serious loss of front-line troops.

At first his family history appears daunting, but later it enlightens his tolerance, good manners, values, and challenges. UK readers will gain pleasure from his descriptions of Uppingham school, Corpus Christi College Oxford, the London Hospital environment at the turn of the century, and his work with Almroth Wright, "Who was the greatest intellectual influence under which I have ever come". "The personality which keeps a team of young men out of their beds as a regular thing till long past midnight is a remarkable one, and it was exercised in a remarkable way. I never heard Wright give an order, or ask a favour that any kind of work should be done. The work was there, and no one asked any questions, but just got on with it."

On arrival in NZ, CJ was met by a bevy of notables and great hospitality from Dr, afterwards Sir James Elliot, "And as I have many times told Lady Elliot, the dinner she gave us remains in my memory, after 6 weeks at sea, as the best I have ever eaten". "On Sunday he took us all to his country house up the Hutt River, where we got into the native bush for the first time. Little houses of this kind are very frequently used in NZ, I think perhaps particularly by doctors."

He was forcibly impressed by the amount of sunshine in NZ, the extraordinary clarity of the atmosphere, and the sombre character of the evergreen native bush. "NZ is a country of great beauty," he said but, "it is not "pretty" but "fine", and "grand" and "magnificent" are rather the epithets that come to mind when its landscapes are in view. Some of it is very monotonous and even repellent."

In Dunedin he did not meet with universal support, though he found his professional colleagues were always with him. When he and Dr Frank Fitchett, an Edinburgh graduate who held the chair of Clinical Medicine were called upon to submit a scheme for the teaching of medicine the differences between Scottish and English teaching traditions became apparent but, "Never once in all those years did Fitchett allow any friction to arise. I think there are few people of whom as much could be said".

His deliberations about the role of the University are premised on the argument that all higher education must have a bearing on two separate objects, culture and vocation, and he found the contrast between Otago and Oxford arresting, concluding that, "The two institutions are called upon to discharge very different functions". On the intellectual side the emphasis at the old English Universities was traditionally on culture and some impatience was displayed with any insistence on vocational interests. University lives were devoted to pure scholarship and young men came to know that scholarship was a reality and had its value.

In NZ he found that conditions were quite different, the university's first duty was vocational, any scholarship that it could convey had to be thrown in as a make-weight, and many students were frankly unconcerned about it. "And the longer and more exacting vocational studies become, the less interest is taken in non-compulsory decorations".

On holiday CJ read Homer's Iliad in the Greek, and on the voyage out he read Macaulay's history.

In NZ he found that anyone taking a class of students would meet a body of young people who were genuinely keen to get qualified and he found that these students, both men and women, usually made capital house physicians after a very few week's

practice. “They are very dependable, their work is seldom neglected, and they are as keen as can be on their clinical, bedside work: no doubt this is the result of responsibility”. NZ students, who often came from working class homes and farms, had shared the work that artisans do for a living, knew more about family budgets than English students, and were a good deal closer to the hard facts of life than were their opposite numbers in England

His experience of working-times reform was confined to the effect on the Fernhill Club (of which he was the president) of the “forty hour week”, which had “recently been introduced by the government, together with a steep rise in the rates of pay of most employees, including club servants, and adjustments are not easy to make”.

Anglers and Southlanders familiar with Five Rivers will enjoy CJ’s fishing expeditions and descriptions of the little up-country township where he stayed. “It consists of one little street of the essential shops, butcher, baker, draper, and the rest with “COMMERCIAL BANK” across the front of a tiny shack which will hardly carry the name-board. His lodgings there were unpretentious, and the “sanitary arrangements, fortunately outside, must be maintained in pious memory of Captain Cook, who certainly might have designed them”. Nonetheless the bed was comfortable, the food was excellent without stint, and if the evening rise had been prolonged, and the fish had taken well and you came home hungry long after hours, there would be a meal ready for you in 10 minutes. “I have fed in Government hotels where the waitress looked as if she would have much preferred to sit at the foot of the Guillotine than to attend to my small requirements.”

These fragments from this outstanding publication ill serve the extension of CJ’s reach, his fluent honest expression, the sincerity with which he reports on NZ, and the modesty with which he assesses his contribution to Medicine and the Otago Medical School. Throughout this book his cultural decorations sparkle in the adopted sunshine, but his etchings are not displayed.

In bringing CJ’s writings together, with illustrations, footnotes, appendixes to the text, his verses, trout fishing terms, a chronology of the life, a record of the published and unpublished work, memorials, and an outline of the history of the Chair of Medicine Dr Barraclough has edited a book that should be in every library. It provides gripping reading for those interested the history of Otago University, Medicine, and NZ medical education, and a sympathetic, charming record of NZ life, landscape and people as seen through the eyes of a discerning English newcomer in 1919.

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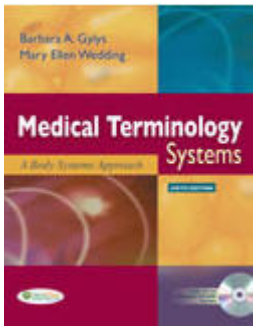
THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

Medical Terminology Systems (6th edition)

BA Gylys & ME Wedding. Published by F.A. Davis Company, 2009.
ISBN-13: 9780803621459. Contains 608 pages. Price USD $54.95

This is a textbook focussing on the make-up of medical words. Its purpose is to help students learn medical terminology so that they can communicate effectively with other members of the healthcare team.



The first chapter breaks down the medical vocabulary into the four basic word elements: word roots, combining forms, suffixes, and prefixes.

It explains how a medical word can be "built" if one has a thorough knowledge of the basic elements.

Chapter 2 and Chapter 3 provide a list of common medical suffixes and prefixes and the suggestion is that these can easily be combined.

Medical terms, however, are not always so simple and there is often no explanation as to why the Greek prefix is used in one situation and Latin in another. For example, using "word-building" the student is unable to determine whether the term for removal of the kidney is "nephrectomy" or "renectomy". This is what Chapters 5 to 15 are aimed at. These provide an introduction to basic anatomy, physiology, and clinical medicine according to specific body systems but with a focus on the terminology. Unfortunately, some of the clinical information is incorrect, or at best outdated, and the full-colour illustrations are attractive but not always accurate.

The book contains self-assessed learning exercises and is supplemented by an audio CD, to help with pronunciation, and a CD-ROM containing interactive resources.

Traditionally, one's medical vocabulary is acquired over a number of years. This book achieves its aim of teaching medical terminology but I am uncertain of the benefit of systematic rote learning of medical words.

The book lacks the necessary detail to be of use to a practicing doctor. It is more suitable for medical students, nurses and allied health professionals and provides an easy-to-read introduction to clinical medicine.

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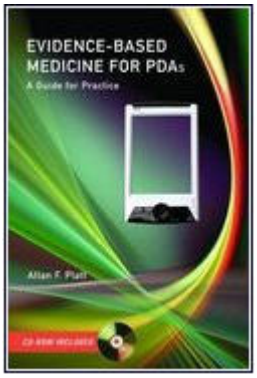
THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

Evidence-Based Medicine for PDAs

Allan F Platt. Jones and Bartlett Publishers, 2009. ISBN: 9780763754761.
Contains 193 pages. Price USD$38.95

Imagine a world where the sign of a doctor is no longer a stethoscope, but a PDA. Well, Allan F Platt can and has written a book to further his vision.



The presumptively titled paperback "Evidence-based Medicine for PDAs" is really a "Medical PDAs for Dummies"; do not expect an education on how to calculate likelihood ratios on your PDA. Rather it is a step-by-step guide to fully utilise the power of PDA in your clinical practise. Like most first-time authors writing on their passion, Platt spends the first 10% of the book explaining why he has written it. But once past that formality he reveals a work of true value. Platt starts with a clear and impartial appraisal of different types of PDAs on the market, and gives useful guidelines on how to select one.

The following chapters explore the myriad of commercial programs that can be used on a PDA. The reader will appreciate the way these programs have been sorted and grouped—e.g. a chapter focuses on programs that aid differential diagnoses whilst another describes different textbooks that can be found on the PDA.

Throughout the book, Platt identifies the market leaders, gives plenty of screen shots to illustrate how each program would be used, and gives case histories that apply these programs for further understanding.

This book is not a text on evidence-based medicine but rather a clear and thorough description on how a PDA can empower a clinician's practise. Anyone considering entering the 21st Century should read this first; and then decide whether they want to treat patients with one hand on their PDA or the time-honoured way.

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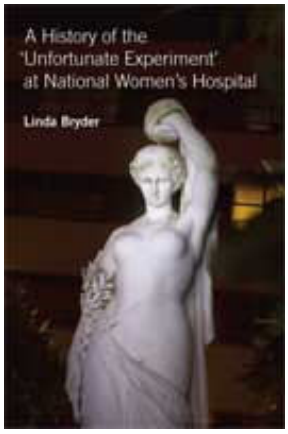
THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

A History of the 'Unfortunate Experiment' at National Women's Hospital

Linda Bryer. Published by Auckland University Press, August 2009.
ISBN 978186940435. Contains 264 pages. Price $45

The book by Professor Linda Bryder about the history of National Women's Hospital is an important contribution medicine in New Zealand.



It describes the context of the work done by Associate Professor Herb Green during the 1960s and 1970s when there was a lot of uncertainty about the significance of abnormal smears but, in 1988, the Report of the Committee of Inquiry stated that the entire medical profession had failed in its duty—a judgement that was retrospective, based on selective information and a lack of an accurate historical context. The consequences of this condemnation have been profound—initially many unnecessary operations for women with abnormal smears; generally defensive medicine; the muting of the medical voice and exclusion from leadership of the health service. National Women's has been decimated.

I hope that all doctors will read this book with an open mind. The public response from some members of the Faculty of the University of Otago has been disappointing, with personal attacks on Professor Bryder, of denial of the history that she presents in her book and, apparently, no interest in new knowledge.

It is ironic that these same people owe their careers to the work that was done by Herb Green in his observational study with his meticulous records and reports.

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